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# A Multi-Dimensional Framework for Adopting Physical Address System in a Developing Country

A

Doctoral Thesis

by

Jeofrey Ditsela
(BSc. IT Comp Eng., BSc Hons., MSc. Eng.)

*In fulfilment of the requirement for the degree of*

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WITS
UNIVERSITY

Division of Information Systems
School of Economic and Business Sciences
Faculty of Commerce, Law and Management

Supervisor:

Prof Ray Kekwaletswe

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# ABSTRACT

This thesis is about the adoption of an Information System (IS) at a country level. Information Systems literature addresses adoption of IS at an individual level, organisational level or national/country level. Each level of analysis has its own complexities. However, literature acknowledging these varied complexities has not been forth coming. That is, literature has more studies done at either individual or organisational, and hardly at national or country level. This thesis argues that the adoption of an information system (also referred to as an innovation) at country level is a multi-dimensional and multi-level phenomenon. Existing literature and previous studies have hardily addressed fully, this complexities and multi-dimensionalism, although it has been noted that countries experience and internalise the innovation adoption, as a social process, differently. The study was on a developing country adopting a Physical Address System (PAS), herein seen as an IS innovation. In this thesis, PAS is seen as a social system comprising of artefacts (digital and visual representations), physical world, residents and organisations as stakeholders.

The goal of the study was to conceptualise a multi-dimensional framework for adopting a Physical Address System, in the context of a developing country. Since the thesis argument is that the adoption of IS at a country level is even more complex, varied theories were employed as lenses to tackle the various aspect of the study. These lenses are the Diffusion of Innovation, the Stakeholder Theory, Upper Echelon Theory and the Contextualist Approach.

Following the interpretivist philosophy, a case study was employed as a research strategy, using Botswana as a developing country case. The research design included semi-structured interviews with stakeholders, observations, policy documents. The data was analysed, discussed, synthesised and interpreted using thematic framework analysis method. Informed by the empirical evidence and the existing literature, this thesis conceptualises that the adoption of the Physical Address System ought to be done sensitive to the developing country as a multi-dimensional social system. This multi-dimensional social system includes the roles of stakeholders, determinants of innovation and context.

The contribution of the thesis is in four folds; theoretical, methodological, practical, and contextual. Theoretically, the thesis conceptualised a multi-dimensional framework for the adoption of the Physical Address System in a developing country. Methodologically, the thesis contributed by following an interpretive philosophy and a case study as appropriate for understanding the complexities of adopting an information system, employing a case. Practically, the thesis, through the framework, may inform practitioners with ways to adopt a physical address system. Contextually, the thesis gives insight into the uniqueness of a developing country adopting an information system.



**Keywords**: Developing Country, Adoption, Physical Address System, Stakeholder Theory, Upper Echelon Theory, Diffusion of Innovation, Context

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Besides my Supervisor, I would like to thank the rest of my research group at University of Witwatersrand for their encouragement, insightful comments, and hard questions about the research. I still reflect on the stimulating discussions, the sleepless nights we were working together before deadlines, and for all the fun we have had in the last three years. Also, I thank the study participants during data collection for their time, the support and encouragement they showed to me on this research topic. I would have made a big mistake to forget to thank anyone who in anyway impacted on this research

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## DECLARATION

I, **Jeofrey Ditsela**, declare that this thesis is my own original work, except as indicated in the acknowledgements, the text and the references. It is submitted in full fulfilment of the requirements for the degree of Doctor of Philosophy (PhD) at the University of the Witwatersrand, Johannesburg, South Africa. It has not been submitted before, either whole or in part, for any degree or examination at this or any other university.

Signature:

Signed at ……

On the …….. day of …… 2017

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## *PEER-REVIEWED RESEARCH PUBLICATIONS ARISING FROM THE STUDY*

Ditsela J, Coetzee S and Copper AK, 2011. Proposed criteria for the evaluation of an address assignment scheme in Botswana. *AfricaGEO Conference,* 31 May-02 June 2011. Cape Town, South Africa.

Coetzee S, Cooper AK, and Ditsela J, 2011. Towards good principles for the design of a national addressing scheme. *25th International Cartographic Conference,* 3-8 July 2011. Paris, France.

Ditsela, J. 2014. A Stakeholder Management framework for a Physical Address System. Presented at the *SEBS Postgraduate Conference*, Johannesburg, South Africa, 18 - 19 September 2014

Ditsela, J. 2015. Organisational innovation: a multi-dimensional adoption framework of the physical addressing system for a developing country. Presented at the *SEBS Postgraduate Conference*, Johannesburg, South Africa, 1-2 October 2015

Ditsela, J. 2015. Locational positioning of the Public Health Facilities: Discussion of the DHIS Data. Presented at the *Geographical Information Systems Health Seminar.* Pretoria, South Africa. 21 September 2015

## ACRONYMS

| | |
|---|---|
| *BHC* | *Botswana Housing Corporation* |
| *BITRI* | *Botswana Institute for Technology Research and Innovation* |
| *BPC* | *Botswana Power Cooperation* |
| *BUIST* | *Botswana International University of Science and Technology* |
| *DSM* | *Department of Surveys and Mapping* |
| *GCC* | *Gaborone City Council* |
| *MLGRD* | *Ministry of Local Government and Rural Development* |
| *MLH* | *Ministry of Lands and Housing* |
| *MTC* | *Ministry of Transport and Communication* |
| *NGO* | *Non-Governmental Organisation* |
| *REIAC* | *Real Estate Investment Advisory Council* |
| *REIB* | *Real Estate Institute of Botswana* |
| *UB* | *University of Botswana* |
| *VDC* | *Village Development Council* |
| *WUC* | *Water Utilities Cooperation* |
| *BOCRA* | *Botswana Communication and Regulatory Agency* |
| *DPO* | *Designated Postal Operator* |
| *CSO* | *Central Statistics Office* |
| *PAS* | *Physical Address System* |
| *OI* | *Organisation Innovation* |
| *GIS* | *Geographic Information System* |

# CHAPTER 1: INTRODUCTION AND BACKGROUND

This thesis is about the adoption of an Information System (IS) at a country level. Information Systems literature addresses adoption of IS at an individual level, organisational level or national/country level. Each level of analysis has its own complexities. However, literature acknowledging these varied complexities has not been forth coming. That is, literature has more studies done at either individual or organisational, and hardly at national or country level. This thesis argues that the adoption of an information system (also referred to as an innovation) at country level is a multi-dimensional and multi-level phenomenon. Existing literature and previous studies have hardily addressed fully, this complexities and multi-dimensionalism, although it has been noted that countries experience and internalise the innovation adoption, as a social process, differently. The study was on a developing country adopting a Physical Address System (PAS), herein seen as an IS innovation. In this thesis, PAS is seen as a social system comprising of artefacts (digital and visual representations), physical world, residents and organisations as stakeholders.

The chapter is laid out as follows; the first section introduces the field of study. The sub-sections that follow discusses the adoption of the IS at organisational level, developing country versus developed countries and contextualise the IS study. The second section discusses the relevance of the research in four folds, which are literature, practically, contextually, and methodological reasoning. The third section discusses background of the research problem. The fourth section looks at identified theoretical and practical gaps in knowledge from literature. The gaps are converted into the statement of the problem. This is followed by the purpose of the research, research objectives and questions that drove the study. The research framework diagram that depicts the social process that facilitated the social inquiry of the adoption of the Physical Address System is discussed. Finally, the research delineation, research contribution and the thesis structured is outlined.

The following section introduces the field of study.

## 1.1 Introduction to the field of study

This section introduces the field of study by discussing the adoption of Information Systems at organisational level, developing country versus developed country, and by finally contextualising this Information Systems study.

Physical Address Systems are adopted and used by countries for various purposes; for example, posting mail items and parcels, ambulances, utility companies to provide services, easy criminal activity analysis of a certain area by the police services, enable smart cities and others (Alabaster, 2015). Physical address system is a fundamental part of the basic information needed to ensure communication of either digital or physical between individuals, governments and organisations. The physical addresses act as a platform for different actors and their activities, and they are a functioning network of networks (Norkeh, 2015 and Carttar, 2015). However, these systems are more widely adopted in developed countries than they are adopted in developing countries. There is no question as to the importance of having a functional and standardised physical address system (PAS). It is, therefore, of concern that some countries still have not adopted it, which is what motivates this research.

The World Bank, Universal Postal Union and French Cooperation have made collaboration efforts on coming up with initiatives (Wells, 2015a) for physical addressing at West African developing countries to resolve the lack of physical addresses for 50 urban areas, mostly French colonies or Francophone countries (DISD/ECA, 2005). There is a need for Physical Addressing Systems and most developing countries are still behind on adopting it. The question driving this study is why is the adoption of the Physical Addressing Systems lacking (Krejcarek and Mickla, 2015) or why is the adoption so slow in the developing countries? To address this problem, this study is about exploring and describing the dimensions that may inhibit or enable the adoption of PAS - of particular interest is the role stakeholder's play and how the context of the country may influence the adoption.

The next sub-section that follows discusses the adoption of Information System at organisational level.

### 1.1.1 Adoption of Information Systems at organisation level

This thesis is about the adoption of an Information System (IS) at a country level. In the research, the organisation level of adopting Information System is synonymous with country level or national level. Organisational adoption of innovation is nowadays coined around a new term organisation innovations (IO).

There is confusing definitions with regard to organisational adoption of innovation or how organisation innovation is defined, meaning innovation created within and adopted by organisations (Drucker, 2012; March and Simon, 1958; Bums and Stalker, 1961; Zaltman et al. 1973). Often, one may come across “Management Innovation” or “Administrative Innovation” names from other scholars. The Organisational Management and Information Systems literature state that the varied organisation innovation names often are determine by the degree and nature of knowledge an organisation transition to become innovativeness. This unfortunate argument is situated between different academic perspectives and their applications. Although the researcher’s viewpoints are scholarships based, they contribute important specific components of organisational adoption of innovations which results to inter-disciplinary and multiple competing perspectives but a general theory of OI has still not yet emerged.

Moore and Hartley (2008), agrees with the fact that most of time, organisation innovation is broadly defined and the lack of general theory exacerbate the complex scholarly debates. Often, some scholars like De Vries *et al.* (2014) specify categories of innovations such as governance innovation, product/service innovation, process innovation (administrative process innovation and technological process innovation) and conceptual innovation. The study is seen to initially fall in the process innovation.

### 1.1.2 Developing country versus developed country

A developing country is a non-industrialised country that strive to develop its resources by industrialisation, with a relatively low standard of living (Dictionary.com, 2017) while Developed countries possess economic systems based on continuous, self-sustaining economic growth and high standards of living.

For the innovation adoption from a developing country perspective, Information Systems literature outline there are efforts committed to identify the issues or challenges surrounding IS adoption (Ishijima *et al.* 2015) from developing countries or comparisons between developed countries and developing countries. For example, Molla *et al.* (2006) conceptualised a temporal process that administers how institutions or stakeholders role influence the adoption and diffusion of Barbadian e-commerce system. On the other hand, Techatassanasoontorn (2005) investigated the innovation determinants of digital wireless phone adoption and diffusion. The author compared and contrasted developed and developing countries. This present study was about the adoption of an information system as the country level – developing country.

## 1.1.3 Contextualising the Information Systems study

This section contextualises this information system study by defining key aspects. The section discusses the adoption of Information Systems (Physical Address System), organisation innovation schools of thoughts, multi-level and multi-dimensional frameworks, the Physical Address System.

#### *1.1.3.1 Adoption of Information System (PAS)*

Most developing countries do not have a functional Physical Address System. The study is about the developing country adopting a Physical Address System (PAS), herein seen as IS innovation. In this study, The PAS is seen as socially constructed

means comprising of artefact (digital and visual representation), the physical world and various activities or roles that stakeholders play. The PAS is viewed as a distinct social system that can be analysed on its own right within its context (Bray, 2007).

Existing literature and previous studies in the Information Systems adoption outline that stakeholders are aligned to the beliefs (with regard to contextual factors), attitudes (with regard to the IS innovation), intentions (with regard collective decision to accept or reject the introduction of the new idea or concept). This social inquiry looked to contribute to the body of knowledge on all the three aspects, with more to be uncovered in the development of the theoretical conjecture (Brady, 2007).

In this study, the roles of stakeholders are underlined as the primary object of interest in studying the phenomenon of human social cognition (e.g. attitudes, values, intent, beliefs, and experiences). The social behaviour (e.g., events, actions taken, structure interacting with action, social decision making) also influence the adoption of the Information System (Walsham, 2001).

Stakeholders experience in this study would be understood to be socially constructed interaction and with interrelationships within their contexts (Pfaffenberger, 1992). This study takes the interpretive and phenomenological case study as methodology to inquire about the information system adoption with the influence of the stakeholders lived experiences as human actors in the developing country. The Contextualist approach hold high the value of social reality of people living worlds as experienced and interpreted by those who live in it.

#### *1.1.3.2 Organisation Innovation Schools of Thoughts*

Information Systems literature (e.g., Dubouloz, 2012; Crossan and Apaydin, 2010) revealed two schools of thoughts with regard to organisational adoption of innovations. Firstly, the most common approach utilise innovation adoption phases and oppose a view that innovation adoption is non-linear, but promote a view that it is sequenced and

it leads to its adoption within an organisation. This approach is associated with quantitative research methodology (Dubouloz, 2012).

The second school of thought considers the adoption of the innovation as a multi-dimensional process associated with complexities and iterations (Dubouloz, 2012). The latter is associated with qualitative research methodology approach. Thus, the present study seeks to understand the adoption of PAS with a view to simplifying the complex social process of organisation innovation where stakeholders have a role to play. This study is aligned to the second school of thought.

#### *1.1.3.3 Multi-level and Multi-dimensional frameworks*

There are accepted comprehensive and systematic frameworks guiding researchers on innovation at the organisational level. From sociology, psychological and information systems perspective as social sciences, the adoption of information system is not sorely on the determinants of innovation, context and others. Its associated sequential social interactions are taken into consideration as it is pivotal to influence organisation behaviour towards adoption as a process and an outcome. The general theory does not yet exist but attempts to improve the research gap are evident, this Thesis is not an exception.

For the multi-level framework, the challenge in the adoption of Information Systems has been the integration and clear understanding of the linkage between individuals and organisational adoption of IS innovations (Jeyaraj et al., 2006; Gallivan, 2001). This viewpoint is also supported by a functional model of organisational innovation determinants conceptualised by Rui (2011) who analyse how these multi-perspectives diverse levels of analysis of complexities shape innovation at organisational context. Early research on innovation adoption concentrated mainly on behaviour of the adopter from the psychological perspective as an individual and hence researchers performed analysis an individual level. IS Researchers tend to apply theories meant for individual

to organisational level of analysis on adoption of innovations. Often, the outcome has been criticized and some inconclusive.

The multi-dimensional frameworks offer an insight and inform this study that the adoption of an innovation happens either as a process or outcome at organisations. It also incorporate other theoretical perspectives from different scholarships as lenses for the organisational innovation. Thus, this study on adopting a physical addressing system was conceptualised to be social process in the developing country to understand the interrelationship and social interaction of the multi-dimensions to persuade stakeholders to arrive at the decision making as an outcome.

#### *1.1.3.4 The Physical Address System*

This study was about the adoption of the information systems within an organisation – a developing country. An Information System(IS) is a system composed of people and computers that process data with instructions resulting in information or interprets information (Dictionary.com, 2017).

In this study, The PAS is seen as socially constructed means comprising of artefact (digital and visual representation), the physical world and various activities or roles that stakeholders play. The PAS is viewed as a distinct social system that can be analysed on its own right within its context (Bray, 2007). That being said, a physical addressing system is viewed as an information system.

#### *The Physical Address System and the Stakeholders*

For a physical address system to be efficient, it should conform to standards. The standards form the backbone of a robust addressing system (Rossouw, 2015 and Coetzee, 2015), they provide a fundamental basis for developing address databases. Coetzee *et al*., (2008) outline that physical address systems help on the provision of services by various stakeholders. For example, In South Africa, physical addresses are

part of policies, such as opening bank accounts as is required by the Financial Intelligence Centre Act (FICA), obtaining an legal documents like Identity Document, Driver's License or Passport as required by the identification Act 7, voting in elections as the Electoral Act requires physical address which is often accompanied by the identity document. To be counted at a particular physical address by the Independent Electoral Commission (IEC), to be given bail by the South Africa Courts - a physical address is required so that the authorities know where the accused reside and for utility companies (water, power and refuge collections) to provide services (Coetzee and Cooper, 2007). Physical addresses offer the service of inclusive and sustainable human settlements.

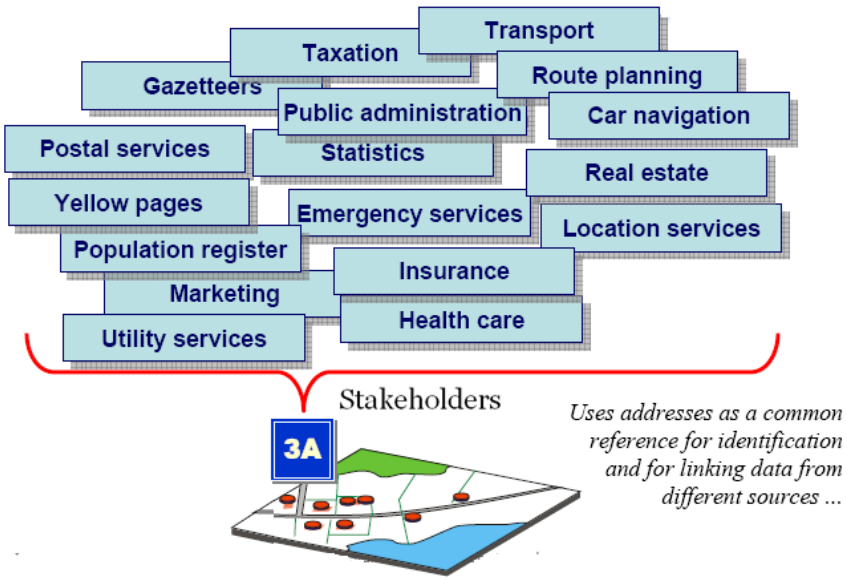


**Figure 1: Physical Address System and its stakeholders (Lind, 2008)**

Figure 1 depicts how stakeholders use the physical address system as a common reference for identifying a physical location. In this study, the physical address is synonymous to physical location or locational address and it is used exchangeable. The stakeholders also use the physical address system to link physical location data from different sources.

The DISD/ECA (2005) and Coetzee (2015) recognised that a functional physical addressing system would serve or link multiple stakeholders for their various service

deliveries. This means that stakeholders can influence physical addressing system adoption.

## 1.2 Relevance of the study to IS research and IS practice

This section discusses the relevance of the research in four folds, which are literature, practically, contextually, and methodological reasoning.

The adoption of PAS as an information system at country level is still a burning issue because it is not well addressed in literature. Practically, this study is relevant as it may inform practitioners. The physical address system incorporates geo-information technologies, policies and standards, transport networks and location identifiers (Wells, 2015b). This study describes the unique context of a developing country.

Theoretically, the adoption of Information Systems was all about understanding the psychological behaviour or intent of stakeholders on the adoption on physical address system as a social process, in a developing country. The theoretical and philosophical perspective is on what really exist at the developing country with regard to the PAS and what may persuade the stakeholders to adopt it. This thesis is an academically written research work in terms of tone, style, structure and semantics that may be understood by both scholars and practitioners. The relevance of the research and the thesis is discussed further in Chapter 7.

The next section gives the background to the research problem.

## 1.3 Background to the research problem

This section discusses the background to the research problem. It looks at the study location and the context setting of the case study - Botswana.

### 1.3.1 Study location and context

The study location is Botswana, a developing country. Botswana is a landlocked country in the southern region of Africa. It borders with Zimbabwe, Zambia, Namibia and South Africa. Botswana has settlement patterns of urban areas, villages and rural area, and farms and lands. The physical address system is used to identify streets and roads, buildings or empty land and official administrative areas such as suburbs, towns, cities and district areas (Pigot, 2015). This study was conducted in the developing country – Botswana. Currently, in this country, the physical addressing is by way of describing a specific location or destination. In other words, a physical address is given by asking people or one will rely on local knowledge for directions. For the traditional way, there is a usage of plot numbers instead of best practice approach of house numbers. Finally, there is different formats of assigning address by stakeholders, as an example, one may find a single household door with different stakeholder numbers (Water Affairs, Independent Electoral Commission, Power Corporation and other utility companies) as their unique identifier to provide or deliver services.

In Botswana, currently there is no adopted standardised physical address system that may allow the location of addresses. This thesis conceptualises a framework for adopting a physical address system. Some aspects of the physical address system may be best depicted by a locational address in a letter; for example, Figure 2. The physical addressing of the letter shows the varied and associated stakeholders as the custodians for the corresponding locational and postal information.

The conceptualisation of the locational address in a letter is informed and was bench-marked on address standards defined by the South African Bureau of Standard (SANS

1883: 2009), by the joint Council of Standards Australia/ Council of Standards New Zealand (AS/NZS 4819:2003), the International Organisation for Standardisation (ISO 19160: 2010) because Botswana has a similar landscapes (the area is largely covered by the desert and mountains) similar to South Africa and Australia (CE at UP, 2015).

The Universal Postal Union (S42:2006) gives guidelines on how to structure addresses of mail or parcel. Cooper and Gavin (2004) identified Botswana's major producers, distributers and users of physical address data as stakeholders from the government perspective but some of them have been identified to be associated with the postal and locational information of the envisaged addressed letter. Cooper and Gavin (2004) excluded the parastatals, private and citizens stakeholders respectively. The conceptualised physical addressing system of an envisaged letter shows Botswana possible PAS stakeholders and locational and postal information as depicted by Figure 2.

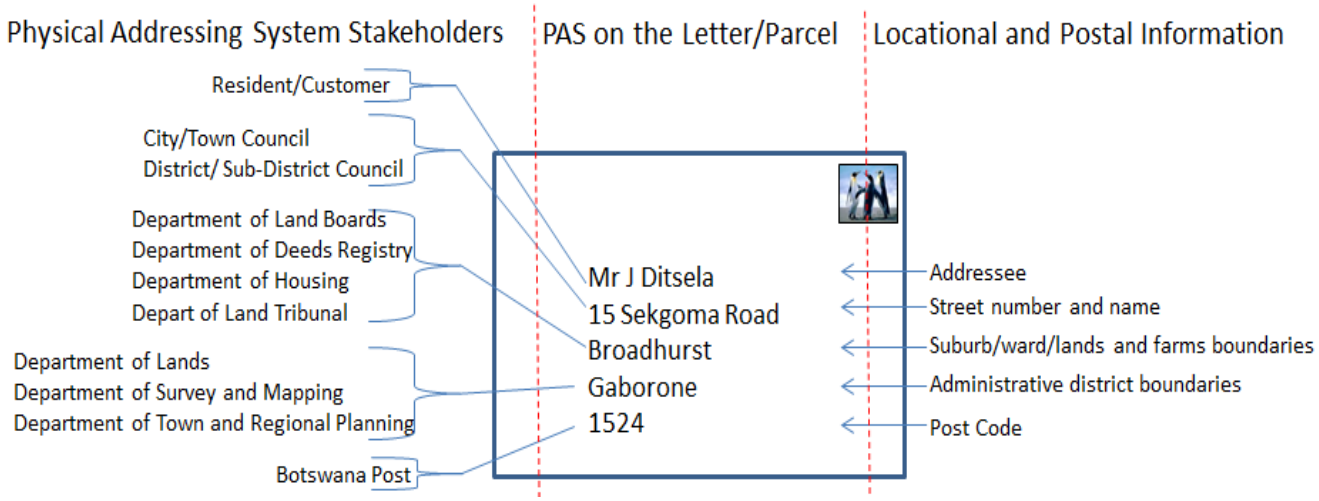


**Figure 2: The envisaged physical location identifier showing possible PAS stakeholders**

The Figure 2 shows the possible stakeholders of the PAS. The possible stakeholders are discussed on Table 1, foreseen playing a role in the adoption of the physical addressing system.

## Table 1: Physical Address System stakeholders and their roles

| Stakeholder | Stakeholder Roles |
|---|---|
| Resident/Customer | The resident or the customer might be the title deeds owner or leasing the land parcel or property. |
| Department of Lands | The department is responsibilities to oversee the allocation, use and management of state land through government policies and statutes (Botswana NDP9, 2000). |
| Department of Surveys and Mapping | The department is responsible of provision of maps for villages and towns in order to facilitate planning and development (Botswana NDP9, 2000). The department provide cadastral, topographic and geodetic services for residential, commercial and industrial plots located in state lands. |
| Department of Land Boards | The department is responsible for tribal land administration and allocation of land for residential, commercial, industrial and agricultural uses. |
| Department of Deeds Registry | The department is responsible of registration of memorandum of lease of all land parcels (Title Deeds). |
| Department of Housing | The department is responsible for housing policy, implementation programmes and strategies housing. The Department is also responsible for administration of Government pool housing applications and procedures of the Self Help Housing Agencies (SHHA) and District Housing programmes (Botswana NDP9, 2000). |
| Department of Town and Regional Planning | The department is responsible for the physical planning process through the preparation of Regional Master Plans, District Settlement Strategies and Settlement Development Plans that are used for guiding the development of regions and settlement (Botswana NDP9, 2000). The department is also tasked with planning permission application process and land use appeals to the Minister. |
| Department of Land Tribunal | The department is responsible for judgements, appeals against the decision of the Land Boards through established specialised court and enforce Land Board decisions. |
| City or Town Councils | The City or Town council is responsible for urban street naming signage, street numbering signage, road constructions and maintenance. |
| District or Sub-District Councils | The District or Sub-District is responsible for village and rural areas street naming signage, street numbering signage, road constructions and maintenance. |
| Botswana Post | Botswana Post is responsible for national postal services to all citizens and its mandate is to deliver mail/parcels to physical address anywhere within the country. The post office is a custodian for postcode data and postage stamps on a physical addressed letter. |

Table 1 shows the stakeholders and their roles in the adoption of a Botswana physical addressing system. This study used the stakeholder theory to explore how their roles manifest within their context to understand how they may influence the IS adoption.

## 1.4 Problem formulation: Theoretical and practical knowledge gaps

This section discusses the identified theoretical and practical gaps from the inadequate literature. The identified gaps are seen as a foundation for this study. The systematic literature review have identified four knowledge gaps, seen here as sub-research problems which were addressed by the present study. The summarised gaps in knowledge are converged into a problem statement. The next sub-section discusses the knowledge gaps from literature and the country status-quo with regard to physical addresses, the phenomenon in the social inquiry.

### 1.4.1 Knowledge gap 1 (Sub-research problem 1)

Information Systems researchers have made efforts to develop organisational innovation theoretical models or frameworks of IS innovation adoption in developing countries (e.g., Xiao *et al*., 2013). This study stance was that different types of innovation adoption process are best explained with different theories (Rowe and Boise, 1974). However, this study acknowledges that there is a degree of allowed variation in social science research and that is why there is always a provision of recommendations and further research. Usually, the relentless regularity of a phenomenon under investigation brings many questions in the research maturity of organisation innovation. This does not allude to the fact that the body of knowledge does not hold value on organisation innovation research. The following are the research knowledge gaps identified from inadequacy of literature

The systematic review of Information Systems literature on organisation innovation contributes a powerful source of evidence-based research towards adoption of PAS at a country level. The research outline the important meta-constructs or conceptual theoretical elements (for example, Crossan and Apaydin, 2010; Fleuren *et al*., 2004; de Veer *et al*., 2011; Aladwani, 2001). The goal towards the integrative general theory

(Rogers and Shoemaker, 1971) is slowly being realised but it is still distant. These contentious innovation findings can be attributed to lack of clarity of several innovation adoption conceptual issues at the organisational level.

With regards to the developing country perspective on adoption conceptual issues, Walsham (2001) outline that country specific context such as histories and cultural foundation gives a significant idea on how developing countries experience and internalises innovation adoption process. This means Information Systems researchers should infuse contextual philosophical and theoretical paradigms to study Information Systems adoption in developing countries. For every country around the world, physical address patterns are unique. Wells (2015b) highlight that in many areas where functional physical addressing may have been absent or partially implemented, people would have a new ways of describing locations and how to navigate to them. Organisation innovation initial difficulties are exacerbated by clearly defining what innovation is. Some researchers hinge on the commonality that innovation is new or novel but omit to clarify the conceptual understanding. This led to the study firs knowledge gap:

> Gap 1: There is lack of theoretical framework to guide or inform physical address system adoption, in the context of a developing country.

### 1.4.2 Knowledge gap 2 (Sub-research problem 2)

The adoption of an information system process at organisational level occurs because of different dimensions and in different settings. For example, due to policy context (innovation strategy, acts and others like National Development Plans), dimensions of organisational management control, organisational learning and knowledge management, socio-economic context, socio-cultural context, socio-political context, socio-technical context and others. In this study, these dimensions and settings are innovation determinants, roles of stakeholders and contextual factors that may have an influence on the social process on innovation adoption process and need to be

considered (Pettigrew, 1985; Pettigrew, 1987; Pettigrew, 1997; Symons, 1991). To date, a functional, comprehensive and standardised Physical Address System has not been adopted in most developing countries – for example, Botswana. What may influence its adoption is subsequently not understood or known. The second knowledge gap is:

> Gap 2: There is a need to explore and identify determinants of innovation and contextual factors within a developing country that may inhibit or enable the social innovation adoption process of the Physical Address System in a developing country.

### 1.4.3 Knowledge gap 3 (Sub-research problem 3)

The Information Systems literature (for example, Pouloudi, 1999, Mumford and Weir, 1979; Mishra et al. 2013) has identified the importance of stakeholder management. However, stakeholder roles in Physical Address System as an information system have not been identified and their influence has not been understood. There is a need for further research to understand how stakeholder roles can influence the Physical Address Systems adoption as advocated by scholars such as Hjelmager *et al*. (2008) and Cooper and Gavin (2004).

Hjelmager *et al.,* (2008) articulate the importance of stakeholder management but stakeholder roles in Physical Address System have not been identified and their influence has not been understood. The Spatial Data Infrastructure committee at the International Cartographic Association has identified stakeholders as Policy Maker, Producer, Provider, Broker, Value-Added Reseller and User (Coetzee, 2017). Meanwhile, Cooper and Gavin (2004) identified Botswana's major producers, distributers and users of physical address data from the government perspective only but no other stakeholders. A physical address system is composed of locational information. Therefore, quite a few stakeholders are involved with a single physical address for different roles as mentioned by ISO standard: No 19160 (ISO 19160; 2010) and Rossouw (2010). There is a need identify the stakeholders and to understand their

roles as they might influence the adoption of the Physical Address System as illustrated by Figure 3.

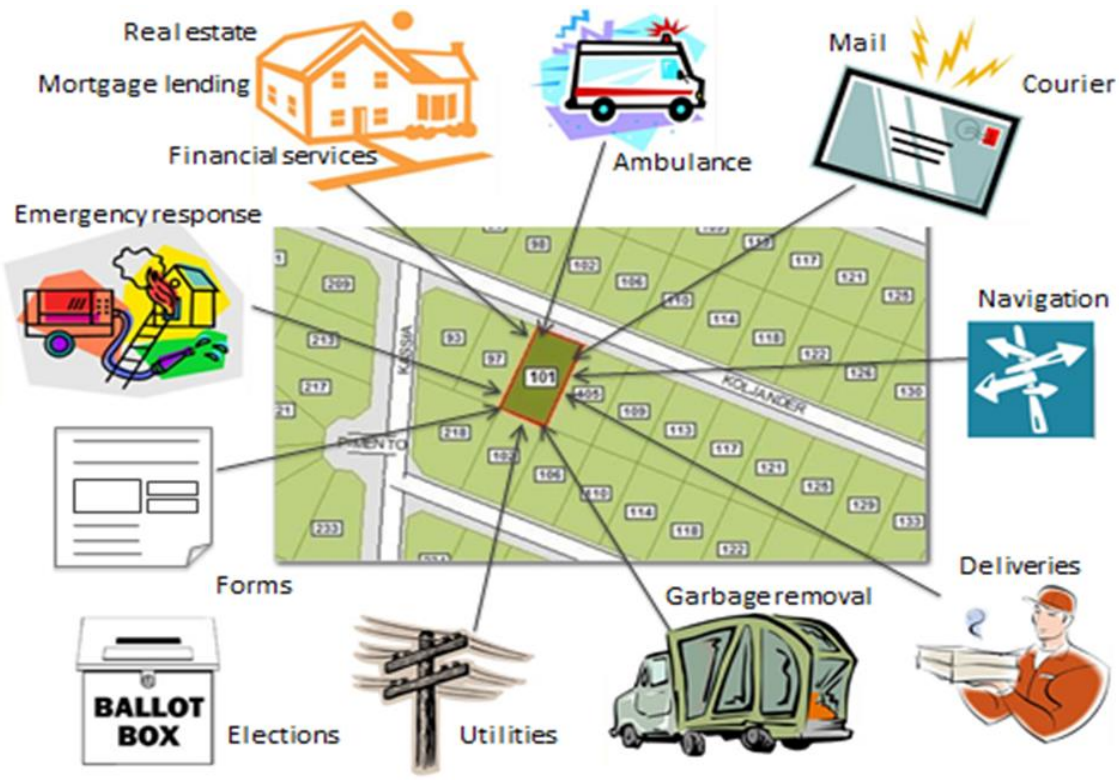


**Figure 3: Stakeholders activities on a single physical address (Rossouw, 2010; ISO 19160, 2010; Coetzee et al, 2011)**

There is social interaction or common inter-relationships that exist between stakeholders because their services intersect at a single unique physical address. The Physical Address System is a social system and links multiple stakeholders for their various service deliveries/activities as roles (Coetzee et al, 2011 and Coetzee, 2017), this means that stakeholders can influence Physical Address System adoption. The third knowledge gap is:

> Gap 3: there is a need to understand how the stakeholder relationship and how the roles of stakeholders may influence adoption.

### 1.4.4 Knowledge gap 4 (Sub-research problem 4)

Citizens need a physical address so that they can be identified and be reached at their households, organisations to be accessed easily for business purposes and services to be delivered (ISO 19160, 2010; Coetzee and Cooper, 2007; Ditsela *et al*., 2011). It is imperative to enhance ways in which people *search* and *find* a physical address, *use* a physical address with geographical precision and accuracy when providing services to a household (Swier, 2013). Physical addresses also act as navigation on the digital and visual representation of the computing world artefacts. The artefacts use is a way to avoid over reliance on local knowledge for direction because a human cognitive mind is not always reliable depending on the context of the geographic orientation. An activity at a single physical address can therefore be regarded as the main core of context specification, with this regard, the identified final knowledge gap is:

> Gap 4: there is a need to understand how context and the awareness of context manifest in the adoption of the physical address system in a developing country.

This study reviewed literature regarding adoption of the information system and in particular at the organisational level. Four gaps from the existing IS literature on the adoption of the information system in a developing country was identified. The research closed the identified gaps and addressed the sub-research problems.

The research gaps in knowledge from literature are summarised and converted to the problem statement discussed in the next section.

## 1.5 Problem statement

Information Systems literature articulate that the adoption of an information system is at either an individual level, organisational level or national/country level. Different complexities arises depending on the level of analysis, however, literature has not been forth coming that acknowledges these complexities. Studies in the adoption of IS

research at the organisational level emphasise a need to understand the multi-dimensionality such as innovation determinants, the stakeholder roles and the social context in which the innovation or information system is to be adopted and implemented.

However, literature often neglects these complexities, multi-dimensionalism, country specific context that gives a significant idea on how the developing country experience and internalises the innovation adoption social process where the innovation is going to manifest. Information System researchers should infuse contextual philosophical and theoretical perspectives to guide or inform organisation innovation in developing countries. There is no known theoretical framework that may help cub this. The research sought to understand how the developing country adopts a Physical Address System as a social process. The process is seen as multi-dimensional in terms of the roles of stakeholders, context and the determinants of innovation which may influence the adoption.

The following section discusses the argument central to this study.

## 1.6 Research argument

This thesis argues that the adoption of an information system (also referred to as an innovation) at country level is a multi-dimensional and multi-level phenomenon. Existing literature and previous studies have hardily addressed fully, this complexities and multi-dimensionalism, although it has been noted that countries experience and internalise the innovation adoption, as a social process, differently.

The argument is that the adoption of the Physical Address System ought to be done sensitive to the developing country as a multi-dimensional social system. This multi-dimensional social system includes the roles of stakeholders, context and determinants of innovation. The study observed how the stakeholders proceeded through a complex social decision making process of the adoption of the Physical Address System.

The section that follow discusses the research goal and specific objectives.

## 1.7 Research Goal and Objectives

The goal of the study was:

> *to conceptualise a multi-dimensional framework for adopting a Physical Address System, in the context of a developing country.*

The goal was achieved by unpacking the multi-dimensionality by the following research objectives that follows.

### 1.7.1 Research Objectives

The research objectives of the study were:

- to identify potential stakeholders and describe the stakeholders roles and relationships that might influence the adoption of a Physical Address System;
- to determine the role of context awareness and the form it manifest in the adoption of the Physical Address System;
- to identify and determine how the determinants of innovation may inhibit or enable the innovation adoption process of the PAS, in context;
- to determine ways in which a developing country can adopt a Physical Address System.

## 1.8 Primary and Secondary Research Question

The primary research question driving the study was:

> *how can a developing country adopt a Physical Address System?*

This question is packed, and in line with the thesis argument that the adoption process is a complex and multi-dimensional with multi levels, the following were the secondary research questions which addressed research question.

### 1.8.1 Secondary Research Questions

The secondary research questions of this study were:

- how do stakeholders roles and their relationships influence the adoption of a Physical Address System?
- what is the role of context awareness and in what form does it manifest in the adoption of the Physical Address System?
- what are the determinants of innovation and how do they inhibit or enable the innovation adoption process of the Physical Address System?
- in what ways should a developing country adopt a Physical Address System?

The section that follows discusses the research purpose.

## 1.9 Research Purpose

The research purpose answers the research questions which are posed by the researcher and the study objectives. Depending on the context of the study and approach, Saunders *et al.* (2009) state that the research purpose may be descriptive and/or exploratory to build theory, on the contrary, Sekaran (2003) outline that for the studies that test hypothesis, the research purpose is explanatory. The purpose of this study was to explore and describe the adoption of a physical addressing system, in a developing country.

The section that follows discusses the research framework.

## 1.10 Research framework

Having discussed the research gaps in knowledge from extant literature, the purpose of the study and research questions that guided the study. This section focus on the social process that facilitated the social inquiry of the adoption of the physical address system with a research framework. The research framework is depicted by Figure 4.

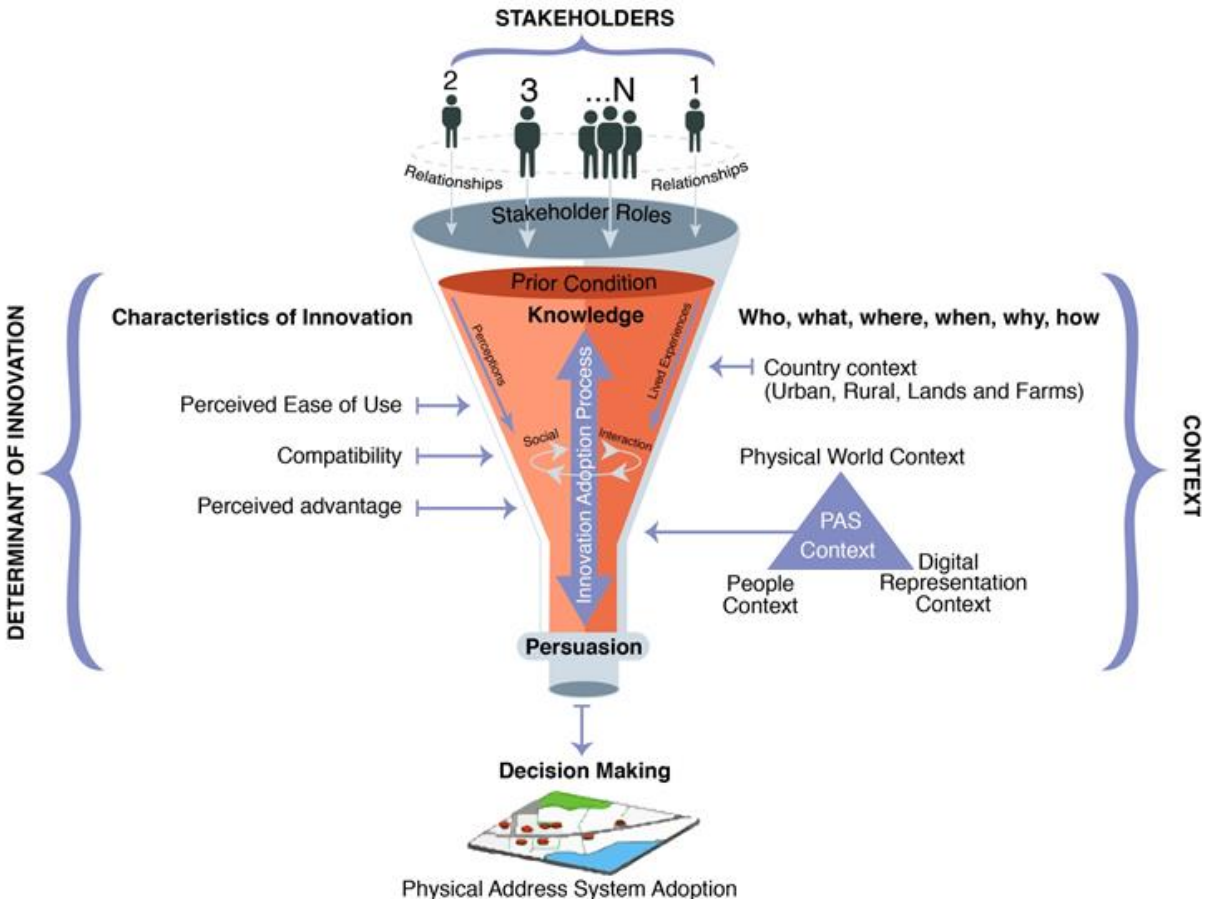


**Figure 4: The Research Framework**

The research is premised on the argument that adoption of an information system (also referred to as an innovation) at country level is a multi-dimensional and multi-level (herein government and private entities) phenomenon. Existing literature (Walsham 2001 and Wells, 2015b) and previous studies have hardily addressed fully, this complexities and multi-dimensionalism, although it has been noted that countries

experience and internalise the innovation adoption, as a social process, differently. The adoption of the Physical Address System ought to be done sensitive to the developing country as a multi-dimensional social system. This multi-dimensional social system includes the roles of stakeholders, determinants of innovation and context. The study inquired how the stakeholders proceeded through a complex social decision making process of the adoption of the Physical Address System.

The introduction of the physical addressing system, as an innovation at a developing country was in a form of a social process with stakeholders playing a role in the process and outcome.

Looking at Figure 4 from the top, the research views innovation adoption process as a social process of decision making by stakeholders who would use their *perceptions* and *lived experiences* of physical addresses within their social setting. Stakeholders make assumptions, explanations, and understand the innovation in its contextual background for them to be persuaded to agree to the introduction of a new idea of physical addresses in a developing country rather than the current descriptive and traditional one.

The innovation adoption process is depicted by the double sided arrow from the prior condition phase, knowledge, persuasion until the decision phase, the double sided arrow also indicate that its iterative rather than linear process. The arrow that rotates around the innovation adoption process shows that there are interrelationships and social interaction of stakeholder's that might influence the adoption of a physical address system. The arrows from the left seek to determine and describe how the determinants of innovation may inhibit or enable the innovation adoption process of the PAS. Finally, the arrow from the right looks to understand the role of context, context awareness and the form it manifest in the adoption of the physical address system at the developing country. The triangle shows the tripod relationship of the people context, physical context and the digital representative context, which complement each other. The stakeholders are aware of their context during the social interaction. If one context is absent, it might be difficult to find, search and use a physical address.

On this background, the stakeholder roles, determinants of innovations and their context play a role in the innovation adoption social process.

The next section discusses the research delimitations.

## 1.11 Research Delimitations

The purpose of this study was to explore and describe the adoption of a physical addressing system, in a developing country. This study was not intending to explain the adoption of Information Systems, which aligned to causal relationships of independent and dependent variable common for quantitative research.

A multi-dimensional physical address system in a developing country in this study was limited to the Botswana, where stakeholders were categories as government and private sector to match the industry balance.

The study focused on the adoption of the information system rather than the diffusion of innovation, which happens after adoption. The diffusion of innovation includes *implementation phase* and the *final phase of confirmation* according to Rogers (1983). These stages ensure that the innovation is set-up at the organisations. The adoption of the innovation required stakeholders to be persuaded on the decision to reject or accept the information system at the developing country.

The section that follows discusses the contribution of the thesis.

## 1.12 Contributions of the thesis

The contributions of the thesis are bracketed into theoretical, methodological, practical and contextual. Theoretically, the thesis conceptualised the multi-dimensional framework for the adoption of the Physical Address System at the developing country. Methodologically, the thesis contributed to research strategy, research design and qualitative research methods chosen to answer research questions and case study bounded on real life settings rather that sample population. Practically, it informed practice and IS professionals.

Contextually, it outlined the new and different context as a context-independent contribution for unique case study with settlement patterns of urban, villages and rural areas, and farms and lands at Botswana. The research contribution are re-visited and discussed further in the last chapter.

The next section that follows discusses the thesis structure.

## 1.13 Thesis Structure

The thesis is structured into seven chapters: 1) the presented the introduction and background of the research, chapter 2) gives a survey of scholarship and theoretical foundation, 3) review theoretical frameworks 4) a description of research methodology, 5) empirical data analysis and discussion 6) interpretation of findings and framework development, 7) evaluation of the research, it assesses the implications of the findings and other theories, evaluates the limitations of the research and offers potential directions for future research. The next section summaries the introductory chapter.

## 1.14 Summary of the Introduction Chapter

The chapter was laid out as follows; the first section introduced the field of study. The sub-sections that followed discussed the adoption of the IS at organisational level, developing country versus developed countries and contextualise the IS study. The second section discussed the relevance of the research in four folds which were literature, practically, contextually and methodological reasoning. The third section discussed background of the research problem. The fourth section identified theoretical and practical gaps in knowledge from literature and the country status-quo with regard to physical addresses, the phenomenon in the social inquiry. The gaps are converted into the statement of the problem. This is followed by the purpose of the research, research objectives and questions that drove the study.

Having discussed the research gaps in knowledge from literature and the research purpose, Section 1.9 brought forward the research framework diagram that depicted the social process that facilitated the social inquiry of the adoption of the Physical Address System. Finally, the research delineation, research contribution and the thesis structured was outlined.

The next chapter reviews a survey of scholarship and theoretical foundations. The chapter discusses concepts that informs this study, the concepts are theoretical frameworks for IS organisational innovation, the physical address system phenomenon in detail and the contextual approach.

# CHAPTER 2: Survey of Scholarship and Theoretical Foundations

## 2.1 Introduction

The preceding chapter introduced the thesis, by highlighting the introduction to the study field. The chapter discussed the relevance of the research, background to the research problem which outlined the study location and context, problem formulation from the identified theoretical and practical knowledge gaps from literature, the objectives and research questions that drove the investigations. The research brought forward the research framework graphical representation that depicted the social process that facilitated the social inquiry of the adoption of the Physical Address System. Finally, the research delineation, research contribution and the thesis structured was outlined.

This chapter is about survey of scholarship and gives the theoretical foundations for the study. The chapter discusses concepts that informs this study, the concepts are multi-dimensional and multi-level theoretical frameworks for IS organisational innovation, the physical address system phenomenon and the contextual approach.

This chapter adds value to the existing body of knowledge on the Physical Address System phenomenon by surveying the scholarship to emphasis the relevance of the research.

## 2.2 Theoretical frameworks for IS Organisational Innovation

This sections discusses the theoretical frameworks of IS Organisation Innovation from the multi-level and multi-dimensional perspective that exist in the Information System scholarship as the theoretical foundation related to this study topic.

There are accepted comprehensive and systematic frameworks guiding researchers on adoption of innovations at the organisational level. The general theory does not yet exist but attempts to improve the research gap are evident. The challenge in the adoption of IS has been the integration and clear understanding of the linkage between individuals and organisational adoption of IS innovations (Wisdom *et al.,* 2014; Jagosh *et al.,* 2011; Jeyaraj *et al.*, 2006 and Gallivan, 2001). From sociology, psychological and information systems perspective as social sciences, the adoption of information system is not sorely on the determinants of innovation, context and others. Its associated sequential interactions are taken into consideration as it is pivotal to influence organisation behaviour towards adoption as a process and outcome.

The following theoretical frameworks are categorised as either multi-level or multi-dimensional. The section that follows discusses these two categories of frameworks as follows:

### 2.2.1 Multi-Level Frameworks

This sections discusses the multi-level frameworks to address the level of analysis complexities centered around this study that emanated from IS organisational innovation.

Hameed (2012) posit that innovation is researched from multiple perspectives such as diverse levels of analysis (Slappendel, 1996; Damanpour and Schneider, 2009). Robert *et al.* (2009) locates innovation in organisations within three perspectives, i.e. individualistic, 'structuralist' (organisational) and interactive process perspective. Damanpour and Schneider (2009) viewpoint on levels of innovation adoption in organisation is at individual, group and organisational. This viewpoint is also supported by a functional model of organisational innovation determinants conceptualised by Rui (2011) to analyse how these multi-perspectives diverse levels of analysis shape innovation at organisational context. Early research on innovation adoption concentrated mainly on behaviour of the adopter from the psychological perspective as an individual and hence performed analysis mostly at an individual level.

Organisational level research analyses the effect of innovation adoption phenomena on overall performance of the organisation and competition advantage gained (Slappendel, 1996). However, Ashraf *et al.* (2008) argues that an Information Systems is embedded in various complex factors such as physical, human, digital and social resources that exist across the three layers of macro, meso and micro. The multiple level frameworks must include the dynamic nature of the relationship between actors within and amongst the three layers (Ashraf *et al*. 2008).

This study is at the organisational level of analysis – the developing country. Similar to Ashraf *et al.,* (2008) argument of embedded complex factors, it informs this study because the developing country levels are government and private sector that exist similar to the layers of macro and meso. This study prematurely excludes micro, which is seen as individual level of analysis. The next sub-section discusses the multi-dimensional frameworks.

### 2.2.2 Multi-Dimensional Frameworks

This section discusses the multi-dimensionalism frameworks within the IS studies addressed by the inadequacy of literature (Kazem, Christine and Frederik, 2012). Due to the lack of coherent and appropriate frameworks, scholars conceptualised multi-dimensional frameworks as a way to understand the organisational innovation phenomenon within Information System. The examples of multi-dimensional framework include Fleuren *et al.* (2004), Aladwani (2001) and Crossan and Apaydin (2010). The discussion of multi-dimensional framework follows:

#### *2.2.2.1 Fleuren et al.'s (2004) Innovation Framework*

Fleuren *et al.'s* (2004) Innovation Framework represents the innovation process and related categories of determinants of innovation based on several theories and models, amongst others the Diffusion of Innovation. Fleuren *et al.'s* (2004) Innovation Framework was originally developed for analysing determinants of innovation in

healthcare since 2002. The framework has been used for global research on the introduction of several innovations in health care sector (de Veer *et al.,* 2011).

Fleuren *et al.* (2004) and dei Veer *et al.* (2011) suggest that when an innovation is being introduced in an organisation, it is imperative that an insight is gained into determinants that may facilitate or impede its introduction of the innovation so that the design of the innovation strategy will be appropriate. Nonetheless, a problem is emerging with the overemphasis on deterministic studies commonly used to quantify associations between innovation adoption and organizational level variables.

Geenhalgh *et al.* (2005), as cited by Robert et al. (2009), point out a fundamental weakness in the literature on structural determinants of innovativeness, i.e. that the assumption tends to be made that innovation determinants can be treated as variables whose influence can be isolated and quantified independently whereas there exists an alternative theoretical approach suggesting that determinants of organisational innovativeness interact in a complex, unpredictable and 'non-generalisable' way with one another.

Fleuren *et al.* (2004) argument informs this study as it takes the determinants of innovation into consideration in adoption of an innovation which is seen as one of the multi-dimensions in this study.

#### *2.2.2.2 Aladwani's (2001) successful ERP adoption framework*

Aladwani's framework basis is on change management strategies for Information Systems. The author's views is that top management should make sure employees anxiety and resistance to the information system is under control. The status evaluation phase provides the feedback loop of the information to top management team (Aladwani, 2001). The author concludes that the marketing concepts and strategies are adaptable to an IS adoption and implementation context to overcome user resistance change and top managers should:

- study the structure and needs of the users and the causes of potential resistance among them,
- deal with the situation by using the appropriate strategies and techniques in order to introduce information systems successfully and,
- evaluate the status of change management efforts.

Aladwani (2001) framework outlines that there is a need to involve top management team (stakeholder managers) in the adoption of innovation because they act in the best interest of the organisation during changes of any information system or organisation innovation. Aladwani (2001) views informs this study as it investigates the structure and needs of stakeholder roles, it deals with appropriate strategies and techniques in adoption of IS. The other important aspect is that it involves the top management team, which can influence adoption of IS at organisational level.

#### *2.2.2.3 Crossan and Apaydin's (2010) Multi-dimensional framework*

Crossan and Apaydin's (2010) multi-dimensional framework looks at organisational innovation as a unit of analysis and is conceptualised by synthesizing various conceptual elements in to a comprehensive framework of organisation innovation. This was achieved by surmising upper echelon theories, resource-based view and dynamic capabilities theory, process theory to help to deepen our understanding of specific facets of organisation innovation. Crossan and Apaydin's (2010) reviewed various dimensions and they organised them into two categories which are innovation as a process and innovation as an outcome.

The discussed frameworks offer an insight and inform this study that the adoption of an innovation happens either as a process or outcome at an organisation. It also incorporate other theoretical perspectives from different scholarships as lenses for the organisational innovation to persuade stakeholders to arrive at the decision making as an outcome.

In summary, the systematic literature review suggests that the adoption of an innovation at organisations is a multi-level, multi-theoretical and multi-dimensional phenomenon. The section that follows discusses the physical address system phenomenon.

## 2.3 The Physical Address System

This section unpacks the Physical Address System phenomenon, firstly it outlines the varied definitions from the extant literature specifically by different standards bodies and outlines the Thesis definition of the Physical Address System. The Physical Address System phenomenon and its fundamentals is reviewed from the literature such as its historical evolution at African and International countries perspective leveraging its applicability to the developing country. This section also discusses the evolution of Physical Address System context awareness through the notion of context, tool-in-context and ubiquitous Physical Address System.

Different institutions around the world define a physical address in a different way because it describes a fixed location or a physical feature on the ground. Few definitions from different Institution Standard Bodies are as follows:

**Table 2: The definition of a physical address**

| Institution Standard Body | Definition |
|---|---|
| Infrastructure for Spatial Information in Europe(INSPIRE) | an identification of the fixed location of a property, e.g. plot of land, building, part of building, way of access or other construction, by means of a structured composition of geographic names and identifiers (D2.8.I.5, 2009 and Bjornsson and Mubarak Al Shaiba, 2015). |
| South African Address Standard (SANS) | an unambiguous specific point of service delivery (SANS 1883:2009, 2009). |

| | |
|---|---|
| Universal Postal Union (UPU) | a set of information which, for a postal item, allows the unambiguous determination of an actual or potential delivery point, usually combined with the specification of an addressee and/or a mailee (UPU S42, 2006). |
| British standard (BS) | as a means of referencing an object for the purposes of unique identification and location (BS7666-0:2006). |
| Australia and New Zealand Standard | as the conventional means of describing, labelling or identifying an address site, and an address site is an object, place or property (AS/NZS 4819:2003, 2003). |

In most countries, a physical address is made up of components like a unique individual locators that provide precise granular levels of detail that have geographic names, the individual locators are 'street number', 'street name' or 'unit, office, floor or flat number', 'suburb name' and 'town or city name', and finally a 'postcode or zipcode'. The postcode is useful for postal deliveries and other services. A Physical Address System includes postal information (Bergström, 2010) and the postcode act as a spatial layer for official demarcation of suburb boundaries.

### 2.3.1 Historical evolution of Physical Address System in African Countries

Recently, African countries has just realised the importance of physical addresses due to the impact of globalisation, the need to trade internationally and deliver services efficiently in their geographic localities. The stumbling block is due the fact that African countries do not have a comprehensive and standardised Physical Address Systems (DISD/ECA, 2005; Farvacque-Vitkovic *et al.,* 2005). In most African countries, there is barely no Physical Address Systems or its only partially implemented. This makes goods and service delivery difficult to reach people in need, navigating to the correct household or arriving at exact final destination to be a daunting task unless they rely on the power of the local knowledge. Most of the time people always describe the proxy

localities of these destinations (i.e. near the big tree, opposite the tuck-shop or after cross-roads).

The absence of, or partially developed or complex physical address system to locate, access land parcels and buildings in many African countries lead to a setback on the country infrastructure development. These affect urban and rural socio-economic development, because it becomes confusing and difficult for physical address users to identify people, land parcels and buildings for better service delivery. Nonetheless, recognition should be accorded to those African countries that have an established or are at an early stage of addressing system development or implementation.

The following section discusses physical address system from some African Countries. Most importantly, it highlights that the physical address system consist of the components that make up physical address or how the components are structured on an physical address and describes how values are assigned. Physical Address Systems vary from country to country and there is usually a strong cultural, religious and traditional connotation to it. Physical Address Systems are vital components of national governments data because they are used to serve the public in many ways such as parcel delivery and numerous critical economic, emergency services, political and social service elements.

The following are some African Countries with history and recognised efforts for implementing Physical Address System, it is worthwhile to understand the status-quo of other countries PAS and their applicability to the developing country – Botswana. The next section discusses Zimbabwe and its physical address system.

#### *2.3.1.1 Zimbabwe*

Zimbabwe is one of country that is consistent and has maintained a long tradition of a cadastral system (land information system) where each property in the country was recorded and attributed a unique identification. However, they have adopted a model of

addressing where by addresses varies across built-up areas and depends on the level of planning (DISD/ECA, 2005). Zimbabwe has a unique situation, the land information differ case by case, but among the most common are the facts that land information is usually not coordinated or it is inadequate (Kurwakumire, 2014).

Zimbabwe has identified four categories for the physical address system development. The first category is the high density residential areas, followed by planned low-density areas, unplanned areas and haphazard planning and numbering of new properties under the new housing scheme as the final category. The numbering system in unplanned areas is often varying according to the landscape but efficient to locate a particular physical address. Such a pattern has assisted the sustainability of a functional address system in Zimbabwe (DISD/ECA, 2005). Botswana has spatially distributed settlement patterns of urban areas, villages and rural areas, and farms and lands. The applicability of the Zimbabwe PAS would not be suitable.

#### *2.3.1.2 Morocco*

Not every country in Africa is starting from the ground or on a clean slate to implement a Physical Address System that is aligned to international standards, but Morocco can be used as a benchmark. Morocco is well advanced and has a system in place where street addressing has been used for a long time. Basically, everyone in Morocco has as physical address including businesses, a mission that Universal Post Union and United Nations wants to achieve for every country. For PAS in Morocco, street names are combined with district identification (Sharmavaram and Farvacque-Vitkovic, 2017).

The only shortfall is that the Moroccan cadastral data is incomplete compared to Zimbabwe because it operate independently from postal address but overall the system functions properly (DISD/ECA, 2005). This study is of a view that a standardised and comprehensive PAS are a combination of postal through postcodes and locational information as outlined in Figure 2, the Moroccan PAS would not be applicable to Botswana because it lacks postcode.

#### *2.3.1.3 Tanzania*

Recently, Tanzania conducted a pilot project on the Physical Address System; the pilot project was under the coordination of Tanzania Communications Regulatory Authority in association with the Municipal Council in Arusha during 2009. Arusha is the first urban area to establish the new postcodes based street, house and personal identification system as a Case Study (Lemanya, 2015).

The adopted postcode model is numerical as opposed to the 'alpha-numerical' method. The former is widely used globally. The first phase of pilot project was tailored to cover major towns and cities while the second phase is expected to cover rural villages and unplanned settlements in urban centers (Lemanya, 2015). The majority of people live in the Arusha municipality, however, most of them live in slum areas, which have no streets let alone street names.

Providing house numbers and codes for slum areas is likely to be a challenge for the latter phases but Tanzania is on the right direction on implementing the PAS (Lemanya, 2015). Similar to Zimbabwe, the Tanzanian PAS would not be applicable because Botswana settlements patterns do not include slums type of a settlement.

#### *2.3.1.4 Nigeria*

Nigeria is one the examples where street address is partly operating in some parts but is inexistent in other parts of the country over the years. This lack of a citywide and harmonised address system contributes to the overlapping and confusion for city dwellers and the service providers (DISD/ECA, 2005).

Nigeria Federal Government also formally launched a new national address postal code on the 27$^{th}$ April 2009. (Adedeji, 2016). The Minister of Information and Communications was of a view that the pilot physical addressing project was designed to put Nigeria in

line with other countries and also to ensure that its Physical Address System is standardised. Although Nigeria had a similar post code system in place between 2000 and 2001, which were described by the Minister as ‘skeletal’, the new platform is to offer full postcode for the country. The Nigerian PAS is incomplete (Adedeji, 2016) and it would be difficult for Botswana to leverage with it as there are unknown issues that have been identified.

#### *2.3.1.5 Ethiopia*

Ethiopia has developed and maintained a communal system of orientation, location and parcel identification before 1974 and the system was not fully functional. It changed drastically over the years. In 2004, Ethiopia started physical addressing initiative and selected Addis Ababa municipality as a pilot study. The Addis Ababa City Authority and the German Technical Cooperation (GTZ) embarked on the development and implementation of the new addressing system (DISD/ECA, 2005). The street addressing project in Addis Ababa was innovative in three key areas that are worth noting (Zein and Berisso, 2012).

First, from the methodological perspective, the project proposed an incremental implementation of street addressing in African cities by recommending a start from planned areas which already has streets layout and gradually moving on the outskirts to address unplanned and informal settlements. The project designed an addressing methodology that applies to all parts of the city (planned and unplanned areas). Second, the need and ways to identify slum areas were developed and incorporated in the citywide addressing framework. Finally, the Physical Address System in Addis Ababa states the predominance of the plot or piece of land, whether it is privately owned or public property (Berisso and Zein, 2013). In that way, land allocations are more stable towards plots identification than houses, the latter being more susceptible to changes such as demolition, addition and reconstruction (CODI-Geo/DISD, 2005).

Botswana is structured in to Districts and sub-districts compared to Municipalities, its structure and applicability would not fit the Botswana set-up.

#### *2.3.1.6 South Africa*

Due to the similarity and commonality of the South African Urban Addressing System with other developed nations compared to rural settings, this study discusses the latter. The South African rural addresses lack formal named streets compared to urban areas where the names changes frequently due to political influence due to the effect of apartheid. There is also lack of numbered streets and sometimes they do not exist (Orderson, 2014).

The rural physical address system is designed as an area and point-based pattern structure. Ezigbalike (2009) observed that not all settlements in Africa are laid out on “streets”, some parts of African cities are also not planned properly to have streets but everyone need to be addressed and this is fuelled by initiatives like ‘Addressing the world – An address for everyone’ by the Universal Postal Union (UPU, 2009).

The South African Post Office is the custodians of the rural addressing, it is compliant to the South African Address Standard: 1886-2015 (SANS 1886, 2009) and UPU S42 (2006) standard. The rural area layouts are sparsely distributed household’s pattern, the physical address process started by conducting research and consulting the village elders who are called *indunas* through a participatory process. From this phase, an aerial photograph of the village was performed and physical address data was allocated from the image visuals. The physical address data was geo-coded and then computerised. After verification and validation of the physical address data on the field, the physical numbering of households on the ground was implemented and the owners were issued with an address. Botswana can benefit from its neighbouring country and benchmark on this type of rural addressing as it has similar landscape, weather, cultural, religious and traditional practices like some communities who resides in South Africa.

The next sub-section discusses PAS from the International perspective and PAS applicability to the developing country- Botswana.

### 2.3.2 International Physical Address Systems and their applicability to Botswana

The international countries that are reviewed in this section are Japan, USA, Sweden, Australia and New Zealand. The section that follows discusses Japan.

#### *2.3.2.1 Japan*

Japanese address system is different from the street-based physical addresses which is common in most countries. It comprises of a hierarchy of administrative areas without reference to a street. The address consists of the three elements being the administrative district names, area names and numbers. In addition, the numbers are classified into Land Registry Referencing System and Systematic Numbering System (Akeno, 2008; Rhind, 2015). Akeno (2008) suggest that the Japanese addressing system is complicated because of their numbering system of the buildings and its even complex to its users to understand it. The buildings that are constructed first, then allocated numbers hence the reason why they are not sequential.

This would not be ideal model to Botswana context as they look to use best practice methods similar to other countries which use streets and sequential numbering system rather than a hierarchy of administrative areas such as district, sub-district, city, town, suburb, section, ward and others. The best practice from other countries has the numbers are given on the right hand side and odd number on the left hand side to the street.

### *2.3.2.2 United States of America (USA)*

In the United States of America (USA), some of the rural addressing is performed by using a system of mile markers set along highways and/or mile indicators that are shown along county roads (AppGeo, 2016). From the point of origin, each mile along the main road is marked. Houses are addressed based on their distance from the main road.

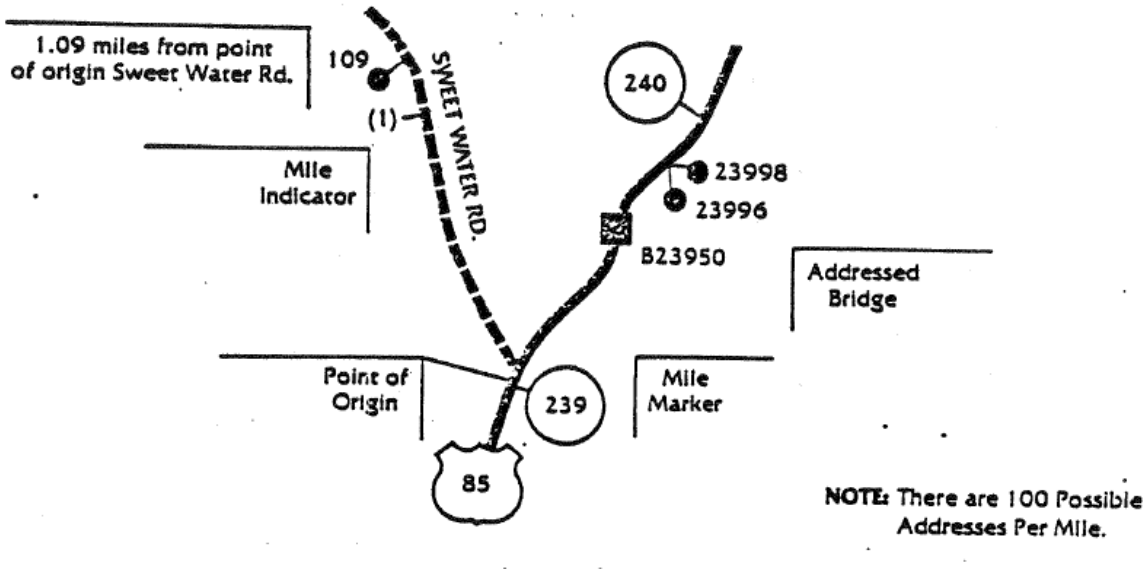


**Figure 5: Physical Address numbering in United States of America (ISO 19160, 2011)**

Figure 5 show that the individual address is determined by the number of miles, to the closest one hundredth (0.01) of a mile, from the beginning of the main road upon which the resident lives. An example is given of Figure 5 for the physical address 23998. The household or private driveway is 9.8 miles along the main road mile marker indicating 2.9 which is a point of origin of Highway 85 (ISO 19160, 2011). The US rural physical address system cannot be applicable to Botswana because its uses the miles system as a measurement from a point of origin compared to kilometres. The Botswana main roads are named in alphanumeric characters compared to the USA physical address

system which use routes in numerical format, For example, In Botswana, the “A1 Road” runs from north to south of the country and it connect major towns and villages.

#### *2.3.2.3 Sweden*

Swedish physical addresses are structured in a parent to child order type of a hierarchy. It starts with a bigger area and zooms into a smaller area and finally point to a single land parcel (Bergström, 2010 and Malatsi and Finnström, 2011). Figure 5 outlines a detailed hierarchy of the Physical Address System, it consists of the municipality, part of the municipality, address area (street or village/farm) and a street/house number.

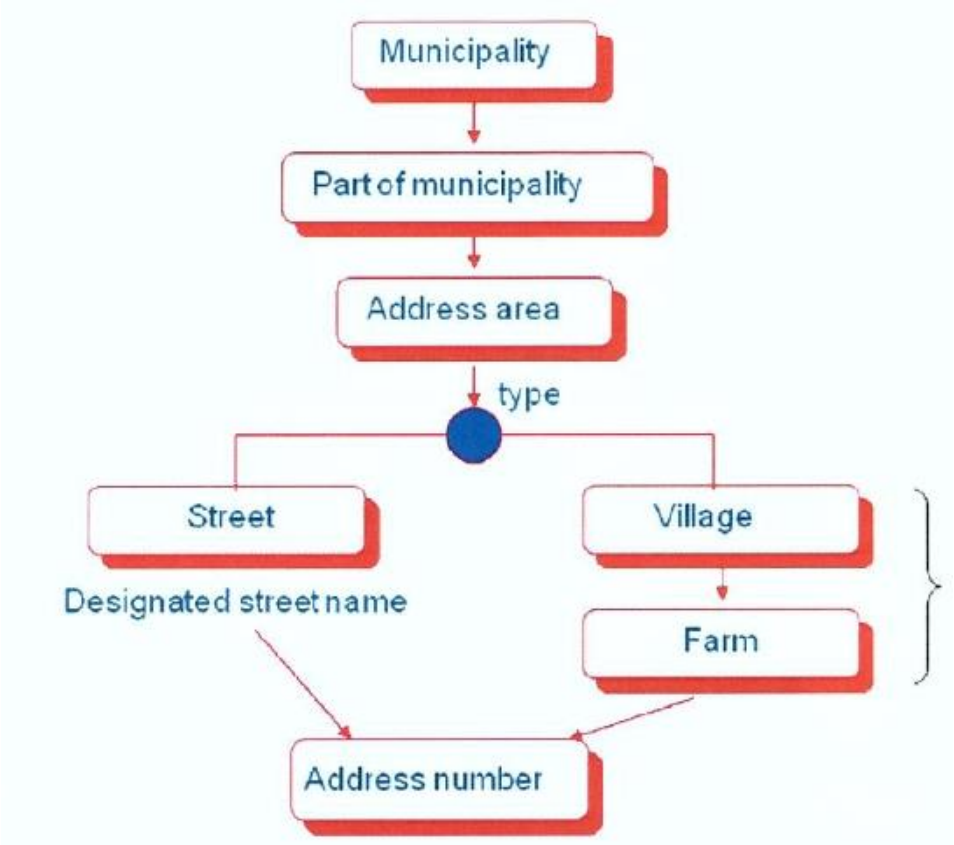


**Figure 6: Complete components of a physical address (Bergström, 2010)**

Following the physical address hierarchy, the address shown by the Figure 6 components is structured as follows:

Example:

| | |
|---|---|
| Municipality | Stockholm |
| Part of Municipality | Kungsholmen |
| Address Area (Street Name) | Bergsgatan |
| Street/ House number: | 29B |

The Swedish physical addresses do not point to objects inside a building or floor number in multi-residential area, they are linked to the building as well as cadastral units (Bergström, 2010). Botswana has urban areas with a planned parcel layout concept which is similar to the one in Sweden (Malatsi and Finnström, 2011). However, Sweden has street/house numbering, which are used instead of plot numbers that is currently used in Botswana. Sweden uses municipalities or part of municipality while Botswana is demarcated into districts and sub-districts areas hence this makes it not applicable.

#### *2.3.2.4 Australian and New Zealand*

Australia and New Zealand address are guided by AS/NZS 4819:2003 “Geographic information—Rural and urban addressing” standard. The Physical Address System design objective was to provide clear and unambiguous information to users in order to assist them to reach their desired destination within urban and rural setting. The rural address are described by reference to the road on which each address site is located followed by the hierarchy of administrative areas in which the address is situated (ISO 19160, 2011), a postal code is provided at the bottom of the address components to cater for postal delivery.

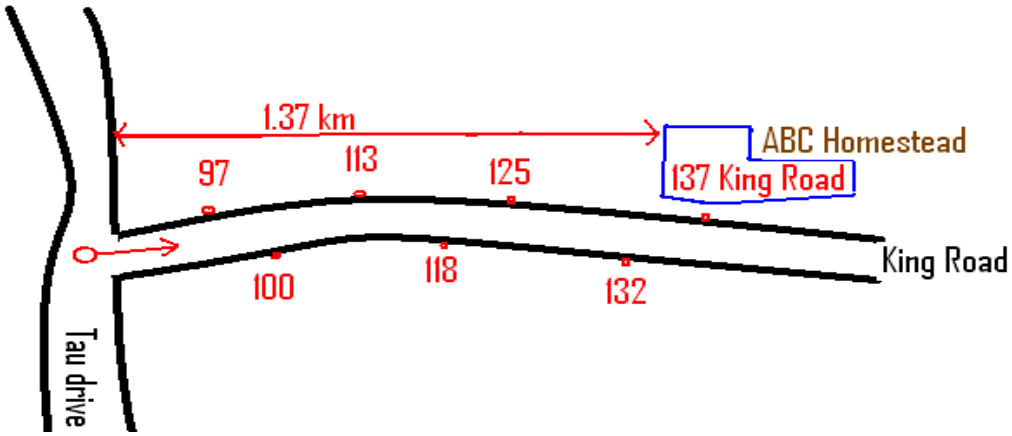


**Figure 7: Representation of rural addressing (AS/NZS 4819:2003)**

The rural address shown by the Figure 7 components is structured as follows:

| | |
|---|---|
| ABC Homestead, | Address site name |
| 137 King Road, | Rural address number and Road name |
| Kabachi NW, | Locality/Place name and State/Province/Territory name |
| 2123, | Post code |
| Australia. | Country |

The Botswana rural area households are laid out in a sparsely distributed pattern, so the Australia/New Zealand might be a suitable option to bench mark when designing rural addressing system. The numbering of the rural addresses start from a datum point at one end of the road. Odd and even numbers are allocated on opposite sides of the road (herein King Road) as shown on Figure 7. The distance in meters from the datum point is divided by 10 and rounded to a whole number. For example, the address site (ABC Homestead) in 1.37 KM from the datum point and situated on the left (odd) side and the rural address number is 137 King Road.

This type of physical addressing is suitable but the shortfall from Botswana context is that the rural road are not named and tarred as in the urban areas.

### 2.3.3 Evolution of the Physical Addressing Context Awareness

The physical world and electronic world converge, creating a completely new evolution where context awareness becomes important (Beard and Neville, 2014). To understand the evolution of the Physical Address System context awareness, this study looks at the notion of context itself, tool-in-context and borrows from Computing and Geographical Information Systems disciplines to aid to the understanding the Physical Address System context.

#### *2.3.3.1 The Notion of Context*

Most computer science and information systems studies define context within its situation or an event, and the definitions are often developed by details of scenarios or examples or by choosing synonyms of context (Sabbata and Reichenbacher, 2014). Schilit and Theimer (1994) define context as "as location, identities of nearby people and objects, and changes to those objects" while Schmidt (2003) simplifies the definition as an "interrelated conditions in which an object exists or occurs". Other authors like Abwod *et al.* (1997) point of view on context is how it solve the problem in its setting, their perspective, they define it as "any information used to determine the situation of an entity".

Dey *et al.* (2000) refer to context as "any information that can be used to characterise the situation of an entity", from this definition, an entity can be a person, place, or object that is relevant to the interaction between a subject and a technology. Schilit *et al*. (1994) outlined the important aspects of context as "where you are", "who you are with" and "what resources are nearby", the author state that this information can be used to determine why the situation is occurring at a certain location.

This study defines context in relation to the Physical Address System background and the Physical Address System itself, as an innovation and stakeholder roles. The roles are viewed as the stakeholder activities using the innovation within its described contextual background. The next section discusses tool-in-context.

#### *2.3.3.2 Tool-in-Context*

Hong (2008) describes “easy-of-use” as a concept essentially for Ubiquitous Geographic Information services. The author state that easy-of-use makes the devices aware of the user’s context, in return, it makes the devices use and provide only the relevant information based on the user’s current context.

This study apply the same idea but as the “tool-in-context” between the interactions of the innovation and other contextual dimensions, the tool-in-context happens from two possibilities that should be met in order to occur, 1) stakeholders should be able to access necessary physical addressing information anytime and anywhere irrespective of the type of gadgets they use as stakeholders may not be all the ‘human’ requirements but it may also incorporate applications, gadgets and other communication tools, 2) any stakeholder should be able to use the necessary physical addressing information without the need to interpret it or make an effort to understand the details of the physical addressing information (Dilley, 2002; Gajevic, 2014).

With this regard, context awareness manifests and is central to the concept of the tool-in-context to help explain how Physical Address System manifest within its context as outlined in Figure 8.

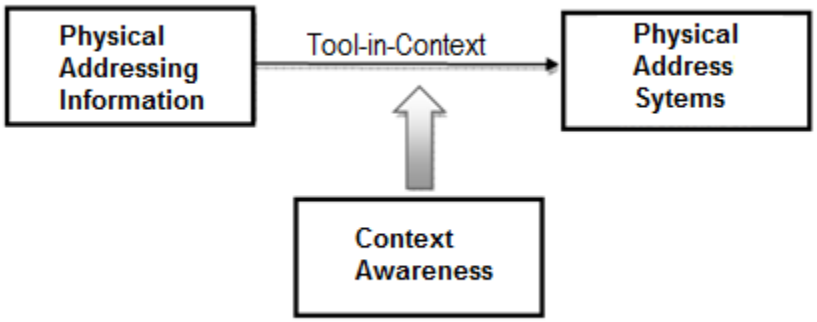


**Figure 8: Relationship between “tool-in-context” and Context Awareness.**

Bunker (1991, 2001) applied alternative models for understanding IS adoption perspective on the development and use of computer-based information systems that was suggested by Ehn and Kyng (1984) and Kammersgaard (1988). With this regard, Bunker (1998, 2001) developed an argument that views the Information Systems as tools that are created in context underpinned by norms and values of a certain organisation.

With regard to this research, these norms and values manifest in the skill set of the users so that the tool-in-context fit its purpose at the developing country settlement patterns (urban areas, village and rural areas, farms and cattle posts). The success of organisations can be determined by stakeholder roles being addressed. The Physical Address System (tool) should be applicable to Botswana landscape and must aligned to the developing country settlement patterns for stakeholders to be persuaded to adopt the innovation within its context.

#### *2.3.3.3 Ubiquitous Physical Address System as the Digital Representation*

The word “ubiquitous” means appearing or existing everywhere, this term is appended to other keywords in different scholarships to extend its description for smart devices, environments and interactions (Poslad, 2009). From the computing perspective, the term “Ubiquitous Computing” (UbiCom) describes the phenomenon of interacting in context of artefacts and environments everywhere to support intuitive human usage and enhance their interactive experiences which sometimes appears invisible (Schmidt, 2002).

From the Geographic Information System perspective, “Ubiquitous Geographic Information” (UBGI) is defined as an information platform that offers geographic orientation to users anytime, anywhere and with any digital representation gadgets to anything upon their contexts (Javidaneh and Karimipour, 2014) but it also incorporated applications and communication devices designed for the average member of the public. Context can be referred to the surroundings, environment, circumstances, location of users and background which determine or specify or clarify the meaning of

an activity/event (Ki-Joune, 2008; Hong, 2008; AG for UBGI, 2007). In this study, the Ubiquitous Geographic Information is synonymous to the Ubiquitous Physical Address System. Figure 9 shows the evolution of the Physical Address System context awareness to understand the ubiquity of the Physical Address System.

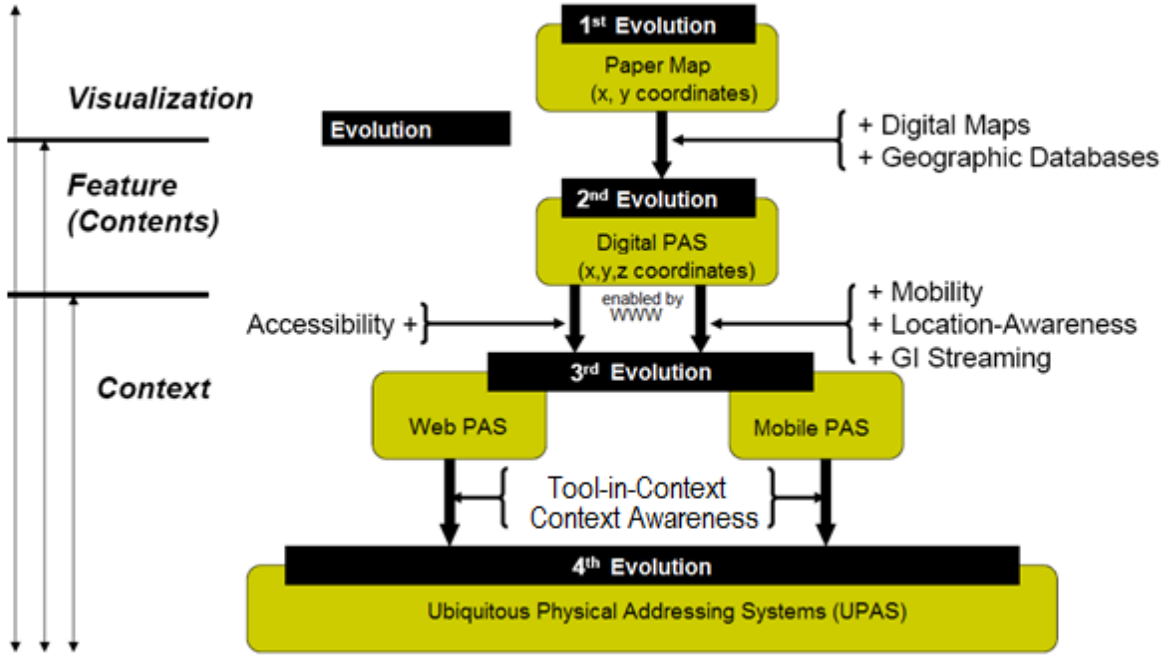


**Figure 9: The evolution of the Physical Address System Context Awareness (adapted from Ki-Joune, 2008 and Hong, 2008)**

The evolution of the physical address started in a form of recognition of the real world by historian sailors and travellers like John Cecil Roads and others. To reach a particular location, surveyors printed paper maps for manual interpretation. Paper based map has two dimension of x and y coordinates with the main objective to visualise a location of a feature on the ground where they intersect, and some people still use it in this era. Visualisation and interpretation of the geographic features was the focus to give an approximate locational orientation to users (Hong, 2008).

The advent of digital computers and its advancement of computer graphics made a realisation of digital maps and digital Physical Address System databases. The

computer systems made it possible for the second evolution because it added the third (z) dimension of the altitude which made it easy to handle geographic information on three dimensions. To represent the augmented reality (the blending of virtual reality and real life) of geographic features in graphic displays to give better geographic information representation by computer systems with desktop software. This resulted to the birth of software like Computer Aided Design (CAD) software, Spatial Virtual Reality software, GIS 3DTechnology Software and Spatial Information Advance Analysis tools (Google earth), ArcGIS Earth and others.

The third evolution of the physical addressing was realised through research and development in the IT/IS development such as advancement of World-Wide Web, GI streaming and smart phones or gadgets (Hong, 2008). This made way for the Web-based Physical Address System (Web-PAS) and Mobile-Physical Address System (Mobile-PAS) which led to the innovations of new type of information services like location based services, Google maps, Google street maps, ArcGIS Earth, Open Street and others. For example, Facebook check-In application and vehicle tracker applications, courier or postal services track and trace of parcels represent both the Web-PAS and Mobile-PAS.

Drawing from Computing and Geographic Information System to aid the understanding the ubiquity of Physical Address System (Hong, 2008), the forth new evolution is Ubiquitous Physical Address System (UPAS) conceptualised by this study is incorporated in “the notion of context”, “context awareness" and the "tool-in-context" as its main characteristics in the digital representation of the computer systems shown in Figure 10.

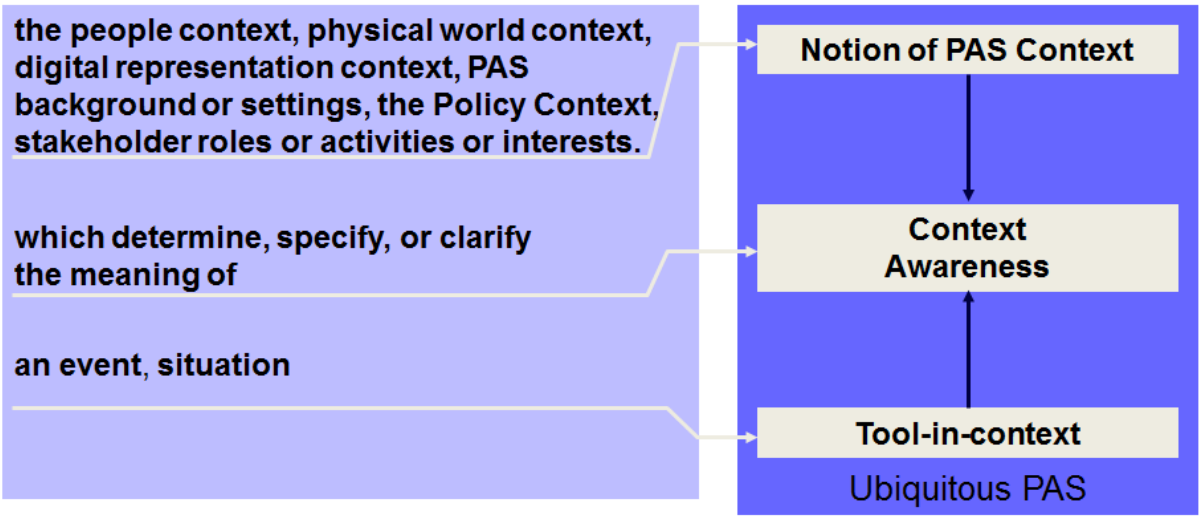


**Figure 10: Ubiquitous Physical Address System (adapted from Ki-Joune, 2008 and Hong, 2008)**

The digital representation context gadgets or computer systems are aware of the user geographic location (Sabbata and Reichenbacher, 2014) similar to the exact position on the ground because it uses global position services (GPS). Having gadgets that are aware of the peoples context, this enable the digital representation context to provide only relevant information of the physical world location based on the stakeholder roles or user current activities. With such context-aware digital representative gadgets, a true “tool-in-context" can be achieved (Javidaneh and Karimipour, 2014). The digital representative might persuade the stakeholders to adopt the innovation.

### 2.3.4 Situating the research and the digital representation solutions

The applications like Google Maps, What3Words, MapCode, Posttudes, Geotudes GPC CODES and others falls in the digital representation context, Rhind (2015) views them as technical solutions looking to solve a problem. The solutions have codes that are jumbled or mixed with characters and numbers, randomised and complicated numbers because of ambiguous algorithms. Often, the familiar codes are barcodes, phosphate stripes, QR codes and GIS co-ordinates. Most of these applications need de-coding either to a map latitude/longitude points, or need geographic reference system which

requires cartographic technical skills. This complexity does not help, as the information is not readable to humans compared to computers.

This study clarifies that digital representation solutions are not Physical Address Systems but play a part in the PAS context awareness. For a comprehensive Physical Address System, humans should be able to read, understand, and remember the physical address from the people context point of view. Humans should be able to use the physical address without the need to interpret it or make an effort to understand the details of it. The digital representations in computer systems and gadgets are complemented by the physical world and people context in a tripod relationship as a part of the PAS context awareness. If one context is absent, it might be difficult to find a physical address.

Rhind (2015) states that physical addresses often contain far more information than any code system. The author argues that there is no code system (even postal code system) that contains detailed information on how a mail items or parcel is to be routed beyond the delivery point such as, room numbers, floor numbers, divisions and departments. Postal code shows the granular details of the approximate boundary area where the physical address is located on the ground. A physical address holds profound meaning for humans to understand them easily compared to a coding system because they are linked to orientation information resources or guide posts like:

- signs of the streets, suburbs or official boundary area names as you enter a certain country;
- Erected sign posts and house/building numbers.

The codes add a layer of complexity and prone to potential error into a system. However, they improve and clarify physical address within the PAS context awareness and can be useful to solve temporary problems. The solutions can never be called Physical Address System or replace the PAS but disruptive innovation is still to be seen to shake the notion of Physical Address System concept and currently, there is still a need for the Physical Address System.

The physical addresses are logical and useful, therefore they are almost universally applied all over the world. They form part of our daily experience and they are part of our citizen's identity because they are incorporated in the countries Acts or Policies such as Electoral Act, Census Act, Title Deeds Certificates and Banking Act where people use PAS as a proof of identity together with national identity cards. The PAS contain a set of addressable components or elements which are hierarchal and allow us to find almost any land feature or land parcel on the ground. The PAS is also an integral part of our cognitive mind maps because people know their physical address fully, and they can offer their physical addresses whenever they are asked about it, which is different from the technical coding system.

The section that follows discusses the contextualist approach taken by this research to understand the role of context awareness and the form it manifest in the adoption of the Physical Address System

## 2.4 Contextualist approach

This section discusses the contextualist approach in IS studies that is used as lens in this study, the contextualist approach is considered important and makes it easy to understand how the information system manifest in different settings. The contextualist approach is discussed on the Context itself and the PAS which involves the people context, physical world context and the digital representation context. Lastly, it looks at the developing country context of this study, which is urban areas, village and rural areas, and farms and lands.

In Information System studies, the Contextualist approach clarifies the significance of considering context when studying change and processual nature of how it unfolds (Sharma, Barnett and Clarke, 2012). With this regard, context is contextualised to encompass the outer and inner context, where the former context refers to inter-organisational conditions like socio-politics, socio-economic, socio-technical to aid

competitive environment (Pettigrew, 1985; Pettigrew 1987; Pettigrew,1997) while the latter context focus on intra-organisational dimensions like structure, organisational culture and political situations.

Avgerou and Madon (2004) state that defining context is often difficult but the contribution of contextual approach is considered imperative and makes it easy to understand how the information system manifest in different situations/environments at that particular time. With regard to the notion of context, context can be defined as factors that affect or influence the information system and consequently influenced by it (Walsham, 1993) hence Avgerou (2001) outline that context is seen as an emergent phenomenon while Davidson and Martinsons (2015) state that context is king.

The power of the contextual approach is aligned to the provision of “guiding assumptions” to conduct appropriate research (Pettigrew, 1997). The dimensional and multiple levels of analysis lead to the emergent and social processual nature under which the given context is captured or manifest (Pettigrew *et al.,* 2001; Walsham and Waema, 1994; Walsham 1993). This different analysis suggests that theoretical perspectives can be appropriate to enable analysis and the social processes that are almost likely to be associated to the outcome.

Sharma *et al.* (2012) highlight that in Information System research, contextual approach is academically accepted to associate elements of content, context and the social process to the “ 'what', 'why' and 'how' of evaluation” questions, with the argument that “effective evaluation requires a thorough understanding of the interactions between these three elements” (Symons, 1991). This offers informed contributions to Information System theoretical frameworks as it enable recursive social relationship between the phenomenon of context and the information system (Sharma *et al.,* 2012), which is fundamental to this study. The next section discusses context and the PAS.

The sub-section that follows discusses the context with reference to the PAS, followed by the developing country context.

### 2.4.1 Physical Address System context

Kaenampornpan *et al.* (2004) state that most researchers make an effort to improve interaction by exploiting information relating to constant changes by users, devices and environment, based on the notion of context awareness. Context awareness is vital on stakeholder's roles. From this premise, the context awareness was focused on stakeholders, the innovation in its context, how the innovation relates to its context to provide relevant physical addressing information to stakeholders, where relevancy would be determined by the stakeholder roles.

The context enables the stakeholder roles to manifest with the tool-in-context or context-in-use in order to understand how they may influence the adoption of the innovation. For this study, the Physical Address System context is categorised as the people context, the physical world context and the digital representation context as shown in Figure 11.

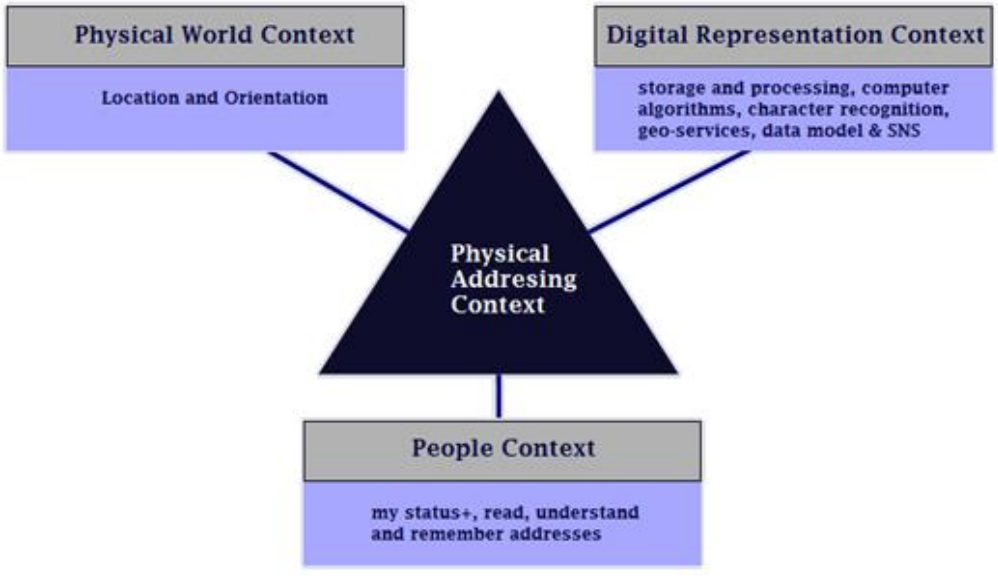


**Figure 11: Physical Address System context**

#### *2.4.1.1 People Context*

The people context incorporates all the 'human' or stakeholder requirements of a Physical Address System dependent on user situation such as (i.e. "humans should be able to read", "understand", and "remember the physical address"). The innovation should reflect the local culture of citizens of the developing country and aligned to their political mandate so that it creates a possible intent to use and persuade them to adopt. The information system in context should help to identify people social living patterns at specific locations (Coetzee *et al*, 2011).

#### *2.4.1.2 Physical World Context*

The physical world context refers to the actual location of the physical address on the ground in relation to how it should be reached by stakeholders. It also extends to collection of nearby people and social situations around the surrounding infrastructure (Coetzee *et al*, 2011).

#### *2.4.1.3 Physical representation context*

The digital representation context relates to the representation of physical addresses by the computer systems that enable stakeholders to interact with them and could make them to be persuaded to adopt the innovation, i.e. ("navigating physical address using gadgets to assist user physical orientation", "character recognition of physical addresses for mail sorting", "maintenance in databases") (Coetzee *at el*, 2011).

The context awareness, in terms of the context of the Physical Address System, is by stakeholders and their understanding of the roles they may play towards the adoption of the information system.

The next sub-section discusses the developing country context and how it is structured in terms of the settlements patterns. This is important for the applicability of the PAS to fit settlements patterns in order for the stakeholders to be persuaded to adopt the PAS.

### 2.4.2 The developing country context

In this Thesis, the developing country context is associated with culture on how people live. Information Systems research has acknowledged that culture is a complex and its multiple faceted phenomenon (Conner *et al.* 1987). Hofstede *et al.* (1990) state that culture is historically determined, socially constructed and mostly it is related to the anthropological concepts.

Geertz (1973), the most renowned anthropologist looks at culture as "a historically transmitted pattern of meanings embodied in symbols, a system of inherited conceptions expressed in symbolic forms by means of which individuals communicate, perpetuate and develop their knowledge about and attitudes toward life". With regard to the authors definition, there is evidence in developing countries of communities with settlements which has a pattern of meanings embodied in a system of inherited conceptions. For that reason, the cultural focus undertaken here as the context of developing country is the settlement patterns of urban, villages and rural areas, and farms and lands.

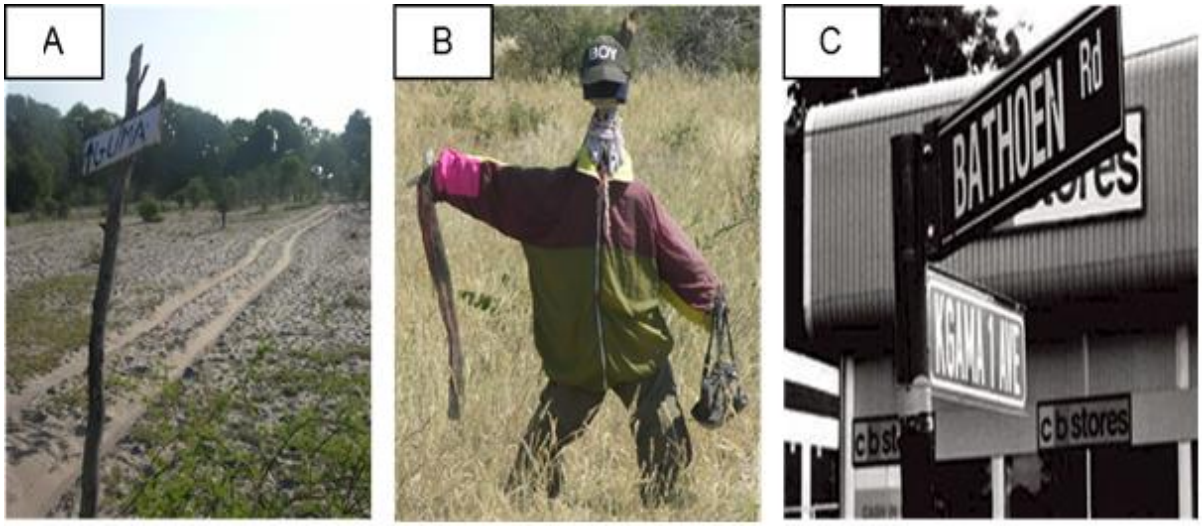


**Figure 12: Botswana Villages and Rural Areas (A), Farms and Land (B) and Urban Areas (C).**

The information system in this inquiry was bracketed on the contextual reasoning of the developing country settlement patterns (Figure 12) for stakeholders to be persuaded to adopt the innovation. Figure 12 is explained by the following sections.

#### *2.4.2.1 Urban areas*

Botswana gained independence in 1966 from Britain, since then, the developing country has transformed itself and the western cultural influence is evident in urban areas where cities and towns are structured according to physical plans and have signage (Figure 12C) on most of their streets. All plots are surveyed and registered with unique plot numbers.

#### *2.4.2.2 Villages and rural areas*

The people who live in villages and rural areas still maintain their tradition and practice their culture (Mathuba, 2003; Ditsela *et al.,* 2011). For the Physical Address System to

be applicable, currently the villages consist of a mixture of unplanned and planned settings as a result of maintaining and practicing culture. In planned village settings, some of the developments resemble those of towns. In unplanned settings, the development does not follow an orderly pattern and most of the time they are built along major roads, thus making it difficult to locate land parcels or buildings. In most cases, roads are started by vehicle tracks and then signage is placed in an unconventional was as shown in Figure 12A.

#### *2.4.2.3 Farms and lands*

With regard to the farms/cattle posts and lands, the borehole at the farms/cattle post signifies that there are house dwellings around the proximity and its used as physical address because it reference a place of interest on the ground. For the farms, the boundaries are fenced to prevent free range livestock on destroying crops. Most of the time, some farms are not fenced because of poverty inequalities. One can find a cultural signage of a scarecrow to scare birds or other animals on a ploughed field which acts as a signage for someone's property or represent a form of an addressed land parcel as shown in Figure 12B.

With this background, the context and context awareness can influence adoption of the innovation, if the Physical Address System is perceived to fit their country culture. The section that follow summaries the chapter of survey of literature and theoretical foundations.

## 2.5 Summary of the Chapter

The second chapter surveyed literature and discussed concepts that informed this study. The review of literature discussed theoretical frameworks for multi-dimensional and multi-level IS organisational innovation, the physical address system phenomenon

and the contextual approach of the research. The detailed physical address system phenomenon added value to the existing body of knowledge on unpacking of its fundamental elements.

The description of the Physical Address System phenomenon from the reviewed literature and its fundamentals incorporated its historical evolution at African and International countries for their applicability at the developing country - Botswana. The chapter also discussed the Physical Address System context awareness through the notion of context, tool-in-context and ubiquitous Physical Address System. Lastly, the chapter clarified and situated the research and the digital representation solutions (like Google Maps, what3word, Mapcode and others) which play part in the Physical Address System context awareness concept.

The next chapter discuss further discusses the literature that informed the research and review theoretical frameworks that grounds the study.

# CHAPTER 3: THEORETICAL FRAMEWORKS

## 3.1 Introduction

The preceding chapter discussed the survey of literature and theoretical foundation. The review of literature discussed multi-level and multi-dimensional theoretical frameworks for IS organisational innovation and the physical address system phenomenon.

The intention of this chapter is to discuss theoretical frameworks which popularly inform studies in adoption of information systems. Firstly, each theory is explained, followed by why it was chosen in this study, the origin of the theory is elaborated and the contested aspect of a theory is engaged. The limitation of the theory is recognised and discussed, finally explanation on how it was used in this study. The theoretical lenses discussed are the Technology Organisation Environment (TOE), Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), Social Cognition Theory (SCT), Technology Acceptance Model (TAM), Stakeholder Theory, Upper Echelon Theory (UET), Diffusion of Innovation (DoI) Theory and finally the conceptual research framework that guides this study.

The next section that follows discusses the theories or models for Information Systems adoption research.

## 3.2 Theories or models for Information Systems adoption

This section discusses the theories of adoption of information systems at the individual and organisational level to clarify the concepts of intention and behavioural studies, acceptance and use studies in information systems (IS).

Various theories with concepts of intention and behavioural studies, acceptance and use studies in information systems(IS) and other scholarships have been used to study the individual and organisational adoption of IS innovations (Ramdani and Atik, 2014; Harrison *et al.,* 1997). Venkatesh *et al*. (2007) summarised major milestones in information systems adoption research in general and categorised them into *Influential models*, *Replication and generalizability*, *Predictive validity*, *Competing models*, *Theory base to study unique problems*, *Temporal dynamics* and *other contingencies*. This study falls on the theory base to study unique problems at a country level.
The sub-sections that follows discusses the theories or models for IS adoption at the organisational.

### 3.2.1 Theories or models for IS adoption at the organisational level

With exception of other IS adoption theories in Information System research at organisational level, the Technology, Organisation and Environment framework (TOE) is so far the only recognised theory at organisation level while the Diffusion of Innovation (DoI) framework is applicable to both individual and organisation adoption of information systems. DoI Theory is one of the underpinning theories of this study and it is discussed more in detail below.

This study uses the Diffusion of Innovation (DoI) phases as a descriptive tool because of its simplified social processual flow of conceptual elements of organisational innovation, which is regarded as complex iterative process (Rogers, 2003). The Technology Organisation Environment framework discussion follows.

#### *3.2.1.1 Technology Organisation Environment (TOE) framework*

The Technology Organisation Environment framework was developed by Tornatzky and Fleischer (1990) and it constitutes three determinants of enterprise's context that influence the process to adopt when implementing a technological innovation. The framework has been adapted in IT/IS adoption studies since Tornatzky and Fleischer (1990) model. Many articles have been published in reputable journals, this is due to its useful analytical capability, solid theoretical basis, consistent empirical support and can be used for studying adoption of different types of IT/IS innovation like the physical addressing system. The framework is also comparable and consistent to the Rogers (1995) as it emphasise on characteristics of individual and characteristics of organisation as some of its determinants of innovation. Even though TOE framework is useful in IT adoption, and thus its construct of organisation, which is synonymous to the developing country informs this study.

The TOE lacks the social process flow phases of innovation adoption process compared to DoI Theory. The understanding of the social process and human actors (Stakeholders roles) is of interest and fundamental to the qualitative research design. For this study, it is crucial to understand the roles that stakeholders play within the social process to persuade them to adopt the Physical Address System within the developing country context.

### 3.2.2 Theories or models for IS adoption at individual level

This sub-sections discusses the theories or models for IS adoption at individual level. The sub-sections present the Theory of Reasoned Action (TRA) and Theory of planned behaviour (TPB), Social Cognitive Theory (SCT) and the Technology Acceptance Model (TAM). It discusses the relevance of their constructs for the adoption of information systems research focus at the individual level.

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#### *3.2.2.1 Theory of Reasoned Action (TRA) and Theory of planned behaviour (TPB)*

Based on intention and behavioural studies, a psychological study also provide a building block for research on IT/IS adoption of the innovation by organisation and use by individuals (Harrison *et al.,* 1997). Theory of Reasoned Action (TRA) by Fishbein and Ajzen (1975) and theory of planned behaviour (TPB) by Ajzen (1985; 1991), are old and renowned intention models in Information Systems research that incorporate concepts and principles of understanding human subjects with behavioural intention to perform certain activities.

Theory of Planned Behavior (TPB) was also developed from the Theory of Reasoned Action (TRA). Ajzen (1985, 1991) extends TRA by adding perceived behavioural control to the original TRA model as an additional determinant of intention and behaviour concept as analysed by Sophonthummapharn (2008). Literature articulates (Solbraa-Bay, 2016) that TPB model constructs of attitude, subjective norms, and perceived behavioural control are empirically realised to predict individual behavioural intentions (Ajzen, 1991).

Behavioural intention is defined as “the strength of one’s intention to perform a specific behaviour” (Fishbein and Ajzen, 1975), which is assumed to be determined by subjective norm and behavioural attitude. Subjective norm is defined as “the person’s perception that most people who are important think should or should not perform the behaviour in question” (Fishbein and Ajzen, 1975). The latter is defined as “an individual’s positive or negative feelings about performing the target behaviour”. In this study, the behavioural attitude is regarded to emanate from individual beliefs regarding the behaviour, which in innovation adoption research pertains to the physical address stakeholder beliefs about the innovation’s attributes.

#### *3.2.2.2 Social Cognitive Theory (SCT)*

Social Cognitive Theory (SCT) was based from the influence of the Social Learning Theory (SLT) (Bandura, 1986). The SCT is part of the psychological theories intended to explain why living things (animals or people) behave in the unique ways within their context (Sophonthummapharn, 2008). The SCT theory is also applicable to predict an individual's behaviour toward the use of information systems functionality.

Compeau and Higgins (1995a, 1995b) applied the SCT to the context of computer usage and adoption. Sophonthummapharn (2008) state that two more factors that also influence the usage of technology are affect and anxiety. The affect refers to an individual's liking for a particular behaviour while anxiety, in contrast, refers to negative feelings or moods toward the usage of technology. The individual aspect of SCT is not suitable for this study as one of the multi-dimensions is stakeholders, which are seen as entities or organisations.

#### *3.2.2.3 Technology Acceptance Model (TAM)*

On the background of TRA discussion, the TAM (Davis, 1986, 1989; Davis *et al.,* 1989) was originally developed to predict the adoption of information systems in organisations but its concepts have later found use in a wide range of studies in the individual analysis domain (e.g., Agarwal and Karahanna, 2000; Hong and Tam, 2006; Koufaris, 2002; Nysveen *et al.,* 2005; Pavlou and Fygenson, 2006; van der Heijden, 2004; Venkatesh and Davis, 1986). By virtue of its popular usage on individual studies and borrowing a lot from individual theories, this study categories TAM to be amongst theories or models for IS adoption at individual level which is not focus of this study

The next section discusses the underpinning theories used by this study.

## 3.3 Underpinning theories/frameworks

This section discusses the theories that underpin this study. These theories included Stakeholder Theory, Upper Echelon Theory, and the Diffusion of Innovation Theory. From these theories, a research framework was conceptualised. The next sub-section discusses the stakeholder theory.

### 3.3.1 Stakeholder Theory (ST)

This section discusses the stakeholder theory as a lens for this study. The intent of this section is to explore and describe the relationship and the relevance of demanding stakeholder roles to understand how they may influence the adoption of the Physical Address System, in the developing country perspective.

Stakeholder theory has been reviewed in many research fields and its approach keeps changing. This section reviews the stake and stakeholders concept, origins of the stakeholder theory, dynamics of stakeholders and classification models, stakeholders Influence strategies and positions it in the context of this study.

Stakeholder management is a broad and universal management concept. Over the past two decades and more, stakeholder concept was always focussed on the firm or organisations (production model, managerial model, “hub and spoke” stakeholder model, the single and multi-relational stakeholder network model), providing a holistic framework for situation analyses and strategic corporate management performances (Freeman, 1984; Yongkui *et al*, 2011). Stakeholder literature discusses the most important task of strategic planning, as the management of demanding stakeholders in relation to their roles (Freeman, 1984; Mitchell *et al*. 1997).

Moreover, the stakeholder concept in the information system is relatively new, it refers to individuals and groups/entities within an organisation for effective information system

planning, development and implementation which is different from strategic management studies (Pouloudi, 1999, Mumford and Weir, 1979; Mishra *et al*. 2013).

#### *3.3.1.1 Stakes and Stakeholders*

A stake is a claim or interest or a share in an organisation and sometimes it can be assumed as a need, role, expectations and ownership. A stakeholder can be defined as an individual or sometimes as a group or entity with stakes within an organisation (Weiss, 2006). This is why they need to be managed so that their roles are well understood (Chinyio and Olomolaiye, 2010).

The term has become increasingly dominant since Freeman's (1984) reviewed it towards the Strategic Management perspective of the stakeholder approach, this led to other writers to suggest definitions like

> *"those groups or individuals who are affected by the organisation as well as those who can affect it"* as outlined by Ackermann and Eden (2011), Bryson *et al*.( 2002), and Freeman and McVea (2001).

Different researchers have defined the stakeholder concept differently (Table 3) from different research fields according to stakeholder roles. Eden and Ackermann (2011) give us an insight that this lack of clarity from the early years of the stakeholder conceptualisation occurs across several research arenas beyond strategic management.

For this study, the definition would be:

> *A stakeholder is this is study is defined as the government and private entities that can effect, affect and/or be affected by the adoption of Physical Address System.*

*Effect:* means to make it happen or to put in place and this can only happen once the stakeholder is convinced and persuaded that the Physical Address System can add value.

*Affect*: means what change the Physical Address System will bring positively or negatively.

*Be affected*: means what changes will the Physical Address System innovation brings to the way stakeholders are currently doing things.

#### *3.3.1.2 Origins of Stakeholder theory*

Stakeholder Theory has in recent history been emerging as articulated within the scholarly expansion of Strategic Management, Management Studies and Management Information Systems disciplines. The concept of a stakeholder is generally accepted in the business context and many authors approximate it to have been around about thirty years ago and refer to it as the Freeman evolution. Freeman (1984) is one of the pioneers of the stakeholder concept in management studies discipline (Mitchell *at el.*, 1997; Lepineux, 2005; Jones, 1995). However, other authors insinuate that the concept was around for about five to ten years ago before Freeman evolution of stakeholder concept (Gomes, 2006). Lepineux (2005) further highlight that the stakeholder concept first surfaced at Stanford Research Institute (SRI) in 1963 which was acknowledged by Freeman (1984) and there is a conspiracy theory that the concept was first discussed by Mary Parker Follet in 1918 (Shilling, 2000). Despite all this, there is a general consensus that it is relatively a recent concept (Mgemane, 2012).

Donaldson and Preston (1995) framework on stakeholder concept distinguish stakeholders of being descriptive, instrumental and normative aspects that can help to classify stakeholders. The stakeholder concept is recent into the Management Information Systems discipline (Mumford and Weir, 1979; Pouloudi, 1999; Mishra *et al*, 2013). In the trace of this is, Pouloudi (1999) has explored how stakeholder

management has influenced its notion, its use and implication in the information system development while of recent, Mishra *et al* (2013) looked at the application of stakeholder theory in the information systems field. This view is qualified by the graphical flow of stakeholder evolving literature history summarised by Elias *et al*. (2002) as outline by Figure 13.

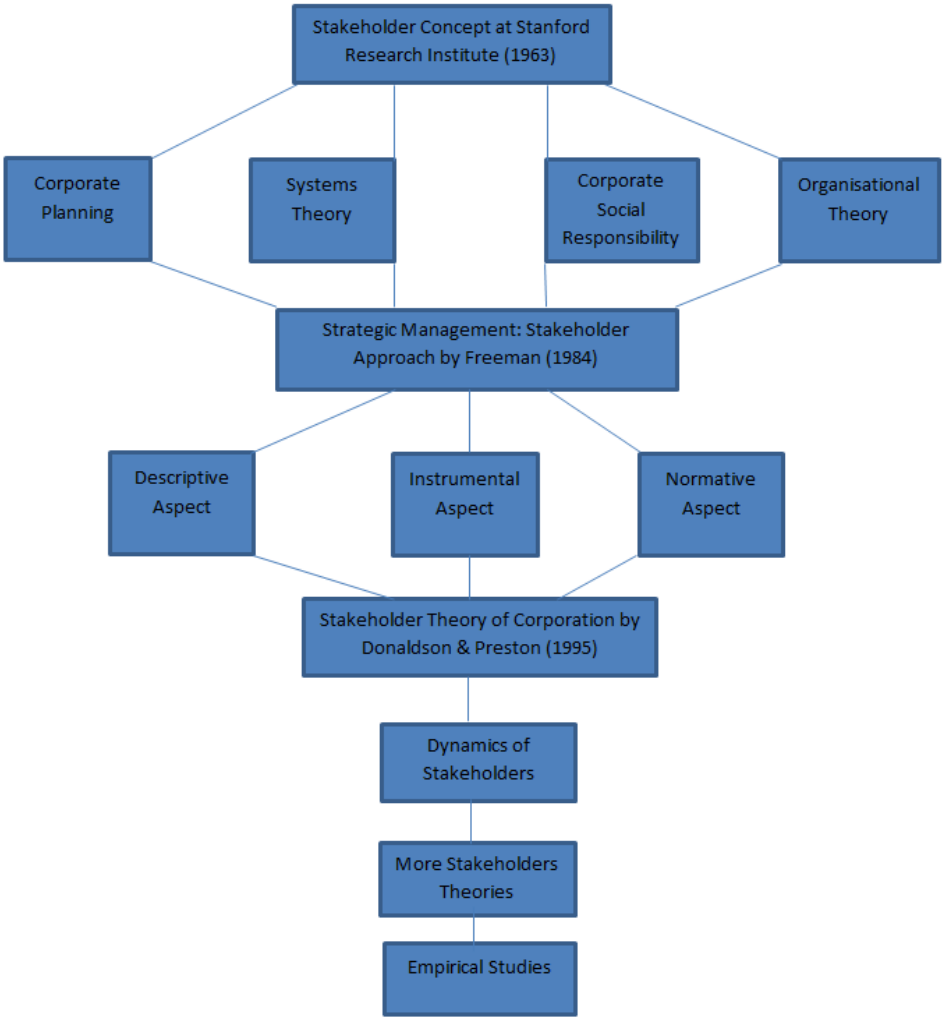


**Figure 13: A map of stakeholder history (Elias et al. 2002, Mgemane, 2012)**

As the stakeholder concepts is expanded to different schools of thought, views on the stakeholder approach increased and became more confusing at times (Friedman and Miles, 2002). Austen *et al.*, (2008) summaries this number of views as unfortunate,

some were invaluable discussions or arguments, but sometimes personal because of exchanges from proponents of the various views from different scholarships (Frooman 1999). This study falls at empirical study of the hierarchy.

#### *3.3.1.3 Dynamics of stakeholders and classification models*

Various stakeholder models have evolved over the years because of the dynamic environment they operate within, stakeholder literature has identified three groupings and their variations (Mgemane, 2012). From the organisation point of view, the models outline the relationships between organisation management and its stakeholders. The first model is the stakeholder view of an organisation or a firm, Fassin (2009) state that the model demonstrates relationships among various stakeholders around an organisation.

The second group are from authors that categorise stakeholders to determine their appropriateness and their potential management strategies. These are based on:

- Power versus Interest,
- Needs versus Wants,
- Power versus Influence grid
- Influence versus Impact grid
- Supply versus Demand,
- Influence versus Impact and,
- Mitchel *at el.*'s, (1997) Salience model base on Power, Urgency and Legitimacy.

Mitchel *et al*, (1997) salience model classify stakeholders based on three attributes of power, urgency and legitimacy. According to the model, the authors put emphasis on that a possession of one attribute, a combination of two or three of them generate a typology of stakeholders towards their salience, research and management implications

(Mgemane, 2012; Freeman and McVea, 2001; Mitchel *et al.,* 1997). Figure 14 represent the stakeholder salience model.

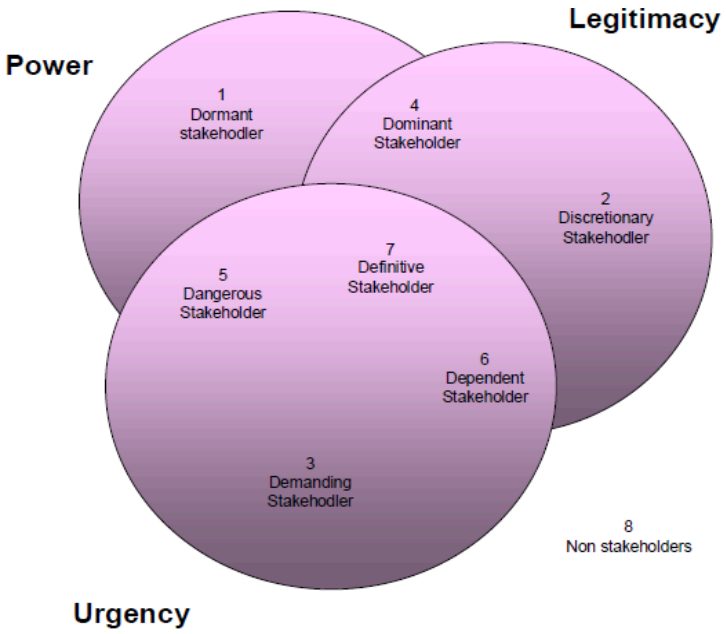


**Figure 14: Stakeholder salience model (Mitchell *et. al*, 1997)**

Mitchell *et al*., (1997) define power as the ability to control resources, urgency exists when an attention need to be given to stakeholders and finally legitimacy refers to law abiding way of going about doing business within the stakeholder community. For their typology proposition concerning their salience, three attributes are highly salient and require management attention, two attributes are expectant (i.e., potential) stakeholders and need to be considered and one attribute are latent and do not require management's attention but they are recognised.

The third group, are those with prescribed steps for the stakeholder strategy formulation process (Mgemane, 2012, Koson, 2008; Elijido-Ten, 2009, Freeman, 2010). This study can be pre-maturely placed between the first and second group as it seek to understand how the stakeholder roles and how their relationships manifest in the adoption of the Physical Address System.

#### *3.3.1.4 Stakeholders Influence Strategies*

Stakeholder management is a process in which organisational stakeholders pursue their interests but not forgetting other stakeholders that they are doing business with, in summary it is about relationships between an organisation-stakeholders (Jackson, 2005; Chinyio and Olomolaiye, 2010) or vice-versa stakeholders-organisation (Boatright, 1994). Strategies or the organisation view point have been develop for this purpose (Savage *et al*., 1991; Jawahar and McLaughlin, 2001), while Frooman (1999) and Frooman *et al*. (2005) identified influential stakeholder strategies that can swing the decision of an organisation.

An organisation can be influenced in different ways by stakeholders. Stakeholders roles need to be understood and attention need to be focused to the stakeholders with different claims because they might have moral or philosophical reasons such as corporate social responsibility (Doh and Guay, 2006; Berman, 1999; Enquist *et al*., 2006). They also might have practical reasons so that they seek licence to operate, innovate and compete (Ring and Van de Ven, 1992). They might have strategic planning reasons to take advantage of identifying opportunities and threats (Heracleous, 1998) or to put themselves in a better position of business.

From the organisation managerial viewpoint, stakeholder success is based on an iterative process of stakeholder management where the roles of stakeholders are managed (Kosonen, 2008). Freeman (1984) stance analysed stakeholders with a view of responsibility on managerial tasks and the framework was implemented within the organisational strategic management process. By doing that, Freeman (1984) suggested that an organisation strategy process which looks at critical issues for an improvement and development of stakeholder strategies is illustrated by Figure 15.

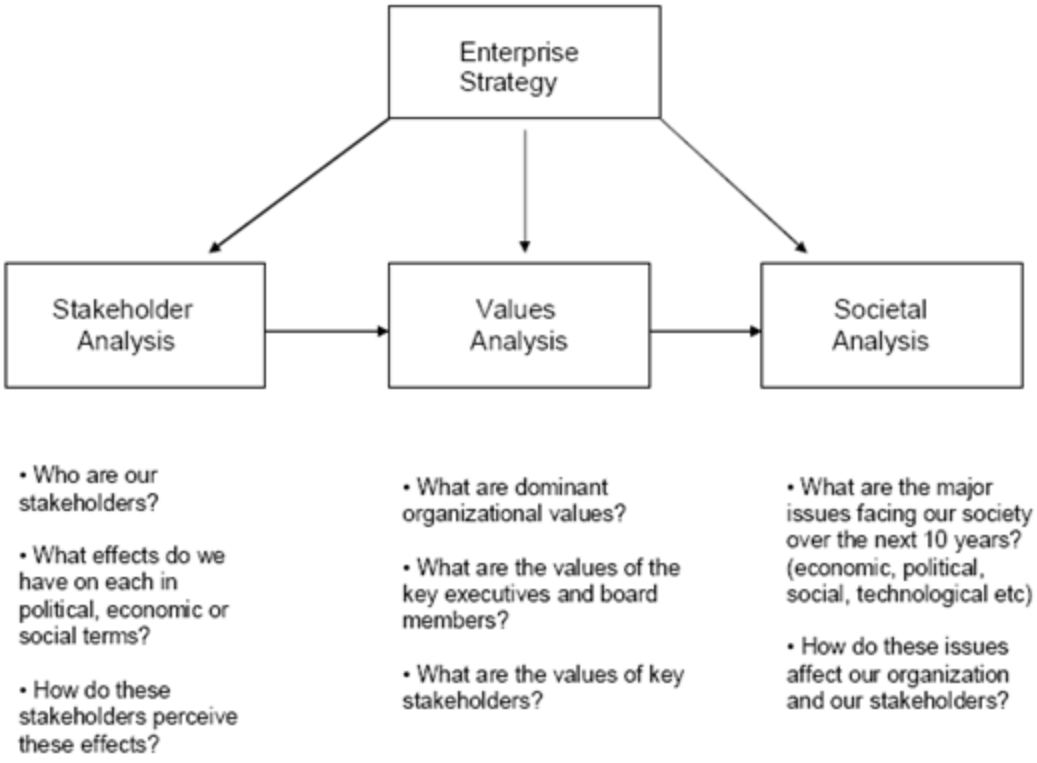


**Figure 15: Enterprise level strategy process by Freeman (1984)**

Literature reveals that Management literature always analysed stakeholder from the organisation or firm viewpoint. Frooman (1999) looked at the stakeholder influence strategies and investigated the types of strategies available to stakeholders and the factors of how each chooses to utilise. With this point of view, Frooman (1999) emphasis that his study differs on the attribute of power compared to Mitchel *et al*, (1997). Mitchel *et al*, (1997) looked at power as an attribute on an individual but this study is at organisional level.

Other scholars outline that uncertainty facing the organisional is a critical factor that can influence stakeholders. Strategies to involve, monitor, defend, engage and collaborate with stakeholders to assist managers to represent different stakeholder entities. The managers need to manage supportive, marginal, non-supportive and mixed blessing stakeholder types.

#### *3.3.1.5 Identifying, Categorising and Prioritising Stakeholders for relationship building*

It is important to manage stakeholder relationships so that there is synergy between stakeholders in order to be effective if the communication boundaries are clearly defined and there is understanding of the engagement, a basic crucial inquiry to any stakeholder being involved would be, "who is involved" and "how and what relationships needs to be managed" early in the initiative. The process is simplified by management literature from Bunn *et al*. (2002), Preble (2005) outlined that providing a list of potential stakeholders, identifying stakeholders, categorising and finally prioritising stakeholders might be difficult to manage the entire stakeholders at the same time.

Preble (2005) proposed a comprehensive model of stakeholder management that combined the theoretical developments with practical experiments and came up with six process model of managing stakeholders. Thus, from the six steps of process mentioned by Preble (2005), the first four are relevant to this study and can be incorporated with lesson learnt from the Geographic Information Systems literature (Hjelmager *et al*. 2008) about stakeholder management. This is envisaged to close theoretical gaps of two different social science disciplines of Geographic Information Systems and Management Information Systems, which informs this study.

In summary of the stakeholder theory, stakeholder management is very important in order to complete an initiative successfully similar to the adoption of an information system. However, for a national project initiative like the adoption of the PAS at the country level, there is a need for stakeholder analysis to find which stakeholders are important and which are not, and then manage the important stakeholders closely because they can affect, effect and be affected by the adoption of the physical address system

The next section that follows discusses the Upper Echelon Theory.

### 3.3.2 Upper Echelon Theory (UET)

In this section, the Upper Echelon Theory proposes that stakeholder leadership behaviour in an organisation is influenced by their lived experiences as a result of their technical and professional expertise. The lived experience of stakeholder's leadership or stakeholder managers on locational addresses is vital in the adoption of the information system.

The Upper Echelon Theory (UET) by Hambrick and Mason (1984) is used to profile employees within their organisation who manage the affairs and make decisions for the organisation. The UET also connect leaders characteristics and their behaviours towards the organisation outcome. The theory surmises that leader's behaviour is a function of their values, experience, socio-economic status, financial position, educational qualifications and personalities (Hambrick and Mason, 1984). That being said, the organisations are what their leaders think, feel, perceive, and believe and its a way forward with regard to the engagements on any business, strategic and operational activities (Martin and Matlay, 2003; Simpson and Docherty, 2004; Galloway and Mochrie, 2005).

Mumford *et al.* (2002) highlight that in order to possess leadership qualities that are outstanding and well recognised, the leaders shall have technical, professional expertise and innovative/creative skills so that they can manage or handle complex and situation critical issues within organisation. The leaders should also able to focus on the organisation vision. Practically, the leaders should be able to critically analyse the environmental threats and opportunities in order to motivate and have the ability to steer the ship in the right direction.

In its origin, the Upper Echelon Theory ought to inquire whether top managers influence their organisation in two ways. Firstly, the theory assesses leaders (CEO and Top Management Team) demographics such as age, gender, working experience and education (academic qualifications). The demographics are assessed whether they enable or inhibit organisational performance and secondly, they measure the underlying

psychological distinguishing quality of leaders and determine whether or not they relate to the organisational performance.

Information Systems literature indicate that a significance of studies on Upper Echelon research focused more on the demographics (age, gender, tenure, functional background, working experience, academic qualification and others) approach rather than the psychological distinguishing quality of leaders which are perceived to directly influence the organisational outcomes (Carpenter *et al.*, 2004; Hambrick and Mason, 1984). In addition to the former approach, Murray (1989) conducted a study on top management team demographics related to organisation innovation and organisational performance respectively as outcomes and it was considered a step way forward for organisational scientists and practitioners alike to understand the factors that underpin the cognitions, values, and perceptions of organisation leaders. Recent scholar like Nishi, Gotte and Raver (2007) established how the demographic characteristics of senior management are positively related with the adoption of the information system artefacts. For the latter approach, there has been a dearth of studies which have applied UET to IS scholarship. This study looks into both approaches in order to understand which one fit the phenomenon in the social inquiry.

With regard to the UET limitations, the demographics (based on Top Management Team) is criticised by Priem, Douglas and Gregory (1999) with a view of sacrificing "construct validity", "explanatory power" and "prescription practicality". In a nutshell, for a demographics–based conducted research, often the researcher is unsure of what the demographics being measured reflect. Hambrick and Mason (1984) are of a view that cognitive diversity is imperative in a dynamic business environment and that demographics served as a way of understanding deep-level personal factors such as personality, power, values, interest and others. Carpenter *et al.* (2004) described demographics as observable factors.

In this study, it will be interesting to understand how UET demographics (professionalism, education background and working experience) compliment the Stakeholder Theory (stakeholders influence strategies). Nevertheless, our understanding of the psychological organisation leader’s behaviour and how they can

influence IS/IT adoption at Botswana as a developing country context remains unexplored (Eze *et al*., 2011).

The Upper Echelon Theory is used to select stakeholder managers to represent the identified stakeholders due to their physical addressing lived experience and perceptions. This might offer explanations and understanding of physical addresses because they act in the best interest of the stakeholders to adopt the Physical Address System at the developing country.

The section that follows discusses the Diffusion of Innovation theory.

### 3.3.3 Diffusion of Innovation Theory (DoI)

This section discusses the Diffusion of Innovation Theory as one of the IS adoption theory used in both the individual and at organisation level. This thesis is about the adoption of an Information System (IS) at a country level. This study acknowledges that the DoI is mostly used in quantitative research. However, in this study, the Diffusion of Innovation (DoI) phases were applied as a descriptive tool because it simplify social process flow of conceptual elements of organisational innovation which are regarded as complex iterative process (Rogers, 2003).

The original DoI research was done as early as 1903 and was developed further by E.M. Rogers in 1962. Rogers is largely credited with the formalisation with the concept and its current usage in most scholarships as there is a trend that, "most innovations have an S-shaped rate of adoption" (Rogers, 1995). Ellsworth (2000) made a comment that the framework is a practitioner's guide. Rogers (1995) defines innovation as "an idea, practice, or object that is perceived to be new by an individual or other unit of adoption". The author views communication as "a process in which participants create and share information with one another to reach a mutual understanding". Rogers framework looks at innovation diffusion from the communication studies perspective, from the moment the innovation is introduced until the end of its journey (innovation

adoption process). The theory has evolved over the years and other scholars have applied it in different scholarly contexts.

Rodgers (1995) distinguishes human factors and the innovation, this led to Ellsworth (2000) posit that the model provides the guidelines for the innovation determinants that influence the intended adopter and it particularly rely on human capital who will be stakeholders in this context. Rogers proposed four main elements that may influence the innovation adoption are: the innovation itself, communication channels, time, and the social system .The adopters are categorised as risk takers, waiters and skeptics, hedgers, and slow pokes. With regards to Rogers (1995) model, adoption is stated as “a process by which an innovation is communicated through certain channels over time among members of a social system”.

Rodgers (1983) outlined that the innovation process consist of five phases while Rogers (1995) has four phases of knowledge, persuasion, decision and confirmation. This study looks to utilise Rogers (2003) Innovation-Decision Process Model as a lens because it explains the different communication channels interchangeably as the innovation transit. This is shown by Figure 16.

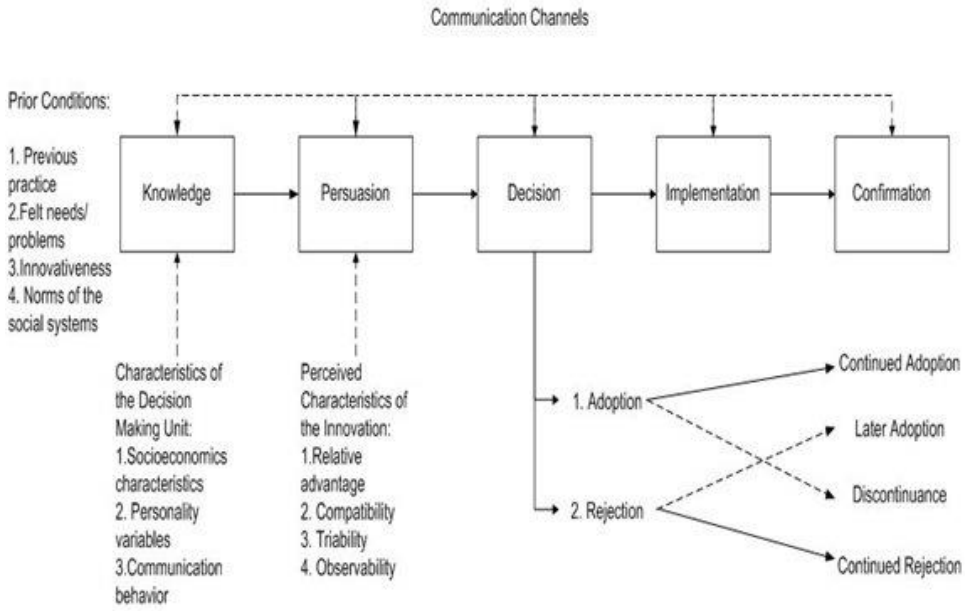


**Figure 16: The Innovation Decision Process Model (Rogers, 2003)**

Rogers state that the *knowledge phase* commence when the decision making unit has access to the innovation and learn how it works (Rogers, 1983). With regard to the *persuasion phase*, selective perception becomes increasingly import and the attitude about the innovation takes a central role, this stage would determine the decision making unit awareness of the innovation and if persuaded or not persuaded (Dobbins, 1999). For the persuasion stage, individuals seek to answer questions such as “what is the innovation all about” and “will its use fit with how we do business”. During the *decision stage*, the organisation engage in a jury type of action to either adopt with a view of continued adoption or discontinue at some point in time or reject the innovation for later adoption or continued rejection according to their priorities. The *implementation phase* ensure that the innovation is in place after the innovation adoption decision has taken place and the *final stage of confirmation*, where Rogers (1983) state that organisation would look at options to find alternatives but they may turn around against what they agreed upon.

This study is about the adoption of Physical Address System (the innovation) within, a developing country. There is a need to explore and identify determinants of innovation that may inhibit or enable the innovation adoption process of the Physical Address System in a developing country. The DoI theory outline the Innovation Decision Process Model (Rogers, 2003) which is about the social interaction and innovation adoption processual flow of four stages of the *Prior Conditions*, *Knowledge* and *Persuasion* stages, and lastly the *Decision* stage or *PAS innovation adoption outcome*. This is important for this study because it is imperative to understand the adoption of the PAS at a country level as a social process and an outcome.

The next section discusses the conceptual research framework that guides the study.

## 3.4 Conceptual Research Framework

This section discusses the conceptual research framework. The conceptual research framework is developed from the underpinning theories (see Section 3.3) of the research. The framework maps to the tested theories that embody the findings of many researchers on why and how a particular phenomenon occurs. A conceptual research framework represents the researcher's synthesis of literature on how to explain a phenomenon. In other words, it simply maps out conceptual issues required during the research process given the review of previous knowledge from conducting systematic review of literature and observations on the current subject of research. The conceptual issues are placed within logical and sequential designs, which are often represented, in a graphical format or mathematical formula.

Since the argument is that the adoption of IS at a country level is complex, varied theories were employed as lenses or underpinning theories to tackle the various aspect and conceptual issues of the study. The theoretical lenses used were the Diffusion of Innovation, the Stakeholder theory, and Upper Echelon Theory to make assumptions on prior conditions, knowledge, persuasions and decision of the innovation adoption process phases to persuade stakeholders to adopt the Physical Address System.

This study developed two conceptual research frameworks as 1) conceptual research framework and 2) the schematic conceptual research framework. The next section discusses the conceptual research framework.

### 3.4.1 The Conceptual Research Framework

This sub-section discusses the conceptual research framework based on the research objectives, identification and clarifying key concepts and their inter-relationships as they manifest within the social process.

The underpinning theories of Diffusion of Innovation, the Stakeholder theory, and Upper Echelon in this study were identified as the starting point to understand the research problem. Furthermore, the underpinning theories established the vision to which the problem is directed through a conceptual research framework. The framework determined and defined the focus, theoretical issues and the problematisation of the research by establishing orderly connections between observations and facts as depicted on Figure 17.

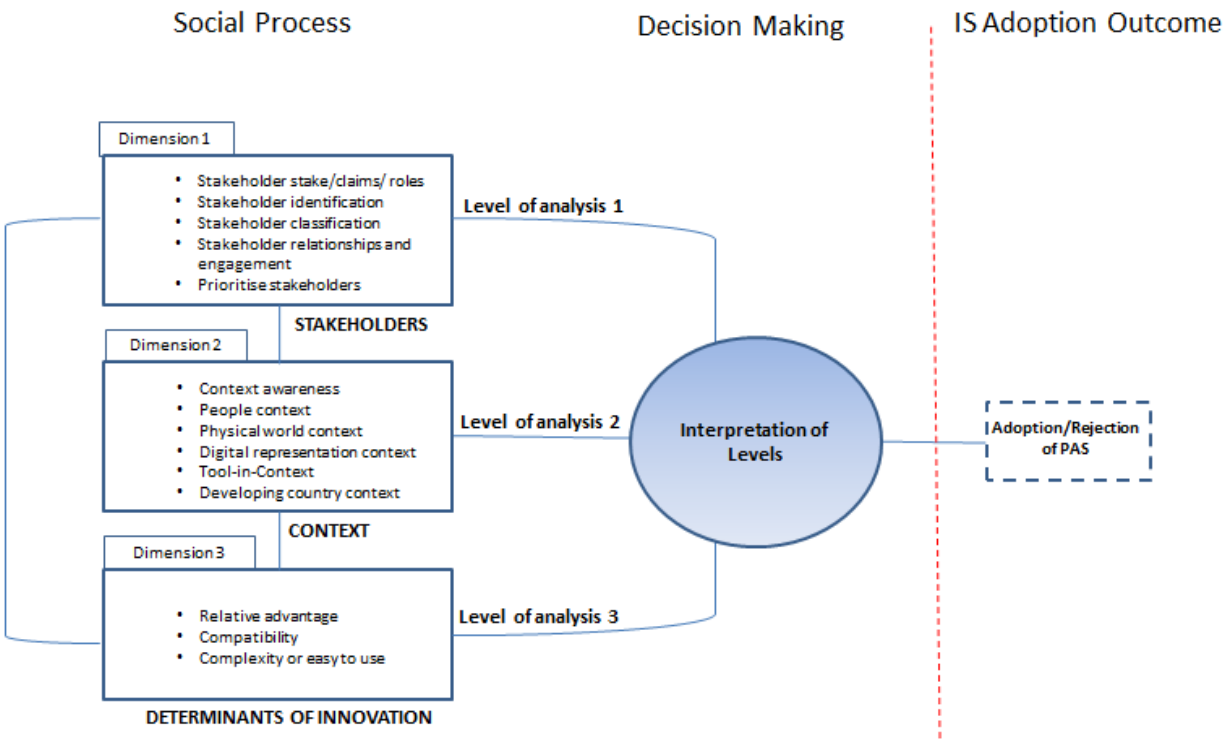


**Figure 17: Conceptual research framework for the adoption of PAS**

Figure 17 shows a graphical presentation of framework elements of context, determinants of innovation, stakeholders, the social process, decision making and finally the Information Systems adoption outcome. The framework elements indicate interrelationship and interaction with one another to achieve the adoption of PAS after

interpretation of results at the levels of both government and private institutions. The dimensions are discussed in the next sub-sections.

#### *3.4.1.1 Stakeholder or Dimension 1*

In this study, the role of stakeholders is underlined as the primary object of interest in studying the phenomenon. The stakeholder manager's human social cognition (e.g. attitudes, values, intent, beliefs, and experiences) and social behaviour (e.g., events, actions taken, structure interacting with action, social decision making) was important to influence adoption of the physical address system. The stakeholder roles, identification, classification, relationships and engagement, and prioritisation are discussed in more detail later in see Section 3.4.2.1.

The Upper Echelon Theory (UET) was utilised by this study to select the stakeholder manager's personality according to their varied characteristics which include *lived experiences* and *perceptions.* The stakeholder managers understanding of physical addresses are important because they acted in the best interest of their stakeholders to adopt the Physical Address System. Stakeholders experience in this study would be understood to be socially constructed interaction within their contexts (Pfaffenberger, 1992).

Strong political will or buy-in will make the stakeholder managers psychological behaviour and in position of influence to understand, become aware, develop attitude and commit to the decision to adopt the innovation. The country leadership should be flexible and provide conducive environment for the innovation adoption process to manifest using their personality variables.

#### *3.4.1.2 Context and Dimension 2*

Currently, in Botswana, the physical addressing is by way of describing a specific location or destination. In other words, a locational address is given by asking people or relying on local knowledge for directions. For the traditional way, there is a usage of plot numbers instead of best practice approach of house numbers. Finally, there is different formats of assigning address by stakeholders, as an example, one may find a single household door with different stakeholder numbers (Water Affairs, Independent Electoral Commission, Power Corporation and other utility companies) as their unique identifier to provide or deliver services.The context of the inquiry is bracketed on Context awareness, People context, Physical world context, Digital representation context, Tool-in-Context and Developing country context. This is further unpacked on Section 3.4.2.2.

#### *3.4.1.3 Determinant of Innovation or Dimension 3*

Stakeholders seek to find out if the Physical Address System capability is aligned to their roles so that they can be persuaded to adopt the innovation. Rogers (1995) suggests that the introduction of an innovation can be seen through considering a number of characteristics such as characteristics of the innovation, characteristics of the organisation, characteristics of the environment and characteristics of the individual.

These characteristics have important effects on phases of the innovation adoption process and on each other. For example: Individual characteristics are influenced by organisational, environmental and perceived characteristics of innovation which shown in Figure 16, while organisational characteristics are influenced by the remaining characteristics. This study is utilises the characteristics of innovation and is discussed in greater detail later in this conceptual research framework (see Section 3.4.2.3).

#### *3.4.1.4 PAS adoption outcome*

The decision stage includes measures of the decision-making process itself to achieved PAS adoption outcome. The collective decisions by Rogers (1995) fit this study. Rogers's posit that collective decisions is the organisation choice to adopt or reject an innovation made by consensus among members of a system (participants), this is applicable as stakeholder managers represent the stakeholders as members of the social system because an entity cannot make decision or "talk", without stakeholder managers (Dobbins, 1999; Orlikowski and Barley, 2001; Orlikowski and Robey, 1991).

#### *3.4.1.5 Innovation Adoption Process*

The DoI Theory by Rogers (2003) has outlined five phases involved in the innovations adoption process over a period of time among the members of a similar social system. The stakeholders evaluate a new idea and decide whether or not to introduce the innovation into on-going practice in a developing country (Rogers, 1995). This study is concerned with only three of these phases; these are the knowledge, persuasion and decision. The prior condition is not seen as a stage on the DoI framework (Rogers, 2003), this study conceptualises it as a stage to describe status-quo of the Physical Address System in a developing country.

### 3.4.2 Schematic Conceptual research framework

This sub-section discusses the schematic conceptual research framework that gives bird eye view of the subject of research.

In the schematic conceptual research framework, the underpinning theories of Diffusion of Innovation, the Stakeholder theory, and Upper Echelon Theory are represented by intersecting sets format as depicted by Figure 18. Graphically, each dimension is

represented as set, the intersection of a sets resulted to a sub-sets that represent the inter-relationships of multi-dimensions and complexities in the adoption of PAS. The subsets are seen as the social interactions that happen within dimensions during the innovation adoption process for the PAS at the country level.

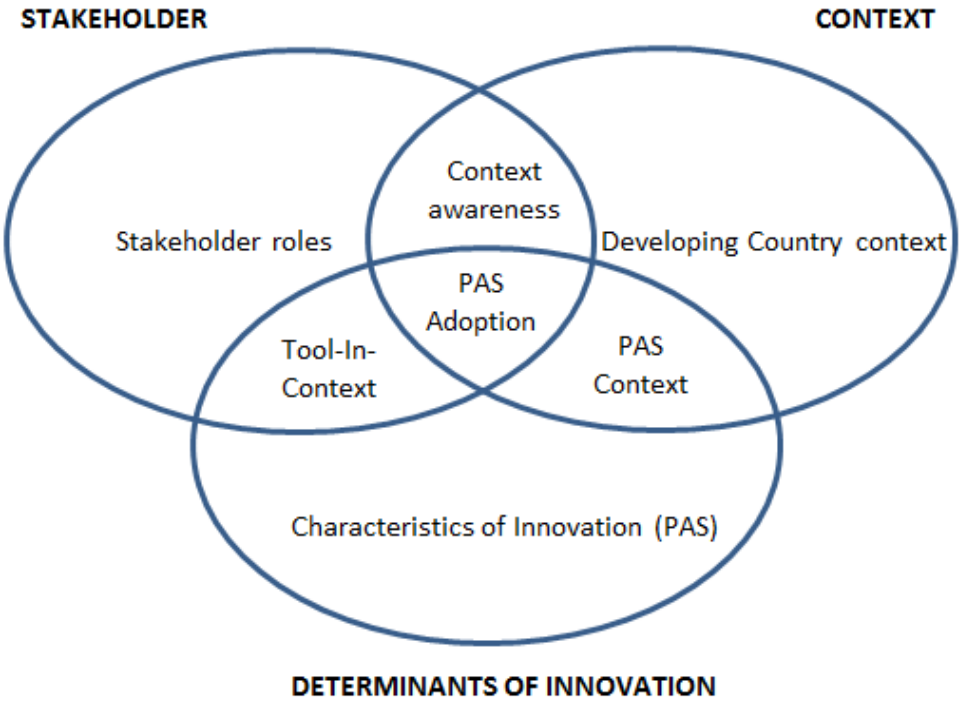


**Figure 18: The bird eyes view of the conceptual research framework for the adoption of Physical Address System study.**

The framework demonstrates the complex inter-relationships that exist between the multi-dimensions. The next discussions unpack the graphical representation of the conceptual research framework (see Figure 17) for the adoption of Physical Address System.

#### *3.4.2.1 Stakeholders*

From the stakeholder perspective, this study explores and describes the relationships and relevance of stakeholder roles. It sought to understand how they may influence the adoption of the Physical Address System.

**Stakeholder Roles**

An organisation needs to achieve its activities that maps to their vision, mission and strategy (Bourne, 2009). Sauer (1993) posit that organisational activity has three components:

- Processes and practices influenced by organisational culture or context that provides the framework, guidelines and measures to deliver the activity;
- Supporters who provide funding, assistance or are beneficiaries;
- Those who will actually plan, manage and execute the target work (stakeholder managers).

From the above three components, success of an organisation activity can be determined by stakeholders roles being met (Bourne, 2009). Various stakeholder analysis models have evolved over the years because of the dynamic environment they operate within (Mgemane, 2012). This study looks to explore and describe the relevance of demanding stakeholder interests or roles to understand how they may influence the decision making of the adoption process of the Physical Address System, in a developing country perspective. The stakeholder analysis process starts initially by:

1) ***Identifying potential stakeholders and their stakes*** in Physical Address System through the envisaged physically addressed letter (Figure 2) and their nature of claims, mandate or roles as they are custodians of the corresponding locational and postal information. It is pertinent to incorporate insights of

stakeholder analysis in a way to answer question of "*who matters?"* or *"what do they want?"* or "*what do they have?"*

2) ***Stakeholder classification*** is assessed through the stakeholder roles. The stakeholder management principle regarding stakeholders classification to any initiative is always on resource dependency on each other and the questions are in a form of "*who should be critical to be involved*?" or "*who is important*?" or "*in what way?"* and *"what is their value proportion"* amongst the groups to adopt the Physical Address System in this context. Power versus interest and others may contribute to the adoption of the innovation.
3) ***Priorities the stakeholder's relationships*** through engagement and intervention, and influential strategies. Stakeholder influential strategies play a critical role for managing organisational stakeholders. The influential strategies from literature (Freeman, 1984; Savage *et al.,* 1991; Kosonen, 1998; Frooman, 1999).

In this study, power versus interest is used classify the physical addressing stakeholders. The discussions that follow look at context as one of the multi-dimensions.

#### *3.4.2.2 Context*

Currently, in Botswana, the physical addressing is by way of describing a specific location or destination. In other words, a locational address is given by asking people or relying on local knowledge for directions. For the traditional way, there is a usage of plot numbers instead of best practice approach of house numbers. Finally, there is different formats of assigning address by stakeholders, as an example, one may find a single household door with different stakeholder numbers (Water Affairs, Independent Electoral Commission, Power Corporation and other utility companies) as their unique

identifier to provide or deliver services. This is the context of practice and norms of the social systems.

The researcher's define the elements of context through diverse context definitions and categories. There is a need to understand how context and the awareness of context people context, physical world context, digital representation context, tool-in-context and developing country context manifest in the adoption of the Physical Address System. With that regard, there is a relationship that exists within the social interaction that is not understood but occurs within contextual background.

## Developing Country Context

The study location is Botswana, a developing country. Botswana is a landlocked country in the southern region of Africa. It borders with Zimbabwe, Zambia, Namibia and South Africa. Botswana has settlement patterns of urban areas, villages and rural area, and farms and lands. The information system in this inquiry is bracketed on the contextual reasoning for the innovation to fit the developing country settlement patterns for stakeholders to be persuaded to adopt it.

### *PAS Context*

In Information System studies, the contextualist approach clarifies the significance of considering context when studying change and processual nature of how it unfolds (Sharma, Barnett and Clarke, 2012). The Information Systems is contextualised on the people context, the digital representation context, and the physical world contexts.

A stakeholder can interact between three contexts, this indicate that there is a relationship or social interaction that exist with regard to the PAS context. The context and context awareness can influence adoption of the innovation, if the Physical Address System is perceived to fit stakeholder roles or activities in their context.

### *Context Awareness*

Context awareness subset means that being aware of the context is vital on stakeholder roles. Nowadays, the gadgets are aware of the stakeholder's physical addressing context, in return, it makes the gadget use to provide only the physical address relevant information regarded as context awareness, based on the stakeholder's activities with regard to the current context. Stakeholder awareness to context can influence adoption of the PAS because the context enables the stakeholder roles to manifest in the adoption of the Physical Address System.

### *Tool-in-Context*

From Figure 18, the Stakeholder Roles to Characteristics of Innovation subset is the tool-in-context means that stakeholders can determine how the characteristics of innovation should look like in order to meet their roles or needs in order to be persuaded. For Example, they can suggest if the country postcode can be four numerical digits, six or eight digits like in the United States of America or alpha numerical like the United Kingdom. In the other way around, the Innovation can have limitations on what is feasible to Stakeholders with regard to the Innovation as to the number of characters of the postcode with reference to the spatial data modelling of the developing country and what is practically applicable on the ground.

Information systems enable diverse human activities or stakeholder roles with regard to this study. Most of the innovation studies from other scholarships do not consider a tool-in-context of the information system. With regards to information system research, a thing (artefact) is investigated on its contextual background on how it enables an activity or stakeholder roles. Thus, the innovation in its context and how the innovation relates to its context might provide relevant physical addressing information to stakeholders, where relevancy would be determined by the stakeholder roles.

#### *3.4.2.3 Determinants of Innovation*

The determinants of innovation outlined factors that the decision makers or stakeholders need to be cognisant off to be in place for the PAS to become a reality at the developing country. The stakeholders are interested in the innovation and actively seek information or details about the innovation.

The perceived characteristics of innovation are critical to the explanation of the innovation (the PAS) for its capability to stakeholders with their way of doing business. Rogers and Shoemaker (1971) assesses the innovation characteristics through relative advantage, compatibility, complexity, trialability, and observability. Similar to the assessment, the introduction of the physical address system can be seen through considering five qualities of the *characteristics of innovation* which are relative advantage, compatibility, complexity or easy to use, trialability and observability. The discussion of relative advantage follows.

Relative Advantage:

> *"is it better to what i have now?"*

In the context of this study, the relative advantage terminology refers to the upper hand that the Physical Address System has if compared to the current descriptive and traditional system which may lead to stakeholders to be persuaded to adopt it.

Compatibility

> *"does it conflict with my values, business practices, or needs?"*

The term refers to the Physical Address System to be perceived as being consistent with stakeholder roles and the way they are doing their business. In developing countries, the Physical Address System innovation should be compatible with the need for locational orientation, navigation to households and business offices, mail/parcel sending and other service delivery.

Complexity or easy to use

*"is it too difficult to understand or to use in authentic settings?"*

This terminology would refer to how easy will be to learn and use Physical Address System (Robinson, 2009). The experience of stakeholders gained from other countries or awareness would be able to determine the learning curve of the Physical Address System. People would not be able to remember geographic coordinates (X,Y) jargon but popular names for most roads and landmarks still prevail. Street number and street name has been proven as the best practice for people to remember for their address land parcel (Coetzee, 2011).

Trialability

*"can i try it out first, and can I go back to what i was doing if i don't like it?"*

Trialability refers to how easy the Physical Address System can be used or experimented by the stakeholders.

Observability

*"can i watch someone else use it before I decide whether to adopt it?"*

The easier it is for individuals to see the results of the Physical Address System or see it from other countries, the more likely they are to adopt it.

This study is based on three attributes, being perceived advantage, compatibility and perceived easiness instead of the discussed five attributes because this study looks at the roles that stakeholders could play to influence adoption of innovation within the context of a developing country where the innovation ought to be adopted. In Information Systems, an artefact can be contextualised on how it manifest in its setting and argued on its own right.

The aspect of trialability and observability is not applicability because the PAS does not currently exist. This view is also supported by Rogers (1995) who indicated that the main attributes of an innovation should be elicited from the participants prior to measuring them. The stakeholders would want to know if the physical address system has the capability of being useful on the basis of the current infrastructure in a developing country, if it can help them on providing services or doing business in way that they can be persuaded to adopt it.

***PAS Adoption outcome***

In this study, there can be two possible adoption outcomes, the organisation can either reject or adopt the innovation if the stakeholders were persuaded collectively during the adoption process.

The next section discusses the summary of the chapter.

## 3.5 Summary of the Chapter

Chapter three laid out the theoretical frameworks that grounded the study. The theoretical lenses discussed are the Technology Organisation Environment (TOE), Theory of Reasoned Action (TRA), Theory of planned behaviour (TPB), Social Cognition Theory (SCT), Technology Acceptance Model (TAM), Stakeholder Theory (ST), Upper Echelon Theory (UET), Diffusion of Innovation (DoI) Theory and finally the conceptual research framework that guides this study.

The conceptual research framework shaped the types of interview questions for data collected and analysis. Following the graphical representation of the schematic

conceptual research framework. Each of the dimensions set and interlinking social interaction subsets between dimensions of the conceptual research framework diagram was discussed.

The Diffusion of Innovation (DoI) framework was used a lens at the organisational level because of its social processual flow. The qualitative research studies hold high of the social processual flow and is aligned to prior conditions, knowledge, persuasions and decision phases of the adoption innovation process to adopt the PAS. The Stakeholder Theory was used to identify stakeholders, their roles and relationships on the adoption of the Physical Address System. The Upper Echelon Theory was used for selecting the stakeholder managers as participants for data collection. The stakeholders are selected based on their lived experience and psychological behaviours in order to persuade stakeholders to adopt the Physical Address System. The Contextual approach discussed the context awareness, in terms of the awareness of the context of people, physical world, digital representation and the context of the developing country.

The next chapter discusses the methodological approach and its rationale to address the research questions and purpose of the study by looking at how the research was practically conducted in terms of the design of the research and methodological approach. The research methodology chapter lays out the research ontological, epistemological, research philosophy, research approach, research strategy and the research design of the social inquiry. The next chapter outlines how stakeholders transform their knowledge of this social inquiry to understand what reality exist in the real world and the way to acquire knowledge as the research engages theoretical perspectives of the conceptual research framework.

# CHAPTER 4: RESEARCH METHODOLOGY

## 4.1 Introduction

The preceding chapter discussed the theories that underpinned the study. These theories included Stakeholder Theory, Upper Echelon Theory, and the Diffusion of Innovation Theory. From these theories, a research framework was conceptualised. The conceptual research framework informs the collection of the empirical evidence and analysis. This fourth chapter, therefore, now gives the methodology that was followed in the social inquiry.

This chapter is about how the social inquiry of the adoption of the physical address system was conducted. This chapter is laid out as follows: it begins with the research process discussion, then ontology and epistemology of the research, research philosophy or paradigm, research approach, research strategy and lastly research design of the study.

## 4.2 Research Process

The research methodology in the social science inquiry like Information Systems is very complex and it has stages that need to be unpacked as a research process. To recap the research question that drove the study.

The primary research question was:

***how can a developing country adopt a Physical Address System?***

In order to answer the research primary question, the secondary research questions need to be answered first in order to understand the adoption of the Information Systems at the country level by this study are:

- *how do stakeholder's roles and their relationships influence the adoption of a Physical Address System?*
- *what is the role of context awareness and in what form does it manifest in the adoption of the Physical Address System?*
- *what are the determinants of innovation and how do they inhibit or enable the innovation adoption process of the Physical Address System?*
- *in what ways should a developing country adopt a Physical Address System?*

Understanding the secondary research questions meant employing research methods that would be deemed appropriate. This study used qualitative research methods to answer the research questions.

Crotty (1998) states that there are four basic elements in the research process and that the use of the elements are only understood if they are justified in relation to the phenomenon being socially inquired. The basic elements are:

1. Methods – the techniques, practical steps and procedures utilised for collecting and analysing data that is related to some research questions;

2. Methodology - strategy, process, plan or design linking the choice of methods and its justification to conduct the research;

3. Theoretical perspectives – the research philosophical position, informing the methodology and providing context for its logic and criteria. Theoretical perspective is also supportive of other theories, and gives new insights.

4. Ontology and Epistemology - the study of the nature of knowledge and view of reality or how knowledge is justified, underpinning the theoretical perspective and methodology.

Crotty (1998) outline that there are interrelationship amongst the theoretical stance taken by the researcher, the research methodology and research methods used, and the researcher's worldview of the ontology and epistemology philosophical assumptions. Figure 19 shows the research process that this study followed

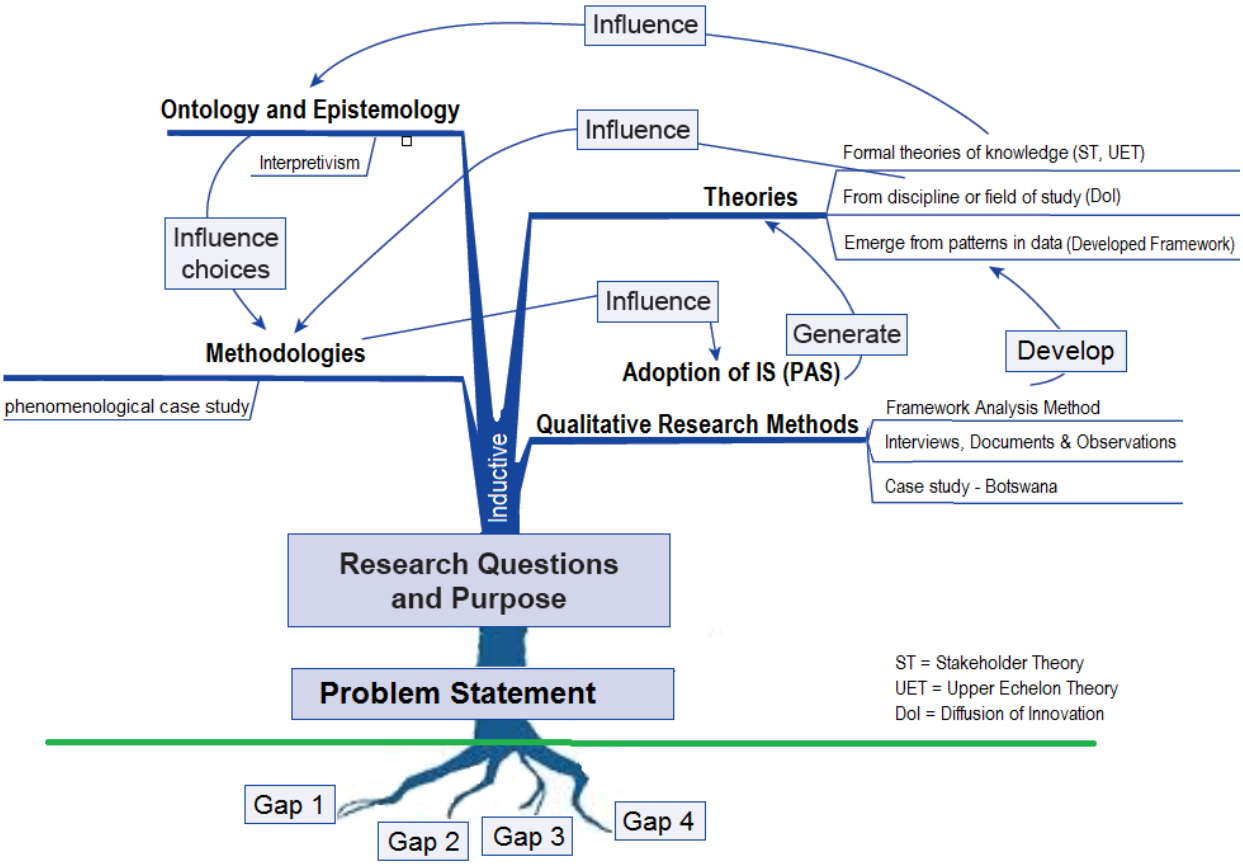


**Figure 19: Research process (adapted from Salmons, 2015)**

The research process is conceptualised on coherent discussions of identified gaps in knowledge from literature and the developing country current situation on physical addresses. The gaps were converted into problem statement, then the research purpose is outlined and finally the research questions that drive the study were formalised.

Figure 19 shows how the research process is an iterative process (linking arrows within a tree format) in an inductive approach. This study takes the interpretive philosophical stance of the ontology and epistemology worldview. The interpretivist philosophy suggests that human actors construct their own understanding and knowledge of the world out of their lived experiences and reflections on those experiences. The

theoretical perspective employed as lenses for this study are DoI, UET and Stakeholder theories to give new insights on the adoption of the information systems.

The case study was used as a research strategy to investigate a contemporary phenomenon within its real-life context and empirical evidence is gathered using phenomenological method, the combination of the two approaches is called phenomenological case study. The semi-structured interviews of stakeholders lived experiences, documents (white papers/policies/acts) and observations are qualitative research methods used to collect in-depth and profound empirical evidence of the case bounded within the developing country – Botswana. The method of data analysis chosen was framework analysis method to attain rigor and relevance of the quality in adoption of the IS study.

In this study, the research process is to guide and direct on the nature of the inquiry the researcher takes to describe the research methodology. The research process provides a path for stages to be followed and the methodology to be understood. The following sections unpack the research process of this study further as shown on Figure 19. First, the research ontology and epistemology is discussed by the section that follows.

## 4.3 Research ontology and epistemology

Hirschheim *et al.* (1995) point out that the ontological and epistemological assumptions is related on how the researcher justifies methods to conduct research or how to inquire about the phenomenon by making sense of acceptable and reasonable research factual outcomes from the empirical evidence. The ontological and epistemological assumptions shape methodological assumptions and explanations regarding the research design. The research design outline how the research is going to collect data from its participants and population, the sampling technique to be applied and finally how to analyse the empirical evidence to arrive at coherent assumptions and explanations (Chua 1986, Orlikowski and Baroudi 1991).

### 4.3.1 Ontology

In the context of social psychology, the term ontology originates from the greek word "ontos" meaning being and "logos" meaning study, hence it is defined as the study of being. It answers the question of "what is reality?" or “what can be said to really exist?" and this is imperative as whatever assumption is being made affects how the researcher approaches science (Naturalistic Epistemology, 2017). Wand and Weber (1993) define ontology as "a branch of philosophy concerned with articulating the nature and structure of the world."

This study takes the constructionist assumptions of the interpretivist’s ontological stance. With regard to this stance, constructionism suggests that the social world as organisations, groups and social systems as socially constructed are bracketed around human actions and interactions (Orlikowski and Baroudi, 1991).This study expand the constructionist assumptions to make sense of lived experiences of physical addresses by stakeholders in relation to their roles.

The ontological stance of this study is, in reality there is currently no adopted standardised physical address system that may allow the location of physical addresses. Currently, the physical addressing in Botswana is by way of describing a specific location or destination and using plot numbers. In other words, addresses are given by asking people or rely on local knowledge for directions. Another way of physical addressing is that there is a usage of plot numbers instead of best practice approach of house numbers. Finally, there is different formats of assigning address by stakeholders, as an example, one may find a single household door with different stakeholder numbers (Water Affairs, Independent Electoral Commission, Botswana Power Corporation and other utility companies) as their individual unique identifier. The different formats of assigning physical addresses are the stakeholders worldview of the daily life that exist as socially constructed multiple realities at a developing country to provide or deliver services to the citizens of the country.

In this research, it can be assumed that the “truth” about the reality of adoption of the physical address system is relative and waiting to be discovered (Crotty, 1998). The truth as conceived by the researcher exists only through understanding the social interaction with the stakeholder realities of the world. This view assumes meanings are socially constructed rather than discovered (Crotty, 1998).

The next sub-section discusses how the researcher can know about reality and ensure that it is both adequate and legitimate, this is discussed as epistemology.

### 4.3.2 Epistemology

The term epistemology also originate from the greek word "episteme" meaning knowledge and "logos" meaning study, and it is defined as the study of knowledge and provide the answers to the question of "how can i know reality?", this is of vital importance because whatever assumptions or postulations made about what can be known affect what the researcher tries to find out scientifically (Naturalistic Epistemology, 2017). The term epistemology is defined by Hirschheim *et al.,* (1995) as "the nature of human knowledge and understanding that can possibly be acquired through different types of inquiry and alternative methods of investigation." Orlikowski and Baroudi (1991) posit that epistemological assumptions articulate about the construction and evaluation of valid knowledge regarding a phenomenon.

With regard to the epistemological stance, the epistemological viewpoint held in this research is that of interpretivism. The stance is based on the researcher own interpretations of the acquired new knowledge of understanding the roles of stakeholders can play, context and determinants of innovation in the adoption of the innovation. The stakeholders are attached to their subjective meanings and lived experiences about physical addressing in their social context at a developing country. The researcher’s knowledge of reality was gained through the interpretations of social constructions such as language, consciousness, shared meanings documents, tools and other artefacts (Klein and Myers, 1999). It was imperative to acquire knowledge or

understand how stakeholders proceed though the social decision making process in the adoption of the Physical Address System.

## 4.4 The Research Philosophy

This section discusses the research philosophy that this research took after the discussion of the research ontology and epistemology. This section intends to make acceptable explanations and assumptions of the study in relation to the philosophical stance.

According to Saunders *et al*., (2007) and Bryman *et el*., (2002), the research philosophy can be thought of the development of research background, research knowledge and its nature of being, and can be defined with its association to the concept of research paradigms in social science. The research philosophy constitute of a pattern, structure and a framework to guide an academic research to make acceptable explanations and assumptions (Olsen *et al.,* 1992). The research philosophy used helps to explain the assumptions made in the research purpose and how it fits the anticipated research methodology. These assumptions are termed either research paradigms or research philosophies by different scholars or used interchangeably (Creswell, 2013). In information systems research, the two commonly used philosophical perspectives are positivist paradigm and interpretive paradigm (Myers, 1997).

The next section discusses the two philosophical perspectives of positivist and interpretive paradigm.

### 4.4.1 Positivist paradigm

The positivist paradigm is based on philosophical ideas, observation and reasons which are obtained by experiments and observation of a phenomenon. This paradigm is based on assumptions that there are certain laws that might exist (Sekaran, 2003; Yin, 2003).

Positivists view the natural sciences as being understood by facts on their worldview in order to infer to a generalisation known as scientific laws (Kolakowski, 1972).
The positivist researchers believe in rigour, validity and evaluation with respect to the 'truth' of the phenomenon under investigation (Chua 1986, Orlikowski and Baroudi 1991).The paradigm emphasise on causal relationships and deductive approach to verify the empirical evidence.

### 4.4.2 The Interpretive paradigm

The interpretive paradigm is based on people subjective evaluations, experiences and social realities that are unique within their context (Maxwell, 1996; Lee, 1999; Miles and Hubberman, 1994). The paradigm enable the researcher ability to address issues that lead to influence, impacts and present the opportunity to pose questions such as "how" and "why" a particular things happens (Walsham, 1995). From the epistemology stance, interpretivism is related to social constructivism and it asserts that natural reality and social reality are not the same and also need different methods of the investigation (Walsham, 1993; Myers, 2009; Wheatley, 2007).
This study takes interpretivist paradigm. The paradigm suggests that human actors construct their own understanding and knowledge of the world out of their lived experiences and reflections on those experiences.

The next section discusses the research approach.

## 4.5 Research approach

There are two approaches in Information Systems research that are known theoretically and commonly used, being deductive and inductive. The deductive approach, which is usually, associated with quantitative research methods. Quantitative research is any type of research that involves quantification and measurements (statistical procedures) applied to populations, since the populations data exists independently from the

researcher's opinions and feelings. Being objective implies that other individuals should agree with the researcher's observations and measurements applied to populations (Welman *et al.,* 2007).

Inductive approach is usually associated with qualitative research methods (Saunders *et al.,* 2007). Qualitative research is any type of research that produces findings not arrived at by statistical procedures or other means of quantification. It can refer to research about person's lives, lived experiences, behaviours, emotions, and feelings as well as about organisational functioning, social movements, cultural phenomena, and interactions between nations, (Strauss and Corbin, 1998). The key aspect about the approach is their role in the gathering of data and to give direction to how the research intends to engage with the theoretical perspective (Leburu, 2013).

The selection of an appropriate approach depends upon the aim of the study, which often come in two folds, to develop a theory or test the theory (Marshal, 1996). With regards to inductive approach, the data gathered enable the theory to be developed by using data collection methods of interviews, observations and documents. The deductive is concerned where hypothesis are formulated to test and validate the theory and involves using methods of experiments, surveys and others (Saunders *et al.,* 2009).

The next section discusses the inductive approach, employed by the research.

### 4.5.1 Inductive approach

For this study, an inductive approach was used and it is viewed as circular, iterative and non-linear. This approach involves the observations and identification patterns in the data to outline insights and new concepts (Beiske, 2007) rather statistical analysis and inferences.

Inductive approach is mostly associated with qualitative research which this study follows. Qualitative data gathering approach requires the researchers to avoid imposing their own perception of the meanings of social inquiry (Garcia and Quek, 1997). It gives the participants an opportunity to determine how they interpret their own reality.

The next section discusses the research strategy used by this study.

## 4.6 Research Strategy

The section discusses the case study as one of the common research strategies from the social science in order to understand human beings from the social context perspective within their context (Yin, 2003). The case study to capture the rich, insights of the case of the inquiry and its complex relationship together with its processes bounded within its context.

### 4.6.1 Case Study

The case study is used as research strategy and is focused on one instance that is being investigated like an information system, an organisation, a discussion forum, a department, and others. Case studies offer rich, detailed insights of the case of the inquiry and its complex relationship together with its processes bounded within its context (Lincoln and Guba 1985; Oates, 2006; Stake, 2005; Willig, 2008). Researchers differ on definitions and the purpose of carrying out a case study strategy, this led to Meyer (2001) to put an argument forward that says “given this unclear status, researchers need to be very clear about their interpretation of the case study and the purpose of carrying out the study”. Silverman (2013) allude that a case study strategy can establish the significance of culture and context, which aligns to this inquiry. Brown (2008) state that case study approach has been extensively explored by three authors in particular, Merriam (1998), Yin (2003) and Stake (2000).

Yin (2003) state that a case study is one of the common research strategies from the social science in order to understand human beings from the social context perspective within their contextual bachground. The author emphasise that the case study approach is useful where conceptual conditions and the research has no control of the events, especially when the boundaries between phenomenon and context are not clearly

evident( Yin, 1981; Yin, 1994; Yin, 2002; Yin, 2003). Yin's case study research approach is from the positivists perspective but is suitably aligned to this inquiry since the study goal is to conceptualise a multiple dimensional framework for adopting a Physical Address System, in the context of a developing country – where the boundaries of the phenomenon and context are not yet clearly evident. Yin (1994) identified five components of research strategy that are important for the case study considered in this research. They are listedd as follows:

1. Research questions (See Section 1.8)
2. Propositions, if any (Not applicable for this case study)
3. Unit of analysis (See Section 4.7.2.1)
4. The logic linking the data to the research question or objectives( Chapter 5)
5. The criteria for interpreting the findings (see Chapter 6) (Yin 1994).

Merriami (1998), a seasoned practitioner of research strategy outlined an organised and thorough approach to a case study research grounded in a philosophical paradigm of interpretivism. The author incorporate mechanics of conducting a qualitative case study in a logical manner which is the interest of this study.

Stake (2000) state that, "case studies are useful in the study of human affairs because they are down-to-earth and attention-holding". Stakes approaches the case study research as an interpreter or story teller, the interpreter listens to the story being told in an engaging way of people in their confortable environment which might lead to a decision favourable to the organisation. This is aligned to this study as it looks to provide a rich, multi-dimensional picture of the situation being studied in their socially constructed context through lived experiences of stakeholders and it might lead to a decision to adopt.

The case study approaches undertaken by Merriam (1998), Yin (2003), and Stake (1995; 2000) on the use of the case study as research strategy informed the choice of case study, even though their theoritical and philosophical positions are distinctly different. With this background, the case study offered profound details and the deeper

understanding stakeholder roles and their lived experiences of the social inquiry in its contextual settings.

There are three types of case studies, which are exploratory, descriptive and causal as outlined by Yin (1993).

- Exploratory Case Study

  For the exploratory case study, the data occurs before theories or specific research questions formulated. The critical and first stage in this type of case study is to underline the issues to be researched.

- Causal Case Study

  For the Causal Case study, the underlying principle is to look for the cause and effect relationship and explain theories of the phenomen. This is mostly associated with the positivist studies.

- Descriptive Case Study

  For the descriptive case study, theory is required to guide the collection of data and analysis. The theories can be debated and their conceptual element used to conceptualise a conceptual research framework.

This study utilised the descriptive case study where a priori conceptual research framework guided the data collection and analysis. The next section discusses the case description and the social context.

### 4.6.2 Case description and social context

Popay *et al.'s* (1998) state that the description and discussion of the social context in an interpretation of subjective meaning is very important within a case study. The case descriptions can be in a form of *history of the case*, *background information about the overall structures*, *settings and frameworks within which participants were situated*. This recognisation and authentic acknowledgement of the effect which these may have in facilitating, or inhibiting participants actions is essential to be known, in order to place the empirical evidence which is obtained from participants within a wider context. This

was briefly discussed on Section 1.3.1 Study Location and Context: Botswana. The next sections unpacks the case description and the social context.

#### *4.6.2.1 A brief history of the case study: Botswana*

Botswana is a landlocked country in Southern Africa and it shares the boarder with South Africa on the south, Namibia on the west, Zimbabwe on the east and Zambia on the north. Botswana has an area of 581,730 square kilometres and 70 percent of land is covered by the Kalahari Desert mostly on the Western side of the country. The country has Ten (10) Districts, Five (5) Towns and Two (2) Cities and all together they make up Seventeen (17) Administrative Districts as shown in Figure 20.




**Figure 20: The districts of Botswana boundaries and their sub-districts**

Historically, the country gained independence in 1966 from the Britain. In 2016, Botswana turned 50 years of independence and termed it “Bot50”. The BOT50 celebration created and built awareness and excitement amongst Batswana to celebrate the nation's achievements as Botswana's Golden Jubilee. Botswana was one of the poorest countries in Africa, but since then it has transformed itself, moving into the ranks of middle-income status to become one of the fastest growing economies in the world that is supported by diamonds and exporting beef.

The population of Botswana was around 2.021 million in the year 2013 and its steadly growing compared to previous years because of HIV/Aids pandemic. With this growing population, there is a need for a comprehensive and standardised physical addressing as best practice similar to other countries and to match the rapid development of infrastructure to locate physical addresses.

#### *4.6.2.2 Background information about the case study overall structures*

Botswana has settlement patterns structured as urban areas, villages and rural areas, and farms and lands. The information system in this inquiry is bracketed on the contextual reasoning for the innovation to fit the developing country settlement patterns for stakeholders to be persuaded to adopt it. To align Popay *et al.’s* (1998) viewpoint to this study. The description of the social context is outlined by the background information about the overall structures with reference to the settlement patterns.

#### *4.6.2.3 The settings and frameworks within which participants were situated*

The case study is the developing country – Botswana. The Physical Address System (PAS) in Botswana exist in a 1) descriptive form, 2) traditional way and 3) in a different formats of assigning physical addresses to give a locational information. For the descriptive form, its in a form of asking people or rely on local knowledge for directions.
For the traditional way, there is a usage of plot numbers instead of best practice approach of house numbers and finally, there is different formats of assigning address

by stakeholders, as an example, one may find a single household door with different stakeholder numbers (Water Affairs, Independent Electoral Commission, Power Corporation and other utility companies) as their unique identifier to provide or deliver services.

Thirdly, the description of the social context is the settings and frameworks within which participants were situated. The Physical Address System is not comprehensive and standardised in the developing country such as Botswana. This study conceptualised an envisaged Botswana Physical Address System on a letter as depicted by Figure 2 with associated stakeholders as the custodians for the corresponding locational and postal information. In this study, this is seen as the settings and frameworks within which participants were situated to describe the context.
The next section discusses the research design.

## 4.7 Research Design

This section intention is to discuss the qualitative research methods chosen to answer the research questions in the adoption of the physical addressing system. The section is structured as follows: secondly it discusses data collection methods and finally the data analysis method that were applied.

Qualitative research methods refers to the steps that the research used to practically conduct the study (Anfara and Mertz, 2006; Carter and Little, 2007), participants differ in their sense making of their *experience* and *understanding* of reality because a social phenomenon cannot be understood outside its own *context* (i.e. economic, political, social, cultural, environmental and organizational). The qualitative research methods incorporate context and are used to describe phenomenon and generate theory that was grounded on the emerged core concepts from the empirical data.

This section revisits the conceptual research framework, and how it helped in the data collection and analysis process. The sub-section situate the adoption of IS research in

the research design, followed by a sub-section for situating the phenomenology data collection method in the research design. The next sub-sections further discusses the unit of analysis and level of analysis, sampling method and sample size, participants and the time horizon of the case study.

### 4.7.1 Conceptual Research Framework – Revisited

Many social scientists believe that a conceptual research framework may constrain researchers by focussing the inquiry only on the conceptual issues and relationships it contains, resulting in flawed findings. However, there is partial truth in this reasoning, a conceptual research framework should still be developed. This led to scholars such as Hartley (1994) to argue that theoretical frameworks are important because their absence in a study might lead to providing descriptions without meanings. In addition to that, Gummesson (1988) state that time might be wasted on obtaining basic information that could have been shaped by conceptual research framework. Walsham (2002) and Eisenhardt (1989) uses conceptual research framework as:

1. A preliminary conduit to data collection to enable instrument design and data collection protocol from a review of the literature, conceptual elements and research objectives (see Section 4.7.9.1 on Interviews). A well-formulated, flexible conceptual research framework that was supported and represented by other theories, conceptual issues, gave new insights, helped to sharpen the focus of an inquiry. It kept the interviews focused on critical issues during data collection.
2. Part of an iterative process of data collection and analysis, and (See Section 5.5.2 on the Discussions of themes, sub-themes and presentation of emerged initial themes). The conceptual research frameworks also helped to deeper understand in-depth lived experiences, unpack complex interrelations and social interactions of conceptual elements for the innovation adoption process during data analysis process which applied Framework Method analysis.

3. An outcome of the research and one of the contributions as developed framework (see Section 7.6.2 on the Multi-dimensional framework development after theoretical implications and reflection on the research goal). The findings produced the theoretical conjecture to show the social process of the adoption of the Physical Address System at a country level. The interpretations of all research findings have resulted to the framework development of the Thesis.

In this study, theory was presented in all three stages similar to Walsham (2002) and Eisenhardt (1989).

### 4.7.2 Situating the adoption of IS Research in the Research Design

This section discusses the adoption of the Information System research in terms of situating the adoption of IS Research and the research design. This helps to align the conceptual elements of the conceptual research framework that are regarded complex for the data collection and analysis methods.

This study acknowledges that Diffusion of Innovation theory is mostly used by positivists to outline causal relationships and cognitive psychological variables in IS adoption. However, this study uses the Innovation Decision Process Model phases of Roger's (2003). The innovation adoption process phases were applied as a descriptive tool because it simplifies social process flow of conceptual elements of organisational innovation, which are regarded as a complex iterative process (Rogers, 2003). The innovation adoption process phases are aligned to multi-dimensions and are used as the basis for data collection and analysis process of the research. Downs and Mohr (1976) state that the model is essentially a single-innovation journey to persuade stakeholders to adopt the innovation.

More research work is required to integrate and infuse contextual philosophical and theoretical paradigms to develop multi-dimensional and multi-theoretical innovation adoption frameworks at the organisational level point of view, as it remains under-developed.

### 4.7.3 Situating the Phenomenology method in the Research Design

In this study, a case study is not a way of gathering data but rather the phenomenological method with semi-structured interviews were conducted within the case to collect in-depth and profound empirical evidence. Phenomenological method was used because it brings to the fore the lived experiences and perceptions of stakeholders from their own accounts at the developing country.

Phenomenologists focus on describing participant's accounts as they experience a phenomenon differently within their unique settings (May, 2011; Myers, 1997). For this study, a comprehensive and standardised Physical Address System is to serve or link multiple stakeholders for their various service deliveries or activities to a unique single physical address as a common reference point on the ground. It was imperative to understand the lived experiences of stakeholders in order to acquire valid authentic knowledge constructed by stakeholders.

The phenomenological method enabled the research to probe an in-depth, profound knowledge of subjective meanings of the stakeholders lived experiences of physical addresses within their social context at the developing country.

### 4.7.4 Unit of Analysis and level of analysis

The unit of analysis is said to be the 'what' or 'who' that is being studied. The unit of analysis can also be the study of an activity, for example the activity of decision-making process (Hak and Dul, 2010a; 2010b). The unit of analysis of this study is a country as organisation.

The research used a case study - Botswana with embedded case units of government and private sector to observe and understand how the stakeholders proceed through a social decision making process on the adoption of the Physical Address System. For

this study, the levels of analysis are stakeholders, context and determinants of innovation in both the government and private sector.

### 4.7.5 Sampling Method

According to Saunders (2009), the research questions and objectives pave a way for the researcher to determine the sampling method to be used. This study considers stratified purposeful sampling technique, as an important kind of non-probability sampling. Patton (1990) says that the stratified purposeful sample enable the researcher to "capture major variations rather than to identify a common core, although the latter may also emerge in the analysis".

The sampling technique was based on the researcher practical knowledge of the research area, the available literature and evidence from the study itself (Marshall, 1996). The stratified purposeful sampling is samples within samples and suggests that purposeful samples can be stratified or categorised in a nested format by selecting particular embedded case units or cases that vary according to business operations or dimensions (Patton, 2001).

### 4.7.6 Sample Size

An appropriate sample size for a qualitative study most of the time is not defined but the collected empirical data should answer the research questions. Smith and Osborn (2003) point out that sample size depends on a number of factors and that there is no ‘right’ sample size. The number of the required participants usually becomes obvious as the study progress as new categories, themes or explanations does no longer emerge from the empirical data, which is called data saturation. Turner *et al*. (2002) used twelve participants in their study as they felt that at this point data saturation was reached.

The stratified purposeful sampling can lend credibility to a research study as the small sample sizes are apparent and identified beforehand (Patton, 2001; Marshall, 1996). Enough empirical evidence was gathered within the strata’s and it is one of the

advantages. This study conducted 11 semi-structured interviews and reached the saturation point, which is almost similar to Turner (2002) who had 12 participants.

### 4.7.7 Research Population and Participants

The research population is the identified possible participants or stakeholders are associated with the postal and locational information that is structured as a best practice way of writing a physical address on a letter (Figure 2) which was informed by literature.

The participants are stakeholders that were purposefully stratified by the research into Government Sector and Private Sector to match the industry balance (Table 4). It is generally recognised that the theoretical argument will be stronger if strata's are used because the depth and breadth of data collected is far greater than could be captured from multiple cases (Remenyi, 2012). In this study, the strata's are foreseen as embedded case units in a case study (Yin, 2003).

## Table 3: Strata's of associated possible stakeholders and their profiles

| Strata's | Participant Number | PAS Stakeholder Profile |
|---|---|---|
| Government Sector | 6 | Managers and administer the Land Administration, Procedures, Capacity and Systems (LAPCAS) in Botswana which started in 2009. The LAPCAS pilot project has 7 components and one of them is the Location Addressing. |
| | 3 | Sustain the government in terms technology, land surveying and servicing and to do a lot of advisory to the government in terms of land administration or simply all matters related to the land parcels in Botswana. |
| | 8 | It's an authoritative post which mandated to take postal services to the citizens at every corner of the country. They also have extended mandate to get commercial services on board. |
| | 5 | Provide the services to the City of Gaborone in terms of the City infrastructure (Roads, Sewage, Water, and Electricity) and erecting roads and suburb signage. |
| | 11 | It's the first higher learning institute in Botswana to provide capacity in terms of training and skills development, tailor-made course on long term and short courses, medium courses like degree and research (Undergraduate, Masters. PhD level and Industry Research). |
| | 1 | It is a single housing authority in Botswana. Handles all housing matters related to rental government housing as a priority and other housing construction activities in the country. |
| Private Sector | 7 | Private Company that provides the survey related services such as mapping and surveying for the purpose of planning, and surveying the existing properties and facilitate the registration of title to land. |
| | 2 | Make and deliver pizza to customers, they conduct door-to-door timely delivery after pizza is ordered from the store either by the phone and walk-in services. |
| | 9 | Provide security innovative services at Phakalane Suburb, where they install security alarms, monitor the security alarms and responds to those alarms when they go off at those locations. |
| | 4 | Provide emergency medical services with 911 call centre in Botswana to private and public customers and sports like Soccer Games, Khawa and Mantshwabisa 1000KM Desert Race. |
| | 10 | A new courier company that has a good reputation of quality services and awards of transporting mail/parcels locally for their customers from one location to another in Botswana, even international with their sister Company Aramex. |

Table 4 outlines stakeholders grouped within stata's to gather empirical data for the investigation a phenomenon in this social inquery.

### 4.7.8 Time Horizon

Time horizon means the frequecy of data collection approach, it can be once or at different times the researcher collects data. Cross section approach is when the data is collected once and logitudinal implies thatdata has to be collected more than once and in different times (Mgemane, 2012; Flick, 2011). This study used cross-sectional approach. It collected data once from stakeholders at the developing country in order to understand their roles in adoption the innovation.

### 4.7.9 Data Collection

This section discusses the data collection in terms of in-depth interviews and observations conducted. The documents were collected and used as a way of triangulate, supplement, and verify the empirical data.

#### *4.7.9.1 Interviews*

The semi-structured face-to-face in-depth interviews were conducted to obtain in-depth and profound knowledge from the lived experience and perceptions from stakeholders.

#### *4.7.9.2 Semi-Structured Interviews*

This study interviewed stakeholders face-to-face using semi-structured approach. Semi-structured interviews usually have a predetermined sequence schedule (i.e set of predermined themes, targeted conceptual issues and specific question with

predermined sequence for their occurance). The interviewer has the flexibility to pursue matters as circumstances unfold to probe more deeply than initially planned questions (Lee, 1999; Myers, 1994; Walsham, 1996).

This study designed predermined themed open-ended question guided by the research objectives and the conceptual research framework conceptual elements (Braun and Clarke, 2006). The participant were given opportunity to elaborate, expand on their answers or provide more relevant information from the probing questions. Larken *et al*., (2008) state that qualitative research interview sample is dependent on participants referrals and data saturation point where knew themes or knowledge does no longer emerge from the interviews. Smith (2004) highlight that verbatim accounts of a small number of participants (typically under 10) is appropriate and are usually prefered through semi-structured interviews.

The stakeholders were interviewed within their strata's (Table 4). As Indicated in the consent letter for the repondents (Appendix 3), the semi-structured interviews took 30-45 minutes as a best practice to allocate interview time. The interview were recorded on a dictaphone so that the information was accurately and truly represented after being transcribed compared to using interview notes which could have been slow and could have resulted to missing certain information (Walsham, 1995).

#### *4.7.9.3 Interview Protocols and Research Instrument*

The interviews were conducted based on the developed interview schedule (Appendix 7). The development of the interview schedule was guided by the reseach objectives as themes and sub-themes that influenced innovation adoption social process.

The interview pack included letter of consent (Appendix 3) and participant information letter (Appendix 4) contained information about the title, purpose and aim of the research that the interview questions looked to address. The letter also has the research email and mobile number for communication with participants. The supervisor email was meant for back-up communication or in case of arising queries or confirmation of the research at the field by participants. The research instrument was

the semi-structured interview questions (Appendix 7) that guided the interviews on the field.

#### *4.7.9.4 Timing of the data collection*

The interview were conducted around the month of June and July in the year 2016. The researcher travelled to Botswana to interview informants at the Capital City - Gaborone. After completing one interview, the researcher transcribed, reflected on the interview and updated the notes from the field while the sequence of the day events were still fresh on the researchers mind. This provided an opportune time to improve the technique and interview strategy towards the next participants for the next day and also plan for the next interview.

#### *4.7.9.5 Documents*

Documents were collected during the continuous progress of the research and supplimentary document were requested where necessary during the face-face interviews. The documents of interest to this study were not limited only but extended to national stategy document, white papers, acts, policies, pamphlets and others were collected. The documents were used in a triangulation process with the empirical evidence.

#### *4.7.9.6 Observation*

Sight-seeing the organisation as well as the way the organisation is located, structured and functions is a very fruitful source of data (Remenyi, 2012). Participants sometimes might demostrate on paper, white boards or any other visualisation tools during the interview session which might enable the research to draw assumptions an explanations that indicate passion, sadness, excitement, enthusiastic when responding to interview questions. It is even possible to observe useful information by looking at the buildings, other facilities (Benbasat et al., 1987) and computer systems gadgets as part

of the digital context and the Physical Address System as outlined in this study. All the observations were recorded on the interview field notes and organised accordingly (Benbasat et al., 1987).

#### *4.7.9.7 Ethical Consideration*

The ethical issue is vital when gathering information from people, the researcher ensured that people are respect as individuals and organisations right to privacy is also upheld. The stakeholders were protected from harm in anyway and they were not subject to needleless research (Mgemane, 2012; Myers, 2009; Creswell, 2013). Participants of the study were protected and informed. This study carried the following:

- Interview questions were sent to University Ethics committee for approval before data collection commenced. This study was guided by the code of ethics from the University of the Witwatersrand, ethics protocol: H16/05/44, and Botswana's Ministry of Local Government and Rural Development: Ref Number CLG 4/14/3/1 I (44) as shown by Appendix 1 and Appendix 2)
- Data recording was be kept safe after the interview;
- Confidentiality in the research report is maintained at all times;
- The participants were fully informed and they were given their consent letter to participate in the research before data collection took place. Anonymity in the in the report was maintained and letter of consent was presented to the participant to sign (see Appendix 3) to acknowledge the interviewer;
- The Participant Information Letter was sent together with the consent letter, the letter outlined the research title, purpose and aim of the research undertaken, researcher and supervisor contact information;
- The debriefing by the researcher was conducted before the commencement of the interview.

### 4.7.10 Data analysis

Literature on qualitative studies (Boyatzis, 1998; Merriam, 1998; Marshall and Rossman, 2006; Miles and Huberman, 1994; Walsham, 1995; Cavanagh, 1997; Joffe and Yardley, 2004; Braun and Clarke, 2006) outline that data collection and data analysis must be a simultaneous process or overlaps (qualitative data analysis entails classifying things, persons, and events and the properties that characterise them). This prompted Cassell and Symon (1994) to argue that there is no distinction between data collection and data analysis. Their point of view is supported by Cohen *et al.* (2011), the authour outlined that data analysis is distinguished by "merging of analysis and interpretation rather than by the merging of data collection with data analysis." This enabled an early start to the analysis process and use insights from the process to inform the qualitative method flexibility aspect of data collection (Eisenhardt, 1989).

There are methods of undertaking qualitative data analysis and can be divided into three categories, the following are the categories:

- Socio-linguistic methods;

  the use and meaning of language such as discourse and conversation analysis.
- Methods that focus on developing theory;

  An example of this type is grounded theory.
- Methods that describe and interpret participants;

  they use views, perceptions or user experiences such as content for thematic analysis.

Even though there are different methods for qualitative data analysis, the empirical evidence is often obtained through participants interviews. This study falls on the last category of the qualitative data analysis. The next section discusses the types of qualitative data analysis.

#### *4.7.10.1 Types of qualitative data analysis*

There following section discusses the types of qualitative data analysis that are common in social science reasearch:

***Thematic Analysis***

Thematic analysis is commonly used qualitative data analysis method. It involves the identifying, analysing and reporting patterns (themes) within the data. It minimally organises, discuss and describes your dataset in (rich) detail (Attride-Stirling, 2001; Cavanagh, 1997).

***Thematic content analysis***

Content analysis is the involves the categorisation of verbal or behavioural data for the purpose of classification, summarisation and tabulation. Content analysis can be descriptive as “What is the data?” and interpretative “what was meant by the data?” (Boyatzisi, 1998; Elo and Kyngäs. 2008 )

***Narrative analysis***

Narratives are the transcribed experiences and then the researcher arrange the context and reflect up on them to give or narrate the whole picture of the story.

***Discourse analysis***

The discourse is about analysing a naturally occurring conversation (spoken interaction) and all types of written texts. It focuses on how people express themselves verbally in their everyday social life.

***Grounded theory***

The grounded theory is an inductive form of qualitative research where data collection and analysis are conducted by using open coding together before buiding theory (Allan,

2003). Constant comparison and theoretical sampling are used to support the systematic discovery of the theory from the original data.

***Framework analysis***

Framework analysis method develops a hierarchical thematic framework that is used to classify and organise dat according to key themes, concepts and emergent categories. The emerged main theme is charted by completing a matrix or table where each case has its own rows and columns that represent the case analysis and the latter represents the core concepts.

### *4.7.10.2 Using Framework analysis as a method of data analysis*

Framework analysis method is still new compared to other qualitative analysis methods. It was developed around the 1980's by applied qualitative researchers working in an independent social research institute for Social and Community Planning (Ritchie and Spencer,1994). The method is increasingly used within the social policy analysis and health sciences research (School of Nursing and Midwifery, 2002; Gerrish *et al.,* 2004; Read *et al.,* 2004). Within the Information System studies, Balley, *et al.* (2004) used the Framework Analysis method to assess the information retrieval from the Internet while Archer *at el.,* (2005) used it for an educational study on student performance.

The Framework analysis is flexible during the analytical process in that it allows the researcher to either collect all the empirical evidence and then analyse it or conduct empirical data analysis during the data collection stage. The Framework analysis involves five stages which will be described briefly and expanded fully in the next two chapters on how they were applied to this study, the stages are:

1. Familiarisation;

   Familiarisation refers to the process during which the researcher becomes familiarised with the transcripts of the data collected. The stage requires the researcher to be immersed in the empirical evidence by listening to the audio

recording, verbatim transcription and re-listening to all again, reading scripts and re-reading each transcript, studying observational or contextual or reflective field notes taken during and immediately after the interviews, reviewing secondary documents and other materials that are useful to the study (Ritchie and Lewis, 2004).

2. Identifying a Thematic Framework

   Identifying a thematic framework, its the second stage of Framework Analysis method that involves the recognition of emerging themes or issues from the empirical evidence and how they arised from the conceptual issues or sub-themes/broader codes of the conceptual research framework.

3. Coding and discussions;

   Coding is a fundamental element within Framework Analysis method. Coding is identifying portions or sections of the empirical evidence that correspond to a particular theme. Indexing is used sometimes interchangeably with coding but in this study, it can thought as attaching numerical index to an emerged initial theme. The researcher needed to apply preliminary thoughts or discuss on how responses or empirical evidence was coded. The links between sub-themes/broader or finer codes and initial categories, and also links between initial categories and initial themes emerged (Ritchie and Lewis, 2003).

4. Charting

   After coding, the research developed the final themes and core concepts, the empirical evidence excepts are lifted or abstracted from the original transcribed accounts of participants and arranged in charts. This allowed the emerged core concepts to be read across for within-case analysis (Case) or downward for the analysis of a specific core concept (Thematic) for between case-analysis (Ward *et al.,* 2013).

5. Mapping and interpretation of multi-dimensions (Ritchie and Spencer, 1994).

   At this stage, themes association is conducted using thematic maps where “is associations” and “is part of” relationships are outlined. The Interpretation of core concepts is influenced by the research objectives as well as emerged final

themes that emerged from the empirical evidence. The core concepts are discussed and interpreted, supplemented by triangulation method with participant's quotes, literature, observations, field notes, documents and others.

***Why choose framework analysis over other qualitative approaches?***

The reason for choosing the Framework Analysis method by Ritchie and Lewis (2003) is because its gaining memontum in health studies, policy making and pyschology studies and it has interconnected stages that guide systematic and explicit analytical process. In comparisons with thematic, the second reason is that thematic analysis has been criticised for lacking depth (Attride-Stirling, 2001).

The thematic analysis approach can result in sections of data being fragmented from the original, which can result in data being misinterpreted. As a consequence findings are subjective and lacking transparency in how themes are developed. The Framework analysis address that in a transparent way. The Framework analysis method offers transparency in data analysis process and the links between thes stages of the analysis (Pope *et al.* 2000, Ritchie and Lewis, 2003, Braun and Clark, 2006). Its comprehensive because the outcome themes are constantly and iteratively refined to aid the development of a conceptual framework.

#### *4.7.10.3 Strata or embedded case units analysis*

This study identified two strata's of Government and Private sector within a case study of the developing country - Botswana. The strata's or embedded case units analysis allowed the researcher to indulge in some comparative embedded case unit analysis which produced some very useful insights into the nature of the circumstances being studied to match the industry balance in a case study as depicted in Figure 21.

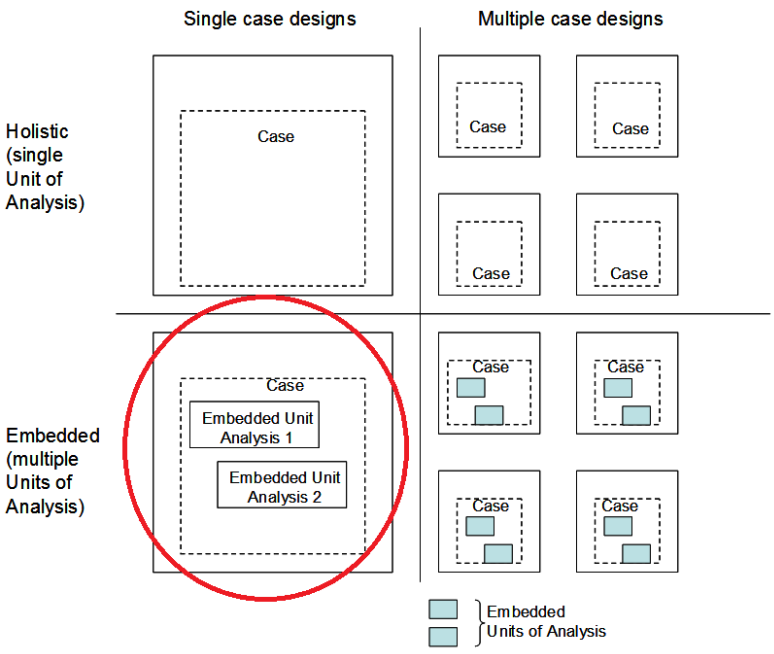


**Figure 21: Case Study Design**

The objective of strata analysis was to get beyond the initial impressions obtained from the empirical evidence in order to obtain a deeper understanding of the situation (Remenyi, 2012; Merriam, 1998; Stake, 2000). Researchers often find the research of the unique case study with multiple embedded units design attractive. It allows them to compare different embedded case units while keeping the main case relatively constant (Stake, 1995; Yin ,2003; Eisenhardt, 1989) and draw theoritical conjucture of emerging core concepts.

#### *4.7.10.4 Role of the researcher and position*

As part phenomenological method, situating the researcher position within the study is important. The role of the researcher in this study necessitates the adoption of the information system at a country level. This investigation was grounded on its contexts through understanding stakeholder roles which offfered valuable information, assumptions and biases. The researcher has extensive experience, academic

qualifications and research publication records on Physical Address System from computer science, information system and geographic information systems disciplines. The researcher is a citizen of Botswana as a developing country and it was advantageous on dealing with politics of language (Denzini, 1994), gate keeping issues and warm welcome reception from participants that made them confortable. This created a gap for opportunity to probe questions and resulted in obtaining handful insights and in-depth profound knowledge of the phenomenon.

The researcher belief and experience enriched his awareness, knowledge, and sensitivity to the issues being addressed in this study. This was helpful during the qualitative data collection and analysis which encompassed dealing with gate keepers (how to gain access to the right people and who should be interviewed) at the different stakeholder site and arrival at the premises. As a trend in qualitative studies, efforts were made to ensure objectivity. The researcher personal bias may shape the researcher worldview (Merriam-Webster, 1997) and bracketing was necessary to separate researcher knowledge from experience (Moustakas, 1994). Having said that, bracketing personal experiences is sometimes difficult for the researcher to implement. Van Manen (1990) state that in interpretive research, it is often impossible for the role of the researcher and position to become separated from the text but efforts were made to let the participants accounts to unravel and unfold the insights of meanings in an authentic setting.

The researcher brought wider understandings of the theoretical research questions into the study and devised thought-stimulating, naive or challenging interview questions. The researcher needed to clearly outline the researcher’s position and provide a rationale on how that position served the study as outlined in Figure 22.

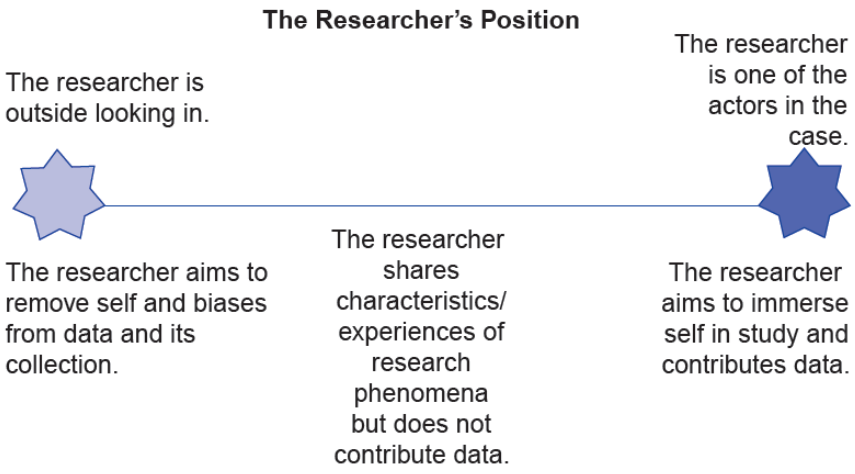


**Figure 22: Position of the researcher (Salmons, 2015)**

The aspect of quality criteria in qualitative research is embedded in the design, conduct and reporting of the empirical evidence (Klein and Myers, 1999, Tracy 2010). The researcher recognised the need to be open to the thoughts and opinions of others and to set aside his experiences in order to understand those of the participants to make a provision for insights to emerge, taking the research beyond pure facts in a technique called bracketing (Creswell, 2009).

The section that follows discussed the summary of the chapter.

## 4.8 Summary of the Chapter

This chapter was about how the social inquiry of the adoption of the physical address system was conducted. This chapter was laid out as follows: it began with the research process discussion, then ontology and epistemology of the research, research philosophy or paradigm, research approach, research strategy and lastly research design of the study.

The research design revisited the conceptual research framework to shape the interview questions which addressed theoretical priori issues or conceptual elements of the social inquiry. The research design outlined how the research questions were

answered by the qualitative research methods, the nature of data collection and the how the data was analysed using the thematic framework analysis method, while observing the ethical consideration. The next chapter outlines a detailed discussion of the procedure for data analysis and discussion using the framework analysis method. The framework analysis method provides clear transparent stages to follow for data analysis. The framework analysis method straddles between Chapter 5 and Chapter 6 consecutively as outlined in the next page.

# Framework analysis method

**Framework analysis steps that was undertaken by this study.**

<table>
<tr><td>Familiarization,</td><td rowspan="4">Chapter 5<br><br>EMPIRICAL DATA ANALYSIS AND DISCUSSIONS</td></tr>
<tr><td>Identifying a Thematic Framework</td></tr>
<tr><td>Coding and discussion</td></tr>
<tr><td>Charting and,</td></tr>
<tr><td>Mapping and Interpretation of core concepts.</td><td>Chapter 6<br><br>INTERPRETATION OF FINDINGS AND THE FRAMEWORK DEVELOPMENT</td></tr>
</table>

**The next two chapters use the Framework Analysis method. The method straddles between the two chapters as outline here by this graphical display. The shaded part of the graphical display outlines the chapter that follows.**

# CHAPTER 5: EMPIRICAL DATA ANALYSIS AND DISCUSSIONS

## 5.1 Introduction

The preceding chapter discussed the research methodology with respect to how the research was conducted. This chapter began with the discussion of research process, ontology and epistemology of the research, research philosophy or paradigm, research approach, research strategy and lastly research design of the study.

This chapter attempts to broaden the natural and profound knowledge of what is already known in adoption of Information Systems at organisational level. In this study, the natural and profound knowledge applicability to the country level is grounded to an epistemological understanding of the empirical evidence focused on the analysis and discussions of semi-structured interviews, documents and observations.

The chapter involves the first four stages of Framework Analysis method of empirical data analysis and discussions of the empirical evidence. This enables the mapping and interpretation of emerged core concepts on Chapter 6 to make the reader to understand the adoption of the Physical Address System as new knowledge at a country level. This chapter is structured in four stages of the Framework analysis method and draws out the emerging new knowledge leading to a theoretical conjecture and then answering the research questions.

The section that follows discusses the qualitative data analysis using framework analysis method.

## 5.2 Qualitative Data analysis using Framework Analysis method

Framework analysis method has flexibility for qualitative data analysis process because it permit the researcher to either collect all the data and conduct the analysis at a later stage or perform the two stages as a parallel process. In the analysis stage, the gathered data is coded, categorised and charted in accordance with the emerged core concepts. This chapter involves four of the five stages of Framework Analysis method being Familiarisation, Identifying Thematic Framework, Coding and Discussions, and Chatting.

The next section discusses the first step of the Framework analysis undertaken by this study as described by Ritchie and Lewis (2004).

## 5.3 Familiarisation STAGE

The first stage of Framework analysis method is called Familiarisation. This stage involves the researcher to be immersed in the empirical evidence, listening to the audio recording, verbatim transcription and re-listening to all again, reading scripts and re-reading each transcript, studying observational or contextual or reflective notes taken during and immediately after the interviews, reviewing secondary documents and other materials that are useful to the study (Ritchie and Lewis, 2004). Familiarisation stage is known to be ‘painful’ to the qualitative researcher as it is an iterative process of the qualitative data analysis but in some cases, it is possible to review all the material at the Familiarisation stage but its contingent to a case scenario.

In this study, semi-structured interviews, observation or field notes were used to collect empirical evidence from 11 participants labelled participants 1 - 11(Res 1- Res 11). Using the Framework Analysis method, a combined approach to analysis was

undertaken, enabling themes to be developed both inductively from the accounts (lived experiences and perceptions) of participants and from existing literature.

While adhering to Ritchie and Lewis (2004), Familiarisation stage is essential guideposts for empirical evidence examined. This is illustrated by the steps listed in the data reduction matrix on Table 5. The following are detailed explanation for each step.

### Table 4: Data reduction matrix

| **Steps** | **Step 1** | **Step 2** | **Step 3** | **Step 4** |
|---|---|---|---|---|
| **Analysis** | *verbatim* transcription | Vertical 1 analysis | Vertical 2 analysis | Horizontal 1 analysis |
| **Action** | Word by word transcripts of interview recordings for each stakeholder interview. | Data reduction by summarising the content of each stakeholder interview from Step 1. The data excerpts that relate to the research objectives were highlighted by *bold and italic font* to prepare it for the next steps. | Data reduction by converting the summarised stakeholder interviews from Step 2 to points form and underlining import points within the content as way of reducing the volume. | Comparing the identified significant content material from Vertical levels. This is where the recurring theme from experiences, perceptions, attitude, values, beliefs, concepts or ideologies emerged.<br><br>See Appendix 8.1 -8.3 |

For Framework Analysis Method, it is not necessary to review all the material (Srivastava and Thomson 2009) once, since this will happen at later stages in the data analytic process. This is clearly an advantage when the empirical evidence is large. It also extends to studies where analysis begins before all data collection is complete. The advantage depends on several aspects of the data collection process like interviews, document collection and observations (Ritchie and Lewis, 2004).

In this study, observations were conducted. Figure 23 shows two stakeholders where an activity unfolded on their own settings or environment. Having obtained consent from participants and understanding of the study objectives, the researcher stood in the

background to observe how they went about their day-by-day activities at the locations or premises.




**Figure 23: Stakeholder activities when using the current Physical Address System**

This first picture on Figure 23 shows the members of the medical emergency stakeholder using their control system to communicate with the ambulance crew who were attending an emergency in the streets of Gaborone City. The system has a Global Positioning System (GPS) from the ambulance, the control system that has interactive web based maps that indicate the ambulance position on the ground. The other scenario on the second picture depicts the pizza delivery employees using manual paper map to look-up for directions and exact location of a customer residence before dispatching for door-to-door delivery of the pizza.

This allowed the researcher to have much richer observation and descriptions of authentic events as they unfolded. The researcher scripted sequence of the event of what unfolded on the field notes. The observations were conducted to understand the social process on how stakeholders go about their activities or roles when using the current Physical Address System in an authentic setting.

In this study, it was imperative for the researcher to ensure that different data sources, the timing and case units are selected in a strategic way. The horizontal analysis of Table 5, Step 4 is important and applicable to the next section of identifying a thematic framework as part of the Framework Analysis method stages.

The next section that follows discusses the second stage of the identifying a thematic framework stage.

## 5.4 Identifying a Thematic Framework STAGE

The second stage of Framework Analysis method involves the recognition of emerging themes from the empirical evidence and how they may have arisen from the priori issues or broader codes of the theoretical conceptual framework. To achieve the Identifying Thematic Framework of the study, key adoption issues, concepts and theoretical themes that have been outlined by the participants from the Familiarisation Stage 1 of the horizontal analysis (Step 4), form the basis of the identification of thematic framework (Ritchie and Spencer, 1994).

This study had set the theoretical adoption issues or themes and sub-themes that were guided by study objectives. At this stage, it was important to maintain an open mind and allowed the empirical evidence to dictate the codes that were converted to initial themes to emanate from the participants original accounts during the Familiarisation stage, Step 4 on Table 5. Subsequent stages of analysis refined the initial thematic framework because it is not an automatic or mechanical process.

Identifying a Thematic Framework stage incorporated logical and intuitive thinking, reflections, the role of the researcher, making judgments about meanings, about the relevance and importance of conceptual issues, and about implicit connections between ideas. When the Framework Analysis method is applied to the social science policy research, it fully addresses the research questions (Ritchie and Spencer, 1994).

### Table 5: Identified Thematic Framework of sub-themes or broader code

| ***Themes or Research Objectives*** | ***Sub-Themes or Priori conceptual Issues or Broader Code*** |
|---|---|
| ***Stakeholders*** | identifying stakeholders and their stake/claims/ roles<br><br>Stakeholder Classification<br><br>Stakeholder relationships and engagement<br><br>Priorities the stakeholders |
| ***Context*** | Tool-in-Context<br><br>Developing country context<br><br>Digital representation context<br><br>Physical world context<br><br>People context |
| ***Determinants of Innovation*** | Prior Conditions (Previous practice and Norms of the social systems)<br><br>Compatibility<br><br>Perceived Easiness<br><br>Perceived Advantage and PAS Adoption outcome |

The identified theoretical framework was used in the next section of the coding and discussion of the Framework Analysis method stage.

## 5.5 Coding and Discussions STAGE

This section discusses the coding of themes, discussion of themes and sub-themes, and finally develops the emerged final themes and core concepts.

### 5.5.1 Coding of themes

Coding is a fundamental element within the Framework Analysis method. Coding is identifying portions or sections of the empirical evidence that correspond to a particular theme and sub-themes. Indexing is sometimes used interchangeably with coding but in this study, indexing can be thought as attaching numerical index to an emerged initial theme for audit trail to link concepts (Ritchie and Lewis, 2003). This stage is the critical thinking phase by the researcher to analyse and discuss all the textual data that has been gathered from the Familiarisation and Identifying a Thematic Framework stages (Ritchie and Lewis, 2003). The researcher needed to apply preliminary thoughts or comment and discuss on how responses was to be coded, links between broader or finer codes and initial categories, and also links between initial categories and initial themes that emerged (Ritchie and Lewis, 2003). With regard to keeping track of the links between emerged initial categories and initial themes, Ritchie and Spencer (1994) recommended that a numerical index can be used as an indexing reference.

This study developed *coding matrix* from eleven (11) interview transcripts where stakeholders outlined a range of lived experiences and perceptions from each interview questions. The participants had different lived experiences of physical address in relation to the stakeholder roles, determinants of innovation and contextual approach. For each dimension, the fine descriptive codes which emerged from the empirical evidence or responses and the research preliminary thoughts or notes on “what information was this about” were stated from the researcher viewpoint and finally the initial categories emerged. For example, Table 27 on page 341 outlines the Stakeholder Classification as a broader code or sub-theme, responses, fine descriptive codes, researcher’s preliminary thoughts or notes and finally initial categories.

The second approach of coding and discussion stage of the Framework Analysis phase was to develop categorisation matrix index. At the simplest level, the data can be aggregated to similar initial category of groupings that were eventually brought together to form initial themes. These initial categories and initial themes formed a 'categorisation matrix index' that was used as a means of organising the whole dataset. However, the categorisation matrix index was constantly refined throughout the data analysis as new insights emerged from empirical evidence and also as part of the data reduction process. As a consequence, coding initial themes this way at least permitted the study to outline meanings on what each participant's viewpoint was about in terms of the identified thematic framework and its conceptual issues which is aligned to the broader codes or sub-themes and interview questions.

The emerged initial themes are very important. The manual descriptive finer codes were the first level of the in-depth analysis because it enabled researchers to start thinking about the links between the initial categories and initial themes while retaining links to the original empirical evidence. The initial themes were assigned an index number according to its respective table number to be used in the next stage as audit trail or to show rigour and for abstraction process of developing emerged final themes and core concepts.

The next section discusses the themes and sub-themes or broader codes of the study.

### 5.5.2 Discussions of themes, sub-themes and presentation of emerged initial themes

The empirical data was discussed per theme and the sub-themes/broader codes as outlined in the previous stage of Identifying a Theoretical Framework stage which are aligned to the research objectives or themes:

> Theme 1 probes Stakeholders- Research Objective 1 (*to identify potential stakeholders and describe the stakeholder's roles and relationships that might influence the adoption of a Physical Address System*)
>
> Theme 2 probes Context - Research Objective 2 (*to determine the role of context awareness and the form it manifest in the adoption of the Physical Address System*)
>
> Theme 3 probes Determinants of Innovation - Research Objective 3 (*to identify and determine how the determinants of innovation may inhibit or enable the innovation adoption process of the Physical Address System, in context*)

The questions brought up in the interviews were based on the conceptual issue of the theory used as a lens of the study as shown in the previous stage. The discussions are about what the researcher enquired, the participant answer and the researcher's comments to the responses. Some participants answered all the questions, some skipped the questions that they were not comfortable with and exercised the option which was outlined in the Ethical approvals. The responses differed accordingly to their lived experience and perceptions while similar responses were aggregated as one response.

The discussion of themes and sub-themes are as follows, the theme or objective is outlined as a guide post for the reader mind map. The sub-themes are stated under the theme and then the interview question(s) that were asked under each sub-themes then followed by answers from participants that are shown in italics and highlighted words

that are of interest (similar responses were aggregated as one response), these responses are then followed by the researcher's comment or discussions of thoughts to make sense of the responses on what the new knowledge is this about. The table that follow shows the development on initial themes by grouping initial categories. The table that outlines how the initial categories emerged from the empirical evidence are shown at the Appendices section (Appendix 8.1, Appendix 8.2 and Appendix 8.3,)

For example, Skills and capacity initial theme with index T7.1 on Table 7 which is an emerged from groupings of initial categories on Table 24 on Appendix 8.1. The same approach was applied to all the Research Objectives or Themes for each interview question.

#### *5.5.2.1 Discussion of Theme 1: Stakeholders*

Under theme 1, the following sub-themes are discussed, then followed with answers from participants that are shown in italics and highlighted words that are of interest (similar responses were aggregated as one response). These responses are then followed by the researcher's comment or discussions of thoughts to make sense of the responses on what the new knowledge is this about. Lastly, the table present the development on initial themes by grouping initial categories which outlines how they were matched. The development of initial themes is conducted for all the sub-themes of the study.

The discussion of stakeholder classification, stakeholder relationship and engagement, and stakeholders priorities are as follows.

#### *Sub-theme: Stakeholder Classification*

Stakeholder management is very important in order to complete an initiative or project successfully. However, for a national project initiative like the adoption of the PAS at the country level, the initiative or the project is large because it is country wide, hence

stakeholder management task is not easy. The literature (Osman, 2015) articulates that stakeholder analysis process cannot treat each stakeholder equally. There was a need for stakeholder analysis to find which stakeholder's roles are important and which are not, and manage the important stakeholders closely because they can affect the adoption of the physical address system. To manage stakeholders effectively, firstly, there is a need to classify them and then you will develop a strategy to manage your stakeholders.

Often, the Project Management Book classification guide (PMBOK) is as follows:

- Power/interest grid
- Power/influence grid
- Influence/impact grid
- Salience model

There are four models to classify stakeholders. For the four models, the first three models are somewhat similar and are based on two attributes. Stakeholder salience means the "degree to which the managers give priority to competing stakeholders claims in their decision making process" by Mitchell *et al.,* (1997). The saliency model enables the stakeholder analysis process to focus on important stakeholders and avoid time wasting on less important ones (Osman, 2015). In this study, power versus interest was used to classify the physical addressing stakeholders. The first interview question about stakeholder classification follows:

**Interview Question 1:** What makes your department relevant to carry out the prescribed mandate or roles?

> *"It's because of the **experience** we have as an organization, we have more than **45 years of experience** in this industry We have the **capacity** and know exactly **what is happening, we know how to go about it** and we believe we have the **relevant expertise** in executing our mandate".*
>
> *"We are the **only Department delegated to deal with land issues in Botswana.** We are **the only department licensed to do mapping**, **surveying** and **dissemination of land information in that regard in Botswana**."*

> "You will ***need someone more knowledgeable on roads aspect*** and that why we are the relevant institution to ***maintain, naming and put up signage*** because ***we are under the MLGRD***. We also ***competent and we had the capacity."***

> "I stand to be correct, it's the organisation that we are or ***our reputation*** in the postal industry and because we are ***100% government owned***, so for that ***might be the reason***. I take it that's why we are relevant and ***given that preference***. It's a ***privilege*** and they always ***make it clear that they are not obligated to give us that status of Designated Postal Operator (DPO***), and they ***can always take it away as they are other players*** in the space of ***postal operation***."

Some stakeholders are proud in their specific industry, uphold pride as there are reputable and the have a vast experience of number years with capacity to execute their roles. This makes them to be knowledgeable of what is happening with their current operation around the country.

> "So ***during implementation of the pilot, we could see that we are different Stakeholders,*** so each institution has to play their role."
> *"We don't provide security guards like G4S and Security Systems in Botswana. As XXXX, we* ***concentrate on innovative technology****, we* ***focus one thing and we do it well****."*

There is an element of independency from other stakeholders as they make it known that their mandate is different, this might be due to being a private institution. The above comment mentions that the stakeholder concentrates on one aspects of business and does it well in that platform. This was confirmed by second quotes, which outlines that they are different security company from others. The participant outlined that they are driven by innovative technology compared to the common services that provided by other security guards companies.

> "Our ***strategic positioning of our branches***. We can ***easily network***, like our ***services now become easily accessible***."

> “Can I point out the ***different first between us and the Government emergency services*** for our relevancy, ***the government will tell you about demarcation and jurisdiction*** and ***they cannot go there***, you ***better go to the nearest clinic***. The XXXX ***goes everywhere*** around the country ***irrespective of the jurisdiction***.”
>
> “We follow the ***standards from ISO and BOBS for compliance***. It also goes to the materials that are being used to put us the signage, they are prescribed in the standards which we follow.”

> “I have ***trained quite a number of people***, say ***close 650 personnel from the Ministry***. I ***designed those short courses and actually running them***, I have also ***designed certificate courses and long term courses*** such as the ***Degree and Diploma in Land Management which incorporate LAPCAS components ideology***.”

Stakeholders are compliant and conform to standards of industry operation for their mandate or roles. Education and training is offered to the personnel through short courses to make them informed on dealing with the physical addresses and issues related to land so that they are knowledgeable.

Table 7 present the development on initial themes of the sub-theme Stakeholder Classification.

**Table 6: Presentation of categorisation matrix of Stakeholder Classification index**

| Initial themes | Initial categories |
|---|---|
| Skills and capacity (T7.1) | Knowledge driven and capacitated. |
| | Reputable skills development and training. |
| | Knowledgeable on maintaining signage and street naming. |
| Innovation Strategy(T7.2) | Because of key turnaround strategic |
| | Innovative technology driven |
| | Innovation Ideation dependent on budget. |
| Reputation in service delivery. (T7.3) | SMME Partnerships with government |
| | Deliver Services country wide. |
| | Custodian of land data the only licensed Department in Botswana. |
| | We differ because of door step delivery. |
| | Experienced player of the industry. |
| Compliance to standards and regulations(T7.4) | Standards conformance and compliant. |
| | Because of institutional arrangements for regulations and legislations. |

The development on the indexed initial themes of Table 7 was conducted by grouping or matching initial categories from the Stakeholder Classification coding matrix table on Table 27 on Appendix 8.1.

### *Sub-theme: Stakeholder relationships and engagement*

This study analysed the nature of the communication process involving stakeholders in a working relationship in a collaborative manner. Most research has been undertaken to identify “who” or “what these stakeholders brings to the table”. This section has two interview questions to inquire about the stakeholder relationships and engagement.

The pattern of stakeholder relationships is very important and very little attention has been given to the ways in which the stakeholders actually engage with each other. The first question looks at the relationship of stakeholders.

**Interview Question 2**: To what extent is your department/ministry processes, task, and operation dependent on other departments/ministries/units/private entities?

> *"The MLH will **allocate us land** to go and **build** or **set-up an Estate in certain area**. We have somebody responsible of **Land acquisition**, we are able to tell what kind of a land is this, whether is **State Land**, **Residential**, or **other types"**.*

> *"The whole **Government Ministries and its department**, **Private Sectors**, **BPC**, **WUC, Telecommunications Providers**."*

The government is the main custodian when it comes to national projects through its Ministries and Departments. Most of stakeholders in the adoption of the Physical Address Systems are government department and they rely on each other in a form of cluster engagement like security cluster, infrastructure development cluster and others, the Physical Addresses are presumed to fall in the infrastructure development cluster.

> "One key dependency is ***Botswana Couriers***, who happens to be somehow our subsidiary or our sister company even though they operate as independent private company. We have a ***huge dependency to them because we have outsourced all our logistics***, all ***our network in terms of the cars or the delivery mechanisms***, they ***manages/control or the own the fleet per say***."

> *"Maybe **internationally**, **locally** we are **still fine**. We **use FedEx is we had some parcels to send international".***

The Postal agencies seem to have a similar trend of leveraging on third parties when it comes to couriers services. This solves the dynamics of sorting mail items or parcel, and optimising roads network for delivery services.

> "We ***don't rely on anyone, we use our own motorbikes***. So we ***don't depend on anyone***."

> "The general population ***is the core people that assist our business and behind us, for instance,*** those are the ***people behind us*** and ***we are behind***

***them 100% dependency wise.*** Whether ***they are in medical aid or not in medical aids, they keep us in business***."

The Private sector does not rely on any stakeholder in their business operations as articulated by the quotes. Their customers keep them in the business and they also offer a good service to them in return. There is huge dependency on the general public to keep them in business and afloat.

Table 8 present the development on initial themes of the sub-theme Stakeholder relationships and engagement.

**Table 7: Presentation of categorisation matrix of Stakeholder relationships and engagement 1 index**

| Initial themes | Initial categories |
|---|---|
| Urban planning and housing. (8.1) | Physical Planning department. |
| | The street network and suburb signage is contingent to the project. |
| | Government and private sector utilities service networks information and national strategies. |
| | Housing corporations benchmarking and collaboration. |
| | Property Regulations and oversight. |
| Infrastructure and land administration. (T8.2) | Land related information. |
| | Various stakeholders' roles are key on surveying, naming and postcodes development. |
| Individuals or General Public. (T8.3) | Individuals or Citizens is important. |
| | An Independent stakeholder resource wise and deliver to individuals and corporates |
| | General Public and those who institutions in need of social and emergency services. |
| Mailing and Postal systems(T8.4) | Competitive Courier market. |
| | International mailing and postal systems partnerships and global presence. |

The development on the indexed initial themes of Table 8 was conducted by grouping or matching initial categories from the Stakeholder relationships and engagement coding matrix table on Table 28 on Appendix 8.1.

The basis of any constructive engagement in a country between its stakeholders should be communication that is linked to mutual understanding as the basis of agreeable action to succeed on national projects. The second question of the sub-theme looks at the stakeholder engagement.

**Interview Question 3**: How do you engage each other as stakeholders, is there any institutional initiative? (I.e. Lekgotla, Pitso, Task team, Ministerial Cluster Committee etc.)

> *"They are part of the **ministerial leadership forum** which all players **engage** through, there is a council (Real Estate Institute of Botswana (REIB), Real Estate Institute Advisory Council (REIAC)) that is responsible for the Valuers, **Land Management** and they have associations and council **that act as an oversight for these players**."*
>
> "There is ***a security association*** and ***we are no longer members of it***. You are ***not forced to comply or conform*** to the association."

There are stakeholder forums where collaboration and engagement takes place. The Ministerial leadership forum purpose is to share ideas and insights. The engagement is dependent on the important resource suppliers possess to facilitate others. When the Presidency want to meet the implementing team, contingency meetings in war rooms are set depending on whatever the case will be at the time.

> *That's the engagement that we have from the **Private side and I can't describe it, in short, we have an unofficial memorandum understand** and we do **financial reconciliation later.***

Most of the time, the private sector has unofficial participatory collaboration. When they are desperate, they just do walk-ins to seek help of information from any government institutions.

Table 9 present the development on initial themes of the sub-theme Stakeholder relationships and engagement 2.

**Table 8: Presentation of categorisation matrix of Stakeholder relationships and engagement 2 index**

| Initial themes | Initial categories |
|---|---|
| Partnerships. (9.1) | Ministerial leadership forum to share ideas and insights. |
| | National Committees. |
| Participation. (T9.2) | Unofficial participatory collaboration. |
| | Engaged in delivering project tasks through seminars, workshops and email communications. |
| | Stakeholder engages according to the project plan. |
| Consultation. (T9.3) | Engagement depend on the important resources through seminars, workshops, email communications and meetings |
| Public Push. (T9.4) | Sabotage and backstabbing complaints by security association forum members public meetings. |
| | We engage through the use of technology. |
| Public Pull. (T9.5) | Walk-in to seek help to get information from DSM. |
| | Contingency meetings in war rooms depending on whatever the case will be at the time. |

The development on the indexed initial themes of Table 9 was conducted by grouping or matching initial categories from the Stakeholder relationships and engagement 2 coding matrix table on Table 29 on Appendix 8.1.

### *Sub-theme: Priorities the stakeholders*

In a collaborative platform, it is always important for a Project Manager to know how much attention each stakeholder within a group deserves or requires because it is impossible that all stakeholders will have the same roles, interests and demands. Once stakeholders have been identified, there is a struggle for attention like “who to give it to”, “who to give more to”, and “who to ignore” (Winn, 2001). Sacrificing the needs of one stakeholder for the needs of the other is a dilemma with which is difficult in stakeholders analysis. When these conflicts arise, it is important for the country to prioritise each stakeholder according to the role. The interview question that probe priorities the stakeholders follows.

**Interview Question 4:** From your point of view, who do you think is important to be part of the stakeholders? How are they selected?

> "The Government at large, the ***Ministry of Land and Housing*** though its ***various Departments*** like Housing Department. Those dealing ***with Infrastructure within MLH were not actively involved initially because they didn't have a role***. In terms *of* ***training***, we ***didn't exclude anybody***. Even ***Top Management*** had their ***special training***. Some did show ***interest,*** and some ***other groups didn't***."

The government is an anchor of any national project, if no government organs support the initiative like introducing the Physical Address System, the initiative would not be successful.

> We ***rely on our customers*** (whether ***individuals*** or ***corporates***) to be ***in the business of selling pizza***, they are ***very important to us at all time***.

The private sector always put the citizens or the general public upfront as they are important for their business to survive. This is articulated in the participant views that the customer comes first for their services.

Table 10 presents the development on initial themes of the sub-theme Priorities the stakeholders.

**Table 9: Presentation of categorisation matrix of Priorities the stakeholders 1 index**

| Initial themes | Initial Categories |
|---|---|
| Utilities company. (T10.1) | WUC because water is a basic need of life. |
| | We need water to build infrastructure from the ground. |
| PPP Agreements. (T10.2) | Partners are construction companies. |
| Individuals and Corporate. (T10.3) | Individuals, corporates companies and investors are important. |
| | Individuals and corporate companies who buy pizza. |
| | The individuals and Ministry of Health for keeping us in business. |
| | Corporate and Individuals are our precious clients. |
| | Individual through common law and inheritance. |
| LAPCAS Core Project Stakeholders(T10.4) | The core team is the GCC, MLH, and Botswana Post with different roles. |
| | MLH for administering the LAPCAS and also through DSM again.<br>Botswana Post under the MTC.<br>City Councils, Town Councils and District Councils (Land Boards) under the MLGRD are all important. |
| | DSM under MLH, GCC under MLGRD, Botswana Post under MTC is import and then the physical address is complete. |
| Land related stakeholders. (T10.5) | DSM and Deeds Registry are key stakeholders. |
| | MLH and its various Departmental Leadership |
| The Presidency. (T10.6) | The Presidency Office and the Directorate of Information Security Services (DISS) for accountability and vetting. |
| Education and Training institution. (T10.7) | University of Botswana for skill development. |

The development on the indexed initial themes of Table 10 was conducted by grouping or matching initial categories from the Stakeholder relationships and engagement 2 coding matrix table on Table 30 on Appendix 8.1.

**Interview Question 5:** In your views, who do think will adversely affect the process of engagement if not part of it?

*"BHC for many years **has not been relying on Government funds** but it **generated its funds** for **sustainability**. Recently **because of the extended Mandate**, we do **receive funds form the Government** for **SHHA Housing and other government projects**."*

The government provide funding for all of its Ministries for infrastructure development mega projects and by doing that, it create employment to its citizens. If the government stops funding from, this can adversely affect the process of engagement to any project that has been commissioned.

*"If you don't If **you don't consult people (Individuals or citizen stakeholder),** sometimes **what you see is not really a complete picture."***

*"The **public consultation** with the people of the ground is a big issue on the **participatory process**, there has been a big **challenge with that regard**."*

Creating awareness is very important, it lead to people know what is happening within their communities and to make the introduction of the PAS happen without the disturbance. People tend to know a lot on what is happening on the ground, if a professional does not conduct public participation process and network with the local residents, might not know the magnitude of the job or revolt the presence of a professional in any community. This is part of Setswana culture, which requires visitors to be introduced by village elders in order to complete their tasks without disturbances from the community.

Table 11 presents the development on initial themes of the sub-theme Priorities the stakeholders 2.

**Table 10: Presentation of categorisation matrix of Priorities the stakeholders 2 index**

| Initial Themes | Initial Categories |
|---|---|
| Government. (T11.1) | Government ministries and departments. |
| | Ministry of Health |
| | Ministry of Finance |
| Individual and Community. (T11.2) | Individual opinion |
| | Ward Leadership (Kgosi/Chief or Kgosana/Sub-Chiefs), Chiefs, and the community |
| | Individuals in the communities. |
| | Individual and Community. |
| The Presidency. (T11.3) | The Presidency for project oversight |
| | Presidency |
| The LAPCAS Core Stakeholder. (T11.4) | MLH, MLGRD, and Botswana Post |
| | The DSM. |
| The Post Office. (T11.5) | Botswana Post |
| Financial Institutions. (T11.6) | BURS for tax collections |
| | Banks for property mortgages |
| The IEC. (T11.7) | IEC for elections registration physical address as a policy. |
| Local Government. (11.8) | City Councils, District Councils and Town Councils |

The development on the indexed initial themes of Table 11 was conducted by grouping or matching initial categories from the Stakeholder relationships and engagement 2 coding matrix table on Table 31 on Appendix 8.1.

### *5.5.2.2 Discussion of Theme 2: Context*

Under theme 2, the following sub-themes are discusses, then followed with answers from participants that are shown in in italics and highlighted words that are of interest (similar responses were aggregated as one response), these responses are then followed by the researcher's comment or discussions of thoughts to make sense of the responses on what the new knowledge is this about.

***Sub-Theme: Tool-in-Context***

Information systems enable diverse human activities. Most of the innovation studies from other scholarships do not consider a tool-in-context of the information system. With regards to information system research, a thing is investigated on its contextual background on how it enables an activity or a stakeholder role. The physical address system is the tool-in-context, argued at the abstract level. This is to understand its usage within the developing country context because a standardised and comprehensive does not exist (see Section 3.2.1 on the Context and PAS).

**Interview Question 6:** Please share with me your understanding of physical addresses or location address.

> "Location of addressing means ***identification of areas*** within a ***specific setting***. We know latterly, there is Ditimamodimo (new name for Block 7) that is meant the ***facilitation of setting or localities***."
>
> ***"Similar to your published papers***, consists of a hierarchy of, i.e. place name, street name and address number, with numbers assigned sequentially along the street."

The participants outlined the definition of the Physical Address System according to their viewpoint. In summary, they say it is the identification of areas at specific setting and facilitation of setting or localities. Some simply says it is a point of service delivery at a location or a place of activity. From all this definitions, the uniqueness of the location stands out from the participants.

> *'There is a problem for the fact that we **don't have a Zipcode**, but it's not a problem because that **does not make any difference to the way we operate."***

Some participants pointed out that or are aware that the Physical Address System has to deal with postcodes. It was pointed out as a problem because Botswana lacks the postcodes or zipcodes as it is known in the United States of America.

> ***"Our business needs proof of delivery*** that ***outline that the clients received the parcel*** as a form of ***signing with an official Identity document at particular physical address***. So physical addresses are so ***crucial to us in this courier industry***."

The participants state that the Physical Address System is core to the business because they do not use box numbers like the main post. For their delivery of mail items and parcels, they rely on a physical address and this was effort to define it because it is essential to them.

Table 12 present the development on initial themes of the sub-theme Tool-in-Context.

**Table 11: Presentation of categorisation matrix of Tool-in-Context index**

| | |
|---|---|
| Unique identification. (T12.1) | Unique Identification of locations. |
| | Standardized addressing. |
| Service delivery point. (T12.2) | A point of service delivery a location. |
| | A point of service delivery. |
| | Door step delivery |
| | A place of activity. |
| | Time savior and easier to locate a place. |
| | Street address delivery. |
| Naming and numbering street. (T12.3) | Process of assigning numbers and naming streets. |
| | Process of numbering and naming streets. |
| Postal mail delivery. (T12.4) | Post box address |
| | Lack of postcodes. |
| Geographic reference. (T12.5) | Spatial reference of a point on the ground. |

The development on the indexed initial themes of Table 12 was conducted by grouping or matching initial categories from the Tool-in-Context coding matrix table on Table 32 on Appendix 8.2.

### *Sub-Theme: Developing country context*

The information system in this inquiry was bracketed on the contextual reasoning of the developing country settlement patterns of urban, villages and rural areas, and farms and

lands for stakeholders to be persuaded to adopt the innovation. The interview question that probe developing country context follows.

**Interview Question 7:** In your opinion, do you think is easy or difficult to find a location at 1) urban areas 2) villages and rural areas and 3) farms and lands as a Botswana cultural social setting, please explain why?

> "It's easier in the ***urban areas because of the way the plot are being arranged***. In the ***Rural areas where they are all scattered***. ***Farm and Lands (Cattle post) is difficult to find*** because ***the plots/households are also scattered and the roads are bad to locate households***."

> *"This is going to work in the three setting according to the structures that we have designed,* ***currently we are going to survey them****,* ***Even farms lands have ERF/parcel number in our surveying diagrams that has been surveyed****, by default* ***if there is any dwelling around there, it will be located by that parcel number****."*

You can find a location in all three settings according to how they are structured as they are associated dwellings and unique numbers that can be used from respective government departments. The farms has land parcel (ERF) numbers on their surveying master diagrams that are held Department of Surveys and Mapping and boreholes has X,Y coordinates as the allocated water points from the Department of Geological Services. This makes it easy to locate a place in all three settings and that might convince the stakeholders to adopt the Physical Address System.

> *"Villages have* ***a lot of gazetted roads which are not registered in Google maps*** *and* ***other map software****. It's* ***going to be hard for us because it's not on the software/systems*** *that we use here EA."*

Other participants outline that it is going to be difficult at villages and rural areas because the roads network are not updated on gadgets and the realities is that the Farms and lands has unforgiving landscape and dirt roads, hence their view that it would be difficult to find a location.

Table 13 present the development on initial themes of the sub-theme Developing Country context.

**Table 12: Presentation of categorisation matrix of Developing country context index**

| Initial Themes | Initial Categories |
|---|---|
| Planned areas. (T13.1) | Urban areas are physically planned. |
| | Some villages are planned physically. |
| Unplanned areas. (T13.2) | Rural areas are physically unplanned. |
| | Farms and lands have bad terrains for infrastructure. |
| | Semi-urban areas are partially physically planned. |
| | Urban areas numbering of properties not standardised. Urban poor roads infrastructure |
| Geographic Reference system. (T13.3) | Boreholes are used as coordinate's reference system. |
| | Wards and sub-wards are used as geographic area identifier |
| All settlement patterns. (T13.4) | Applicable on all settlements patterns |

The development on the indexed initial themes of Table 13 was conducted by grouping or matching initial categories from the Developing country context coding matrix table on Table 33 on Appendix 8.2.

### *Sub-Theme: Digital representation context*

The digital representation context relates to the representation of physical addresses by the computer systems that enable stakeholders to interact with them and could make them to be persuaded to adopt the innovation. The computer system should be aware of the stakeholder's context, in return, it makes the devices to use and provide only the relevant information based on the stakeholder current context. The interview questions that probe the digital representation context follow.

**Interview Question 8:** In your experience, how easy is to go around using a gadget with a navigation capability?

> *"I know that the **GPS gadgets have been loaded lately** or **the maps have been updated lately**. It **used to be very difficult."***

*It is **very easy**, as you have seen that **we have the tracking system** and the gadget here in EA to see the big area of the suburbs.*

The participant indicated that using the GPS gadget with navigation capability might work. The stakeholders in the emergency health sector have already integrated the navigation technologies that have tracking capabilities for their fleet of cars and they are currently using it in their ambulances. This is part of ubiquitous use of Physical Address Systems

***"I haven't had the experience a gadget experience but looking at the future."***

"In *Gaborone* ***is not easy to around using a gadget with a navigation capability***, we ***don't have the updated information in our gadgets***. "

Some of the participants indicate that the digital divide makes it impossible because they do not have the experience of using advanced gadgets with navigation capabilities. Some outline the complexities of urban areas orientation when using technology because they need to be also aware of their orientation or to sight see while navigating the streets.

Table 14 present the development on initial themes of the sub-theme Digital representation context.

**Table 13: Presentation of categorisation matrix of Digital representation context index**

| Initial Themes | Initial Categories |
|---|---|
| Address data quality. (T14.1) | A good address data quality makes it easy |
| | Poor residential address data quality makes it difficult |
| | Poor map data quality makes it difficult. |
| | An updated mapping address data quality makes it easy |
| Location-based services. (T14.2) | Though GPS digital representation |
| | Physical address interoperability enables apps to go around locating places. |
| | Innovation solutions can make it easy. |
| Ubiquitous use. (T14.3) | Ubiquitous use of Physical Address System navigation system. |
| | Physical address interoperability enable address related software. |
| | IT Usability principles makes it easy for people to use cellphones. |
| | The digital divide makes it impossible. |
| Orientation and awareness. (T14.4) | Urban area orientation and context awareness. |
| | Compatibility with the current addressing system. |
| Local knowledge. (T14.5) | There is a Digital Divide but local knowledge better. |
| | Local knowledge descriptions are better. |
| | Local knowledge and Years of experience is enough. |

The development on the indexed initial themes of Table 14 was conducted by grouping or matching initial categories from the Digital representation context coding matrix table on Table 34 on Appendix 8.2.

### *Sub-Theme: Physical world context*

The physical world context refers to the actual location of the address on the ground in relation to how it should be reached by stakeholders. It also extends to collection of nearby people and social situations around the infrastructure that surround them. The interview question that probe the physical world context follows

**Interview Question 9:** In your view, can I find your organization assets, land parcels, places of interest, on my own without assistance given the GPS coordinates?

> "It's ***not easy in Botswana***. It's not easy and ***it's a question of are we really tech*** savvy because not everyone at ***the entry level uses smartphone***."

"No, *you* ***can't, it is very difficult***."

GPS Coordinates systems and any computerised codes are technical and are not user friendly to novice users, the participants outlined that it's a mammoth task to use coordinates to find organisation assets, land parcel or any place of interest.

*"I think you can but* ***you need expect knowledge on how to use them****."*

*"We have* ***GPS in our ambulances****, I think you can if are* ***given the coordinates and our crew have to put them in the GPS gadget and it will take them to the exact location****."*

*"Given coordinates,* ***As a Geomatics lecture****, I know I have to do* ***some calculations or put them in the gargets*** *but* ***people who are not knowledgeable of using coordinates will have problems****."*

On the other hand, if you have been professionally trained and possess knowledge and skills to that effect of a GIS Specialist, Geometrician, Computer Scientist and others, you can easily perform some arithmetic calculation and able to find the exact feature on the ground. The other option is to use the GPS software to help locate the exact physical address.

Table 15 present the development on initial themes of the sub-theme Physical World context.

**Table 14: Presentation of categorisation matrix of Physical World context index**

| Initial Themes | Initial Categories |
|---|---|
| Training and development. (T15.1) | Map skills development and training needed. |
| | Skills transfer and training needed for maps. |
| | Training and development for effective use of maps. |
| | Tool-in-Context and training required. |
| GPS Coordinates are complex. (T15.2) | Expect Knowledge is required to use GPS gadget. |
| | GPS coordinates jargon not user friendly and not easy to understand. |
| | GPS coordinates not difficult to understand. |
| | GPS coordinates are usable by mostly Professionals. |
| Access to Smartphone issues. (T15.3) | Inclusive smartphone access and the issue of the Digital Divide. |

The development on the indexed initial themes of Table 15 was conducted by grouping or matching initial categories from the Physical World context coding matrix table on Table 35 on Appendix 8.2.

***Sub-Theme: People context***

The people context incorporates all the 'human' or stakeholder requirements of a Physical Address System dependent on stakeholder's situation. The stakeholders should be able to "read", "understand", and "remember" the physical address. The interview question that probes the people context follows.

**Interview Question 10:** What is your take on this, does being given directions for a particular location by someone or using local knowledge easier to find a residence, a land parcel or a place of interest.

> *"Some people are* ***comfortable to description as way of addressing***."
>
> ***"That's the practice here in Botswana***, sometimes *you need to* ***ask twice until*** *you get to* ***the right place***. People ***don't really know their locations***, the person ***might know how to get there*** but to ***direct someone is always a problem***."

The description of an address seems to be common in Botswana. The citizens feel comfortable to be narrated how to get there, there is a contradiction that even though some people know how to take themselves to a certain location, describing directions to someone else can be a daunting task.

> ***"Yes***, ***using a local knowledge*** or ***description is easy to find a place***."
>
> *"Using a* ***local knowledge*** *sometimes* ***gives advantage*** *because* ***you know your location or bad enough you might be lost****."*
>
> "*People* ***interpret the descriptive directions according to their orientation or local knowledge****."*

The people who have been around a certain location believe that the local knowledge to describe the direction is better to reach a physical address. They describe the direction according to the local culture that is only understood by them.

> ***"It is very difficult because direction*** *cannot take you there* because ***directions are interpreted by someone with different orientation*** and *some of the names we have are duplicates."*
>
> ***"It's not easy*** *because* ***description*** *can be anything because* ***people describe things differently***."

The participants indicated that it is not easy to understand directions most of the time because people describe things differently. They tend to rely on local knowledge for directions as human cognitive mind is not always reliable depending on the context of the geographic orientation.

> *"Well,* ***I just use my own memory because I stayed here long enough****, if there is any* ***new development, I will know it or I knew about it****."*

One of the participants had a view that using own memory is better because of being around for so long in the Gaborone area and as such any development that comes along will be known.

Table 16 present the infrastructure development on initial themes of the sub-theme People context.

**Table 15: Presentation of categorisation matrix of People context index**

| Initial Themes | Initial Categories |
|---|---|
| Directions are context dependent. (T16.1) | Descriptions are orientation and context dependent |
| | Confusing as they can be interpreted with reference to context of the interpreter |
| | Digital representation Context always win than directions |
| Directions are easy. (T16.2) | Easy to use and understand directions. |
| | Traditional descriptive of addressing is functional. |
| | It's the people preferences and experiences. |
| | Local knowledge and experience to direct properly makes it easy. |
| | Directions are easy to find a place. |
| Uncertainty of directions. (T16.3) | Uncertainty about direction because patients call in panic situations. |
| Directions are complex(T16.4) | Directions are complex. |
| | Area names duplicates makes directions difficult. |

The development on the indexed initial themes of Table 16 was conducted by grouping or matching initial categories from the People context coding matrix table on Table 36 on Appendix 8.2.

#### *5.5.2.3 Discussion of Theme 3: Determinants of Innovation*

Under theme 3, the following sub-themes are discussed, then followed with answers from participants that are shown in italics and highlighted words that are of interest (similar responses were aggregated as one response), these responses are then followed by the researcher's comment or discussions of thoughts to make sense of the responses on what the new knowledge is this about.

#### *Sub-Theme: Prior Conditions (Previous practice and Norms of the social systems)*

The Physical Address System at Botswana is in a form of description where the current practice is by asking people or most of the time there is reliance on local knowledge for directions but this can be a problem as human cognitive mind is not always reliable depending on the context of the geographic orientation. The traditional practice of giving physical addresses is evident as there is a usage of plot numbers instead of best practice and standardised approach of house numbers in developed countries. The interview question that probes the prior conditions follows.

**Interview Question 11:** Please tell me your physical address or locational address where we are having this interview?

Example:

| | |
|---|---|
| *BHC Headquarters* | *Building name* |
| *Cnr Mmaraka and Station Road* | *Roads network intersection* |
| *Plot 4773* | *Plot number.* |

| | |
|---|---|
| *Gaborone* | *Administrative Area/Suburb.* |

*Example: "Digital Mapping Product" pamphlet*

| | |
|---|---|
| *Private Bag 0037,* | Postal mail box delivery |
| *Gaborone* | *Administrative Area/Suburb.* |
| *Station Road, Plot 1285* | *Street and plot number.* |
| *Phone: (+267) 3623-200* | *Phone number.* |
| *FAX: (+267) 3952-702* | *Fax number* |
| *EMAIL: dsm@lists.gov.bw* | *Email address.* |

The above examples outline a mix of multiple physical address types for a single unique location. There is also the ppostal office box address within the mix of addressable types.

Example:

> "*Let me give you descriptive directions coming from Airport Junction Robots. "You head straight facing Barclays cycle, there is you turn in you left, the turn left again and curve with the road, after Botswana craft heading to MetSef, you take the second turn on the right and then first right you be at Emergency Assist building or Look-up for the board outside*".

The participants shared a descriptive address to outline the physical address where the interview was conducted. To describe is a form of physical addressing and it currently works, some people are comfortable to offer physical addresses on this format of an address. That being said, it remains a concern to observe if participants who offered the physical address this way can be persuaded to change to the new way of providing physical addresses.

Table 17 present the development on initial themes of the sub-theme Prior Conditions.

**Table 16: Presentation of categorisation matrix of Prior Conditions index**

| Initial themes | Initial Categories |
|---|---|
| A mix of multiple physical address types. (T17.1) | Building address. |
| | Intersection address. |
| | Plot number address. |
| | Site address. |
| | Area boundary address. |
| | Landmark address. |
| | Informal Address. |
| | Street and plot address. |
| | Street address. |
| | Lot number address |
| | Room and floor address |
| | Country address (Botswana = BW) |
| Telephone address. (T17.2) | Phone number address. |
| Fax Number. (T17.3) | Fax number address. |
| Email address. (T17.4) | Email address |
| Descriptive or informal address. (T17.5) | Descriptive address to someone. |
| Post Office Address. (T17.6) | Postal Office box address |

The development on the indexed initial themes of Table 17 was conducted by grouping or matching initial categories from the Prior Conditions coding matrix table on Table 37 on Appendix 8.3.

### *Sub-Theme: Compatibility*

The Physical Address System is to be perceived as being consistent with stakeholder roles and the way they are doing their business. In developing countries, the Physical Address System innovation should be compatible with the need for locational orientation, navigation to households and business offices, sending mail/parcel and other service delivery. The interview question that probes compatibility follows.

**Interview Question 12:** Is the current way of physically locating residences, land parcels or places of interest working, how is working well or not working well for your organisation?

> "I ***don't think is working*** because of the mindset, ***I don't think people have been trained on how it works*** or ***oriented to know if this is how you should locate a physical address***."
>
> ***"Not really efficient and effective***, so ***we have to run*** *with what we have for now*."
> "The ***traditional address that I gave you is also cumbersome to a normal Motswana***."

The identification of physical addresses is difficult to achieve using the current way of physically locating residences and land parcels. These issues can be exacerbated by the lack of knowledge on how physical address is important and are used by the citizens.

> ***"It's working for us*** *because we* ***use plot as*** *they are the* ***ones available for us to direct our crews***, we ***work with what is available and we have mastered it***."

The participant's views seem to have settled to the fact that the current way of addressing is the only one that they know and they have turned its weakness to its strength by mastering its shortfalls. By virtue of their strategy, it is working for them as the country lacks physical address system that is standard and comprehensive.

Table 18 present the development on initial themes of the sub-theme Compatibility.

**Table 17: Presentation of categorisation matrix of Compatibility index**

| Initial Themes | Initial Categories |
|---|---|
| Capacity building required. (T18.1) | Training and development to increase knowledge and its usage. |
| | Creating awareness of physical addressing components is welcomed. |
| | Culture and illiteracy levels make it difficult. |
| Address data quality. (T18.2) | Not working as plot numbers has poor address data quality. |
| | Nonexistence of house number. |
| | Seldom usage of street names. |
| The current addressing not working. (T18.3) | It's difficult to move from norms of the social systems. |
| | The current is ineffective and inefficient. |
| | Physical addressing change is imminent from the current one. |
| | Compatibility issues as people are accustomed or used to the current way of addressing. |
| | It's difficult to move from norms of the social systems which is cumbersome. |
| | Complex way of addressing. |
| Standardization of Addresses. (T18.4) | Urban areas numbering of plots not standardised. |
| | New standardised Physical Address System is a way forward. |
| | Address standardization is a priority. |
| The current addressing is working. (T18.5) | Logical, contextual and practical way is how we work with the current system. |

The development on the indexed initial themes of Table 18 was conducted by grouping or matching initial categories from the Compatibility coding matrix table on Table 38 on Appendix 8.3.

### *Sub-Theme: Perceived Easiness*

The perceived easiness refer to how easy will be to learn and use Physical Address System (Robinson, 2009). The experience of stakeholders gained from other countries or awareness would be able to determine the learning curve of the Physical Address System. People would not be able to remember geographic coordinates (X,Y) jargon but popular names for most roads and landmarks still prevail. Street number and street name has been proven as the best practice for people to remember for their address land parcel. The interview question that probes perceived easiness follows.

**Interview Question 13:** How easy is your organisation currently finding their assets, land parcels, places of interest within the country?

> "Every BHC house has a number. At the moment, the ***number is still confined to BHC internally***, we ***are the only one who knows what that number means*** and they ***general population or public do not know***."

The participants indicated that various unique numbering systems are used because there is no national standard that guides how numbers should be formalised. The different types of numbering have been observed on some households who have multiple types of stakeholder numbers placed on their doors for providing service delivery.

> "We use an ***A0 paper size map in the store to look-up for the plot numbers***."

The participants outlined that they still use manual maps to look-up for physical address for their business operations to orientate themselves. The adoption process might enable a change from manual to a physical address system that uses gadgets from the digital representation context.

> "Firstly, its either you find it from ***Satellite Images*** or ***Aerial Photographs*** and secondly ***you go strictly to the ground to do cadastral survey***."

Some participants are technical, they use satellite images to visually find their assets before they leave to site to verify and validate the physical feature on the ground.

Table 19 present the development on initial themes of the sub-theme Perceived Easiness.

**Table 18: Presentation of categorisation matrix of Perceived Easiness index**

| Initial Themes | Initial Categories |
|---|---|
| Seldom usage of addresses. (T19.1) | Seldom usage of street names but it's not easy. |
| | Names not used by public. |
| Various unique addressing numbering systems. (T19.2) | BHC has its own house numbering standard. |
| | Accuracy and reliability of maps makes people get lost. |
| | Using physical address types for different stakeholders. |
| | Use of descriptive address. |
| Creating address awareness. (T19.3) | Need communication strategy to create awareness for the public. |
| Manual map use. (T19.4) | Use of manual map interpretation. |
| | Use landmark address |
| | Use of descriptive address. |
| Convenient addressing innovation solutions. (T19.5) | Use of the address-related software |
| | Address accessibility for services through air. |
| | The use of physical Address coordinates referencing. |
| | Use of internet access |
| | Use the Contingency plans to get there. |

The development on the indexed initial themes of Table 19 was conducted by grouping or matching initial categories from the Perceived Easiness coding matrix table on Table 39 on Appendix 8.3.

### *Sub-Theme: Perceived Advantage and PAS Outcome*

In this study, the relative advantage refers to the upper hand that the Physical Address System has if compared to the current descriptive and traditional system which may lead to stakeholders to be persuaded to adopt it.

The collective decisions by Rogers (1995) fit this study. Rogers's posit that collective decisions is the country choice to adopt or reject an innovation made by consensus among members of a system (stakeholders), there can be two possible adoption

outcomes, the country can either reject or adopt the innovation if the stakeholders were persuaded collectively during the innovation adoption process.

**Interview Question 14:** Finally, if the physical addressing or location addressing is introduced, would your organisation adopt it to be in place in Botswana (Yes or No), please give a reason(s)?

> ***"Yes, it's a welcome development and it will help us in a big way***. We have ***to catch up with what other countries have been doing***."
>
> "We are going to ***look at it to see how easy is it to use it to use in our business*** and then ***we will embrace it*** or ***adopt it per say."***
>
> ***"Yes, we will adopt it*** because ***we understand the importance of it through the LAPCAS pilots that are already on the ground*** and ***theoretically how it can improve the life of citizens*** through its ***benefits***."
>
> Obviously, if ***the new physical address system is being introduced*** and it***s part of the city plans***, ***we don't have a choice but to embrace it*** and configure our systems.
>
> ***Of course***, we ***are tired of this long descriptive way of describing things*** even if you have a sketch. They ***still call to make sure and confirm the location addresses***.

All the participant's views are related and agree that the future point to the directions of adopting the Physical Address System to change the status quo in the developing country to be on par with the rest of the world.

Adopting the Physical Address System for the developing country will facilitate trading of mail items, parcels and goods globally. The importance of efficient and effective physical addresses as a core infrastructure datasets is not only for a quality postal service, but also for improving the living conditions of people around in Botswana. The PAS perceived advantage and PAS outcome is anticipated to add value to smart cities

initiatives because it improves the country living standard for all residents. Finally, from the policy context perspective, the physical addresses are integrated with other legacy system that are aligned to the Acts and Policies to deliver services like the FICA Act, Electoral Act, Census Act, Immigration Act and others in a case of South Africa.

Table 20 present the development on initial themes of the sub-theme Perceived advantage and PAS adoption outcome.

**Table 19: Presentation of categorisation matrix of Perceived advantage and PAS adoption outcome index**

| Initial Themes | Initial Categories |
|---|---|
| Innovation is a game changer. (T20.1) | Yes, Innovative concept is a game changer. |
| | Yes, after the innovation has been reviewed and before its implementation. |
| | Yes, the innovation will be important on optimization and time saving for reaching a certain location. |
| Best practice addressing components. (T20.2) | Yes, the process of house numbering and naming streets is welcomed. |
| | Descriptive addresses are interpreted differently. |
| Address data is core datasets. (T20.3) | Yes, Address data recognised as a core datasets. |
| | Physical address is core infrastructure datasets and we have an obligation to see its success. |
| Address benefits. (T20.4) | Yes, physical address facilitate easy trading |
| | There are known physical addressing benefits. |
| | Yes, for cost cutting measures. |
| Promote socio-economic inclusion. (T20.5) | Yes, physical address promotes social-economic and financial inclusion. |
| Botswana Pride. (T20.6) | Yes, its first for the country and it will be welcomed in catching with other countries. |
| | Yes, The country sense of identity and dignity will be restored as Botswana will have PAS. |
| Smart city initiatives. (T20.7) | Yes, it adds value to the Smart Cities initiatives. |

The development on the indexed initial themes of Table 20 was conducted by grouping or matching initial categories from the Perceived advantage and PAS adoption outcome coding matrix table on Table 40 on Appendix 8.3.

### 5.5.3 Developing the emerged final themes and core concepts

The lists of initial themes were developed from initial categories from the coding matrix table as articulated by the preceding sections. The initial themes has an indexed number as per their Table numbers.

In this section, the initial themes are also grouped under higher order heading of emerged final themes and core concepts (McCain, 1988; Burnard, 1991). The intent of grouping data was to reduce the number of categories by collapsing those that are similar or not similar into emerged final themes and lastly core concepts. Dey (1993) state that creating categories of themes is complex process to a researcher through observations of similar and matching related initial themes, instead initial themes are classified as belonging to a particular group and sometime can appear in certain groups or applicable in more than one group, this implies that the researcher is to looking for “is associated with” and “is part of” relationships of initial themes from different Categorisation matrix’s.

The researcher arrived at the decision making, through deciding the groupings of the initial themes and labels by naming them as emerged final themes and then core concepts to show connections between themes. Creating categories also provide means of describing the phenomenon, aid a transparent process and help on the understanding of how to generate body of knowledge from real to abstract level (Cavanagh, 1997). The abstraction process is whereby general descriptions of the research topic or conceptual elements are developed through generating categories of themes (Robson, 1993; Burnard, 1991; Polit and Beck, 2004). Each category is given a name or label using content-characteristic words for different levels of abstraction (i.e. initial themes with index number to emerged final themes to core concepts). The abstraction process continued as far was reasonable and possible, and it was depended on the aim of the study, systematic literature review, researcher subjective decision making.

Table 21 outline the abstraction process of developing from emerged final themes and core concepts from the themes of this study.

### Table 20: Abstraction process of developing core concepts from emerged final themes

| Initial Themes | Emerged Final Themes | Core Concepts | Themes |
|---|---|---|---|
| Compliance to standards and regulations. (T7.4), Standardization of Addresses. (T18.4) | PAS Standardization. | Governance | Stakeholders |
| Government. (T11.1), The Office of the President. (T11.3), The Presidency. (T10.6), Land related stakeholders. (T10.5) | Attitude towards Control (Organisational Leadership). | | |
| Compliance to standards and regulations. (T7.4), Financial Institutions. (T11.6), The IEC. (T11.7), Promote socio-economic inclusion. (T20.5), Smart city initiatives. (T20.7) | Address Policy Compliance. | | |
| Orientation and awareness. (T14.4), Creating address awareness. (T19.3) | Address advocacy, communication and public campaign. | Project and Stakeholder Management | |
| Partnerships. (T9.1), Participation. (T9.2), Consultation. (T9.3), Public Push. (T9.4), Public Pull (T9.5) | Stakeholder Engagement. | | |
| Land related stakeholders. (T10.5), The LAPCAS Core Stakeholder. (T11.4), The Office of the President. (T11.3), | Stakeholder Analysis | | |
| The LAPCAS Core Stakeholder. (T11.4), The Post Office. (T11.5), Land related stakeholders. (T10.5) | Steering Committee. | Group division and its formalisation (Structure) | |
| Urban planning and housing. (T8.1), Consultation. (T9.3), Utilities company. (T10.1), Land related stakeholders. (T10.5), Individual and Community. (T11.2), Financial Institutions. (T11.6), The IEC. (T11.7), | Consulting Committee. | | |
| Partnerships. (T9.1), PPP Agreements. (T10.2) | Partners in the PAS initiative. | | |
| The current addressing is working. (T18.5), Manual map use. (T19.4), GPS Coordinates are complex. (T15.2), Uncertainty of directions. (T16.3), Directions are complex. (T16.4), The current addressing not working. (T18.3), Seldom usage of addresses. (T19.1) | Historical Development and shortcomings of current PAS. | Context and evolution of PAS | Context |
| Planned areas. (T13.1), Unplanned areas. (T13.2), All settlement patterns. (T13.4), Local knowledge. (T14.5), Directions are context dependent. (T16.1) | Reflect Botswana Landscape Realities. | | |
| Mailing and Postal systems (T84), The Post Office. (T11.5), Postal mail delivery. (T12.4), Post Office | Street postcodes | Address format and Structuring | |

| | | | |
|---|---|---|---|
| address. (T17.6) | mail/parcel processing. | | |
| A mix of multiple physical address types. (T17.1), Telephone address. (T17.2), Fax Number. (T17.3), Email address. (T17.4), Descriptive or informal address. (T17.5), Post Office Address. (T17.6) | Address types | Development and Implementation | |
| Address data quality. (T14.1), Access to Smartphone issues. (T15.3), Address data quality. (T18.2), Location-based services. (T14.2), Ubiquitous use. (T14.3). | Address interoperability and Quality. | | |
| Naming and numbering street. (T12.3), Address data is core datasets. (T20.3). Post Office Address (T17.6), Land Related Stakeholder (T10.5), Government (T11.1) | National Address Database design and Ownership. | | Determinants of Innovation |
| Skills and capacity (T7.1), Education and Training institution. (T10.7), Training and development. (T15.1), Capacity building required. (T18.1) | Skills transfer and knowledge. | Education and training | |
| Innovation Strategy. (T7.2), Convenient addressing innovation solutions. (T19.5), Innovation is a game changer. (T20.1) | PAS innovation and strategy alignment | Innovation Strategy | |
| Unique identification. (T12.1), Geographic reference point. (T12.5), Geographic Reference system. (T13.3), GPS Coordinates are complex. (T15.2), Various unique addressing numbering systems. (T19.2), Reputation in service delivery. (T7.3), Individual and Community. (T11.2), Service delivery point. (T12.2), All settlement patterns. (T13.4), Ubiquitous use. (T14.3), Local knowledge. (T14.5), Best practice addressing components. (T20.2), Address benefits. (T20.4), Promote socio-economic inclusion. (T20.5), Botswana Pride. (T20.6) | Determinants of a comprehensive and good PAS. | PAS for Public Good | |

The initial themes with patterns and meaning are represented by the developed final themes and the associated core concepts, the systematic process of detection begins in next section of chatting of the Framework Analysis method using the emerged core concepts.

## 5.6 Charting STAGE

After developing the emerged final themes and the core concepts under the research themes from the previous section as outlined in Table 21. The data was arranged in charts of the themes. This allowed the research themes to be read across for within-case analyses (Case) or downward for the analysis of a specific core concept (Thematic) for between case-analysis (Ward *et al*, 2013). During Chatting, data was lifted from its original textual content (such as phrases, short expressions), this required the researcher to revisit the first stage because the process is iterative.

The chatted data is placed in chats that consisted of the headings of themes or the best way the researcher determined to present and write up the study (Ritchie and Spencer, 1994). This links the useful original empirical evidence and highlights particular areas of interest within the emerged core concept of the themes. It overcomes some of the inherent difficulties faced when trying to manage original accounts large volumes of empirical data by the qualitative research methods of analysis.

Most of the time, the participant's words are concise and there was no need to paraphrase their words or interpret or articulate researcher viewpoint on what empirical evidence is about unlike the previous stage of coding and discussion, the ***bold and italics*** words were highlighted to indicate participants own words from the original accounts that link to the theme and aligned to the core concept.

Empirical data lifted or taken from the original transcript is identified by participant's number, Familiarisation Analysis Stage number, page number and finally a line numbers (For example, ***RES_5_Vertical_1, Pg. 2:45:47***) may assist in retrieving data of interest (quotes) from the original accounts to specific research questions in the next stage of mapping and interpretation of themes. This approach makes sense of the themes in terms of tracing information aligned to the core concepts from the original accounts that strikes the reality before interpreting participants lived experiences in the

next chapter. The chat matrix comprised of one row per participants and one column per core concepts is outlined on Table 41 on Appendix 9.

This section summaries the chapter of data empirical data analysis and discussions.

## 5.7 Summary of Chapter

The proceeding analysis have shown that stakeholder roles, the determinants of innovation and social context does influence the adoption of physical address system at the developing country. The dimensions produced core concepts of the study which will be mapped and interpreted in the next chapter. Through the lens stakeholder theory, upper echelon theory, diffusion of innovation and contextualist approach which was applied on interview questions, the analysis and discussions have shown how the stakeholder interrelationships, social interactions and contextual awareness happens in the adoption of PAS as a social system.

This chapter described framework analysis method and demonstrated its use in case study methodology and research design. It illustrated the usefulness of the framework analysis method in the field of Information System because it was developed in other disciplines but used few times in IS studies (Balley *et al.,* 2004; Archer *at el.,* 2005). Framework analysis was illustrated as flexible but rigorous which proved to be a good fit to answer the research questions and helped in how the patterns and meanings emerged from the empirical evidence. This study showed that the four stages of Familiarisation, identifying a framework, indexing and discussion, and chatting of the framework analysis outlined by Ritchie and Spencer (1994) were helpful in data reduction, processing meanings in a transparent way when dealing with the volume of empirical evidence.

In the next Chapter, the researcher builds up a research picture of the empirical evidence as a whole. The research picture would be built by mapping and interpreting the core concepts, considering quotes from perceptions and lived experiences that link

each theme or research objective/research question. The explanatory accounts of themes began on the Chatting stage by reflecting on the original empirical evidence. The Chatting stage is useful for the cross case analysis of embedded case units. The analytical process of the four stages of the framework analysis method showed how lived experiences of stakeholders in their social settings had an effect, affect or be affected on the introduction of the Physical Address System.

The next chapter is about interpretation of findings and framework development. The findings related to the research questions include mapping and interpretation of emerged core concepts as the final Framework Analysis stage. This stage brings to the fore powerful technique that allows the researcher to produce conceptual maps. The maps do not only show relationships between concepts but also connections between the sources of concepts by a triangulation process with literature and others materials. The process is helpful to explain the lineage of emerged final themes that became core concepts.

# Framework analysis method

**Framework analysis step undertaken by this study.**

<table>
<tr><td>Familiarization,</td><td rowspan="4">Chapter 5<br><br>EMPIRICAL DATA ANALYSIS AND DISCUSSIONS</td></tr>
<tr><td>Identifying a Thematic Framework</td></tr>
<tr><td>Coding or Discussions,</td></tr>
<tr><td>Charting and,</td></tr>
<tr><td>Mapping and Interpretation of core concepts.</td><td>Chapter 6<br>INTERPRETATION OF FINDINGS AND THE FRAMEWORK DEVELOPMENT</td></tr>
</table>

**The next chapter uses the Framework Analysis method. The method straddles between the two chapters as outline here by this graphical display. The shaded part of the graphical display outlines the chapter that follows.**

# CHAPTER 6: INTERPRETATION OF FINDINGS AND THE FRAMEWORK DEVELOPMENT

## 6.1 Introduction

The interpretation of findings and the framework development chapter refines our knowledge of Physical Address System as an innovation and the phenomenon of adoption of Physical Address System at the country level. The preceding chapter discussed the empirical data analysis and discussions that resulted from the Framework analyses method. The Framework Analysis method extends to the last stage of the empirical research procedures in Chapter 6 because the method straddles between Chapter 5 and 6. This chapter revealed the actual nature of knowledge transformation through interrelationships and social interaction of stakeholders for the adoption of the information system at a country level. Finally, the chapter interprets and conceptualises the summary of findings and presents a developed multi-dimensional framework.

This chapter presents the interpretation of findings of the study and it is structured as follows, 1) the findings related to the embedded case units and 2) the findings related to the research questions. The findings lead to development of a theoretical conjecture and finally, the empirically developed multi-dimensional framework as outlined by the last research question. The framework analysis method final stage of mapping and interpretation of emerged core concepts from the previous chapter is conducted within the findings of each research question. Firstly, the next section discusses findings related to the embedded case units.

## 6.2 Finding related to the Embedded Case Units or Strata's

This study used a unique case study strategy and designed it into embedded case units or strata's. This was important for the depth and breadth of empirical evidence collected within a bounded case. It also offered greater insights of perceptions and lived experiences on understanding the social process of the adoption of the Physical Address System of participants from government and private stakeholders as level of analysis as depicted by Figure 24.

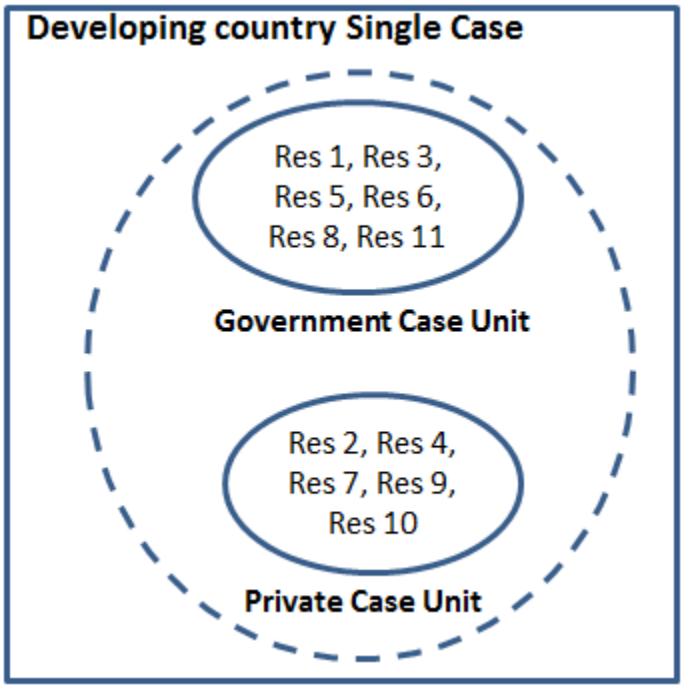


**Figure 24: Case design and embedded case units.**

For the embedded case units, the researcher operated in a standard manner across all of them. The standard manner is a way of asking similar questions in the same way to the participants within the unique case. It was crucial for the researcher to ask probing questions in order to obtain as much profound insights as possible as articulated by the data collection section.

This section discusses the cross case analysis of embedded case units.

### 6.2.1 Cross Case analysis of Embedded Case Units

The Chatting stage of the Framework Analysis Method outlined participants own words that link to the themes. The empirical data from the original transcript is indicated by ***bold and italic font*** and it is identified by participant's number, page number and finally a line number (s) to assist in retrieving data of interest related to the themes. The best practice approach is to tabulate these comparisons with tables.

Table 22 shows a cross case unit analysis technique. The technique is used to compare the results of government and private case units from the participants in their groupings by examining themes.

**Table 21: A cross case unit by counting theme frequency per participants from Chatting Stage.**

| Case Units | Government | | | | | | Private | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Participants | Res1 | Res3 | Res5 | Res6 | Res8 | Res11 | Res2 | Res4 | Res7 | Res9 | Res10 |
| Stakeholders | 3 | 5 | 5 | 4 | 5 | 5 | 2 | 1 | 1 | 1 | 2 |
| Context | 3 | 3 | 6 | 4 | 3 | 5 | 3 | 5 | 2 | 5 | 1 |
| Determinants of innovation | 1 | 2 | 1 | 2 | 5 | 5 | 2 | 2 | 2 | 2 | 5 |

The numeric values in Table 22 represent the frequency in which each theme was mentioned or portions of insights highlighted when transcribing the interviews (empirical data from the original transcript is indicated by ***bold and italic font***). This is shown by Table 41 on Appendix 9, the researcher lifted or abstracted the original content or highlighted portions of the empirical evidence which is regarded significant to the theme having heard it from the interviews.

Table 23 shows the average scores of themes derived from Table 22 above per embedded case unit, it is a simplified approach of examining the table per column that shows the case units of Government and Private.

**Table 22: A cross case unit analysis by averaged theme per case unit.**

| Case Unit/Core Concept | Government | Private |
|---|---|---|
| Stakeholders | 4.5 | 1.4 |
| Context | 4 | 3.2 |
| Determinants of Innovation | 2.7 | 2.6 |

The table above indicate that determinants of innovation has almost the same average score of around 2.6, this suggest that the two case units has similar concept profiles. It can be interpreted that the participants are confident enough to believe that Physical Address System can become a reality given the closeness of the average score of the determinants of innovation. Furthermore, the score that is almost similar can be interpreted as the government and private have similar concept profiles. This aspect can be assumed that they both understand the best practice and systematic procedures needed to adopt the PAS as outlined by the determinants of innovation theme. The set of approaches of the determinants of innovation might mean that stakeholders are cognisant about are innovation strategy, education and training, PAS development and implementation, PAS addressable components structuring and PAS for Public Good.

However, a simple numeric comparison of averages of embedded case units shown in Table 23 might not be suitable to come to any definite conclusion of interpretive study but it gives grounds for interpretive inferences from a simple mathematical arithmetic's, a trend that is known in quantitate research.

The stakeholders theme has an average score 4.5 on the government case unit while the private has 1.4. The government institutions can be seen to have vested interest in the adoption of the PAS because of its strategic alignment to the policy context like the Botswana Vision 2016, Electoral Act, Banking Act, Census Act and others. It can also be seen as government stakeholders are custodians of the physical address

information. It can be eluded that the government is in political power or in possession of economic resources to make PAS reality. The government departments serving the interest of the ruling party mandates usually tend to have categories of management control like bureaucratic controls, financial controls and quality controls (Maciariello *et al.,* 1994). This highest average score can be assumed that the government can sometimes force other stakeholders in the lower socio-economic status (mostly private stakeholders) to do what they want. If there is resistance, there can been ripple effects and the repercussion can be severe such as making their authority ungovernable or not creating a conducive environment for trading or doing business with government (not awarding government tenders) to the private sector (Wijnet, 2002). The private sector might be interest on the technicalities and applicability of the innovation to be adopted rather that administration side of things which has red tapes or a lot controls by the government stakeholders within the developing country.

Context average score of 4 and 3.2 does not differ by a significant margin. This study collected empirical evidence at an urban setting (The Capital City Gaborone) only and probed information for villages and rural areas, and farms and lands at their Ministries that government them because they are located in the Capital City. However, the researcher acknowledges that more insights could have been obtained at the authentic settings but this has been address as the limitations of the study in the next chapter.

#### *6.2.1.1 Themes verification levels of analysis*

Another approach with regard to comparing case unit analyses is to use a verification table as demonstrated by Table 24. The table outlines the results of a detailed examination of data to verify the importance of the themes. With reference to Table 23, the verification of core concepts is shown on Table 24.

### Table 23: Themes verification

| Core Concepts | Evidence supporting | Evidence contradicting |
|---|---|---|
| Stakeholders | Government | Private |
| Context | Government, Private | |
| Determinants of Innovation | Government, Private | |

From Table 24, the stakeholders theme appears on both evidence support and evidence contradicting column because they had the scores of 4.5 and 1.4 respectively which is a significant difference on the score from Table 23. This can be interpreted that, if the PAS is to be adopted at the developing country, the stakeholders theme and its core concepts such as project and stakeholder management, group division and its formalisation (structure) and governance are duties of the government ministries for implementing and administering the adoption of the PAS rather than private sector. The government has to find mechanisms to finance the Physical Address System or upfront cost of the Physical Address System through using tax payer's money. The private sector can be on technical oversight for successful PAS adoption and implementation.

The analysis of empirical evidence is always a stroke of genius, creativity and analytical skills that researchers should possess. The cross case unit analysis tables and the verification table are simple indicators that can trigger ideas of a researcher. Figures and graphs are helpful to the understanding of complexities of level of analysis on the empirical evidence in qualitative data analysis. This approach looks for subtle comparisons which may give insights to a new theory as it has been shown in this section (Remenyi, 2012).

The next section discusses the finding related to the research questions.

## 6.3 Findings related to the Research Questions

This section discusses the finding related to the research question 1 (RQ 1), research question 2 (RQ 2), research question 3 (RQ 3), and research question 4 (RQ 4), and develop a framework from the emerged core concepts. Firstly, the mapping and interpretation of emerged core concepts is conducted in each research question subsection.

***Mapping and interpretation of emerged core concepts STAGE***

To get beyond the initial impressions obtained from the empirical evidence in order to obtain a deeper understanding of the phenomenon in the social inquiry. Mapping and interpretation of core concepts within the themes is a powerful technique which allows the researcher to produce conceptual maps which does not only show relationships between concepts but also connections between the sources of concepts. The next step was to define and explain core concepts within the themes and interpretation of their association relationships.

The theme association was conducted using thematic maps. The mapping and interpretation of core concepts is influenced by the original research questions as well as core concepts within the themes. The core concepts were discussed and interpreted, supplemented by triangulation method with literature, observations, field notes, documents and others. The next section outlines the discussion and interpretation of the findings of each research question (RQ) and its associated emerged core concept.

### 6.3.1 Research Questions 1 (RQ1) or Theme 1

*how could stakeholder's roles and their relationships influence the adoption of a Physical Address System?*

The elements of Theme 1 are the emerged core concepts categories of Project and Stakeholder Management, Group division and its formalisation (Structure) and Governance. The thematic mapping of the abstraction process and theme associations is depicted in Figure 25 and the discuss follows.

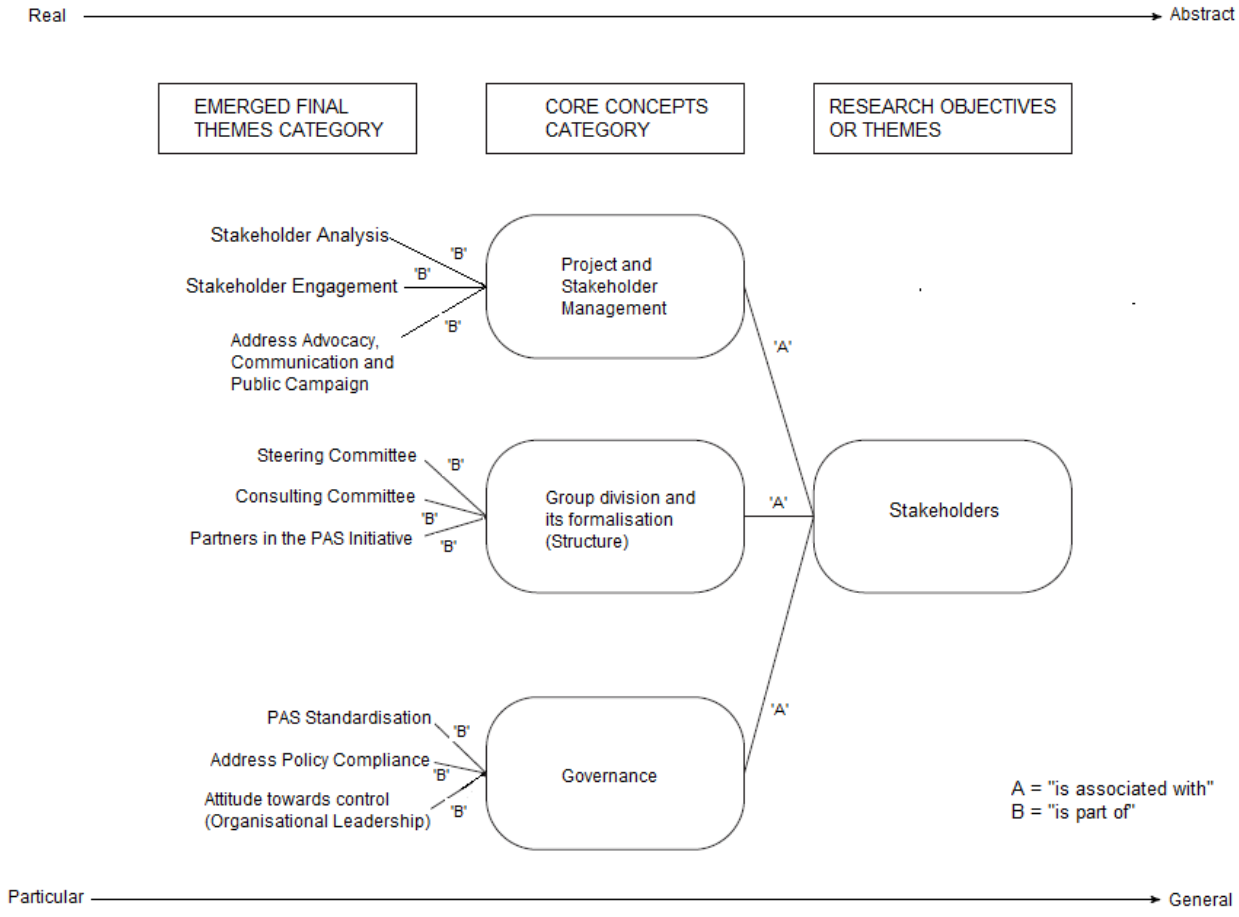


**Figure 25: Stakeholder thematic map**

The stakeholder theme has “is associated with” relationship with Governance, Project and Stakeholder Management, Group division and its formalisation (Structure) core concepts as outline by their connections. The emerged final themes have the “is part of” relationship to the core concepts. The next section discusses the core concepts on how they are applicable to the adoption of the physical address system.

#### *6.3.1.1 Project and Stakeholder Management*

For this theme, Creighton (2005) quote is aligned to this study as it says:

> *“Public participation remains a craft, not a science. I don’t think it will ever be different. It partakes too much of the messy emotional stuff of intense human interaction, struggles for power, and strongly-held beliefs about what’s good for our societies.”* Creighton (2005)

It can be interpreted as Project and Stakeholder Management is vital in the adoption of Information Systems. It is important to actively involve stakeholders like social scientists, the citizens or the general public who contextualise social problems and handle emotional intelligence of participants when the debates or argument spiral out of control within communities where the innovation is going to be implemented. The project management frameworks usually perfect skills and formalise the beliefs, the powers, norms and values that drive the psychological behaviour of humans and their social interactions. If this is achieved, it can lead to success on the introduction of the PAS through invaluable insights of lived experiences and perceptions of stakeholders.

The next section discusses 1) stakeholder analysis, 2) physical address advocacy, communication and public campaign and 3) stakeholder engagement.

***Stakeholder Analysis***

To address relevancy of demanding stakeholder roles and to understand how their relationships may influence the social decision making process of the adoption of the Physical Address System, in a developing country perspective. The stakeholder analysis process starts initially by:

1. identifying stakeholders and their roles in adoption of the Physical Address System,
2. stakeholder classification is assessed through the stakeholder roles the play and direct dependency on other stakeholder resources,
3. Priorities the stakeholders is assessed through engagement and intervention, and influential strategies such as power versus interest

It was imperative for the researcher to conduct stakeholder analysis to understand how key stakeholders are associated with each other and then link them to specific resources and direct dependence on resources. In order to address Point 1, for each listed potential stakeholder role, with regard to the envisaged PAS letter on Section 1.2.5, the researcher's made findings on the stakeholder mandate and applied preliminary thoughts, these are described on the first three columns (column 1, 2 and 3) of Table 25. In order to address Point 2, the last two columns (column 4 and 5) of table indicate stakeholders who are key and those whose claims had direct dependence on resources to that is central to their relationship.

## Table 24: Physical Address System stakeholder analysis

| **Broader Code** | identifying stakeholders and their stake/mandate/claims/interest/ roles | | | |
|---|---|---|---|---|
| **Response** | **Stake/Mandate** | **Potential Role in Physical Address System adoption (Researcher's Preliminary thoughts)** | **Resources** | **Key stakeholders direct dependence on Resources** |
| Res 1 | To build houses to the general public for rent, sell and partner with investor and facilitate Public-Private Partnerships agreements.<br>The Corporation was established by an Act of Parliament (CAP 74.03) of 1971 under section 14 of the BHC Act. Corporation's mandate has been expanded in accordance with Presidential Directive Cab 20 (B)/2010. This made BHC to oversee Government housing implementation programs and operate as Government's Single Housing Authority (SHHA) | Identification of new development of government properties, future proposed development though NDP's, identifying Urban Area infill's to build property for rental and finally number these properties as part of physical addressing component. | House, Multi-purpose Flats, Government Buildings, Maintaining government estates and rehabilitating old houses. | City, Town and District Councils (Land Boards) or MLGRD, WUC, REIAC/REIB, BPC, WUC, Telecommunications Service providers. |
| Res 2 | To make pizza and deliver it to individual and corporate customers.<br>We adhere to Food Control Act 11, 1993. Chapter 65:05, Premises used for food. | Identification of new or duplicate plots numbers, new private residents or estates, dirt roads or informal settlements. | Area orientation and advanced local knowledge from logistics, Customer address delivery database. | Independent |
| Res 3 | To sustain the government in terms of geospatial technology, land servicing and advisory in land administration and management.<br>We are guided by list of Acts such as Land Act, Survey Act and Standards (both international and locally). | MLH are custodians of mapping information and geographic data or simply all matters related to land in Botswana. | Survey cadaster data, Geodetic data, Basic maps and GIS spatial data, Orthophotos and Satellite Imagery. | MLH, Botswana Post, MLGRD, |
| Res 4 | We provide an emergency medical services in Botswana to private companies, individuals (cash or medical aid holders), extreme sports (1,000km Desert Race, Khawa Dune Challenge | For emergency services, its very important to be at the exact location during emergency in order to save life. The use plot numbers and Google maps which is embedded in our navigation system offers | Navigation System, Charter Flights like Okavango Air Rescue, Descriptive regular patient | City, Town and District Council to reach households in different settings. |

| | | | | |
|---|---|---|---|---|
| | races).<br>We are regulated by Ministry of Health and comply and conform to Standards Assessment Tools for Emergency Medical Services. | technology experience and it impact on response time. | address. | |
| Res 5 | Provide services to the communities or residences in terms of the City Infrastructure (Roads, Water and Electricity). Most infrastructure start from the Central Government and then handed do us for operation and maintenance purposes.<br>We follow the Naming Process and Regulation, Township Act, Proc. 66, 1955, which provide the regulation of cities and townships in Botswana and regulate the City advertising rules on signage. | Conduct participatory process of naming area boundaries, metropolitan roads and street networks naming within the city and erection of signage. | Metropolitan road and street network names, Standards for material types used for signage. | DSM, Individuals, Community, Village Development Community, Chiefs, Area Councilors, Private Suppliers, Advertising Companies |
| Res 6 | Ministry of Lands and Housing has different mandate to its various Departments. There is a project that alludes to the Physical Addresses or Locational Addresses. The MLH mandate is to manage and administer the project that seeks to improve Land Administration, Procedures, Capacity and Systems (LAPCAS) in Botswana which started in 2009. It has 7 Components and one of them is locational addressing. | LAPCAS Pilot Project conceptualisation might offer insights to what extend it succeeded or failed or which stakeholders was in charge and on which roles. The overall Pilot Project insight is to understand the general stakeholder project management and challenges. It's crucial to understand who possess claims, including those that are legal and use of PAS over the resources at stake. | Report on benchmarking study trips, Stakeholder Project Plan, Budget/Money, Survey Master Plans, Reports to the Presidency, Pilot Project strategy of LAPCAS. Project Reports to Parliament and General Public | Presidency,<br>Minister of Finance, DSM, Partners (UB, Landmariet),<br>Residents,/Individuals, Communities |
| Res 7 | To provide the survey related services such as mapping and surveying of existing properties and also to facilitate the registration of title to land.<br>We are guided by the Land and Survey Act that informs what the surveyor should do and how on the accuracies and the methodology to be applied for a surveying task and finally the | The knowledge of private property sub-divisions of most owners of the land parcels (including government through tenders). The invaluable experience or having insights of process and procedures of working with other land related stakeholders like Landboards or City Councils, Lawyers for seeking permission, approvals, and finally registrations of Title Deeds might add value. | Master land plans for Private Clients,<br>Land Information Status-quo.<br>Stakeholder relationships on land issues. | DSM, Deeds Registry, Lawyers, Individuals, Corporate. |

| | | | | |
|---|---|---|---|---|
| | survey product. | | | |
| Res 8 | The mandate is in two folds,<br>1) To take services to the people at the every corner of the country without the intention to make profit.<br>2) To maintain relevance and profitability in the postal industry by being competitive with other Courier companies with regard to commercial services.<br>We adhere to Botswana Postal Services Act 22, 1989. We are regulated by BOCRA and we have been appointed as the DPO for certain categories of postal service. We also conform to ISO/TC 211, UPU S53, UPU S42 standards. | The structuring of physical address on mail parcel and development of postcode (both streets and postal codes) for postal mail delivery. Optimisation knowledge of mail delivery through postal metrics that incorporate network of sorting hubs and post offices. | Postcodes (streets and postal), Expects knowledge on postal development network and services | DSM, MLGRD (City, Town and Districts), MLH (LAPCAS Budget), Individuals/Residents, Communities, Corporates. |
| Res 9 | To provide a security service through the use of innovative technology. We don't provide security guards like others. We install security alarms, monitor the security alarms and respond to the alarms at different locations.<br>Regulated by the Office of the President, Directorate of Information Security Services (DISS). | The opinion of the use of simple descriptive directions and to navigate to plot numbers to the exact household. The experience of using land marks for security purpose as means for orientation and security strategy. | Private Customer's physical addresses database. | Police, BHC, Phakalane Individuals/Residents and Corporate only. |
| Res 10 | To transport goods for the clients from one location to another within a short time. Good reputation in Botswana for efficient service.<br>Regulated by BOCRA. | Door-to-door delivery to households and delivery to the whole country experience. | Customer delivery database, International Courier Partnerships, Technology for mail/parcel deliveries. | Individual, Corporate |
| Res 11 | To provide capacity in terms of training and skill development inform of short certificate courses, long or medium term course like Undergraduate degrees, Masters, PhD's and Industry research and development. | Industry training input and experience for government ministries to capacitate them with the physical address information by providing LAPCAS Concept short course as the Highest Institute of Learning | Skills and experts knowledge, Academic Consultation Services | MLH, Individuals, Corporates, BUIST and BITRI |

***Stakeholder Map***

This study used the Stakeholder map to address point 3 of the stakeholder analysis process. The stakeholder map is an analytical tool that enables the researcher to map stakeholders based on their power and interest. The map helped the researcher to priorities the level of engagement and social interaction of stakeholder roles in order to understand how the stakeholders proceed through a social decision making process of the adoption of the Physical Address System. The stakeholder interest is related to the stakeholder level on being keen or enthusiastic to be part of the initiative or project while stakeholder power refers to the status given to a stakeholder who can facilitate or avoid change from happening or enforce it.

Figure 25 show the power vs. interest stakeholder map for this study. The power versus interest matrix map was adapted and conceptualised to its current form by Johnson *et al.,* (2007) after years of reviews from other scholars.

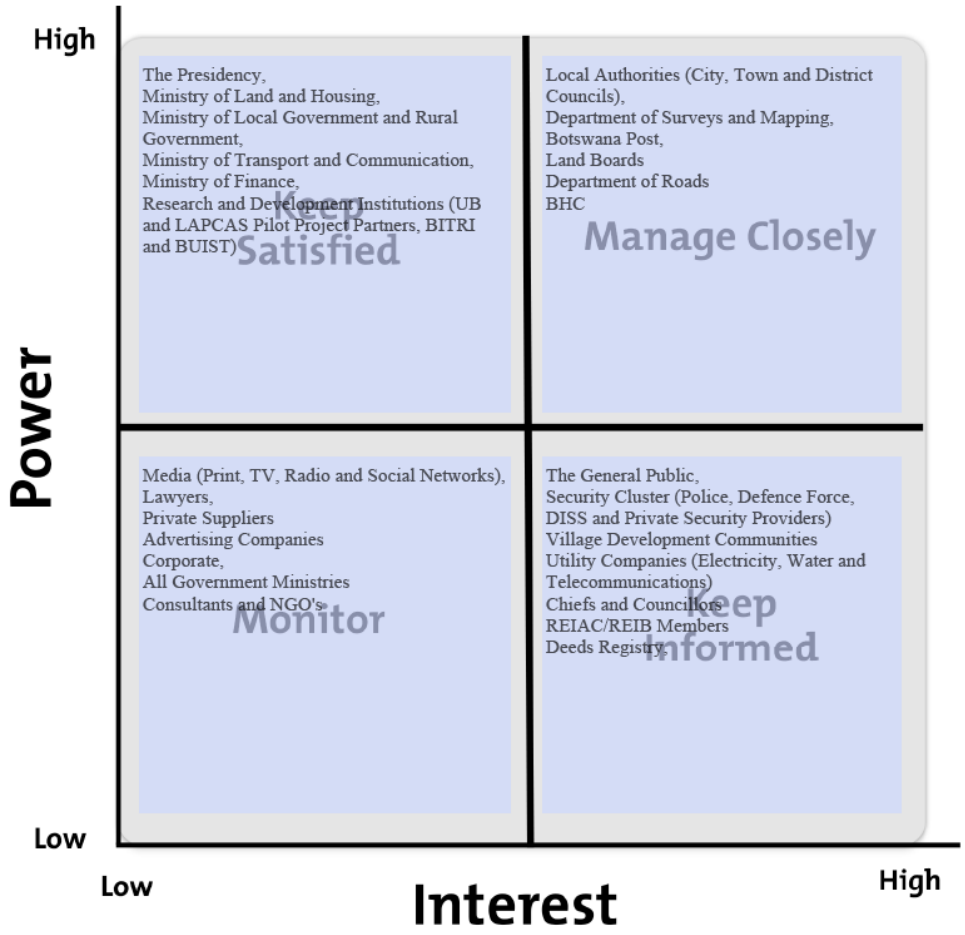


**Figure 26: Power versus Interest map for Stakeholders**

From Figure 26, the stakeholders who are powerful and interested in an initiative or any project need to be managed closely. This might involve those stakeholders to be part of a steering committee. Stakeholders with high power and low interest may need to be kept satisfied regularly throughout the continuous progress of the initiative or through project updates and be given feedback to the issues or concerns as they emanate. The stakeholder who poses the least power and high interest literally do not require much attention to be spent on them but can be informed as and when is necessary. Care should be taken to a stakeholder who possesses low power and low interest, as they need to be monitored because they might report common project issues out of proportion and the progress of the initiative or project would be being affected. For example, the compromise of basic governance principles that was contested at the Court of Law as it emanated during the discussion of Management Control core concepts and could have been managed by mediator.

This study determined how to involve the different stakeholders as mapped by Figure 26 for the anticipated adoption of the PAS and leveraging on stakeholder management disciplines, the different types of stakeholders are engaged in different ways at the various stages of the initiative or project. The stakeholder engagements aspects are concept ideation, updating stakeholder with progress of the information, consultation strategy, conducting workshops and seminars for participations and signing partnerships. If all the aspects are in place, stakeholders might be persuaded to adopt the Physical Address System.

### *Address Advocacy, Communication and Public Campaign*

The dissemination of information through public campaigns to create awareness is required. The Information Technology tools, Ward (*Kgotla*) meetings by Chiefs (*Khosi or Induna*) and word of mouth are one of the platforms that could be used to get the message across and raise the level of interest and awareness of the innovation, hence creating environment for the innovation to be adopted.

There is a need to develop a target media (print media, social networks, radio or Television) campaign, to organise an addressing seminars or present at local,

regional and international conferences. There is a need to publish and update a website to share the information to the public about the introduction of the PAS because we live in the era and advent of technology, to prepare and publish posters and reports on introduction of the PAS.

The researcher made findings that efforts of address advocacy, communication and public campaigns were conducted but the turnover of people attendance at the rallies was low and there was no communication strategy in place with regard to the LAPCAS Pilot Project. The public or communities selected for pilots were confused as there was no coordination when it came to creating awareness of the introduction of the pilot programs by core stakeholders. The MLH as project administrator and the Gaborone City Council (GCC) roles were to notify the general public that there was going to be activities happening within their communities and they should plead with them and to cooperate with field workers. The GCC role was to put signage and number the houses.

For the home delivery of mail/parcel by the Post Office were to install postal boxes in front of the residents with assumption that communication protocol (Protocol is defined as the accepted practice or rules of behaviour in any group, organisation or situation) have been observed from the previous activities. They ran into troubles because the previous stakeholders did not follow the procedure on the ground as agreed in stakeholder seminars or meetings or project plan. This is demonstrated by the following comments from participants:

> *"Stakeholder consultation is important when doing public/national project, meaning the citizen stakeholder has been an issue as we take the responsibility because they have not been involved in the process so far. People are not aware and it's a big concern. If you make beautiful things and when people are not aware of any idea, they will be the make it or break it. You cannot communicate for the sake of communicating; you have to communicate until you feel it has been felt on the ground." [Res_8_Vertical_ 1, Pg. 7:217-221].*

> *"The lesson leant is that; you have to go to any length to create awareness because people need to know what happening. The answer is that if people*

*are not on board with something, you are as good as dead." [Res_8_Vertical_ 1, Pg. 8:236-245].*

*"The time we put house numbers as GCC for the pilot, there was no communication with the residences owners, they were only notified later. Communication and creating awareness was a big problem with this regards." [Res_5_Vertical_ 1, Pg. 2:45-47].*

*"Ditimamodimo is an official name of Block 7, I think lack of awareness and public participatory process makes people not to know official names of Suburbs but they know the Cadastral name like Blocks or Extensions or Phases from Title Deeds or Development plans in Gaborone." [Res_8_Vertical_ 1, Pg. 10:329-331].*

The analysis of the above quotes from the empirical evidence was interpreted as lack of concerted effort on physical address advocacy, communication strategy and public campaigns by stakeholders backfired because residents or citizens found their house attached with house numbers without any knowledge. There is evidence from participants that residents complained that the general blue painted house numbers that was put on their walls by the GCC devalued their properties because they did not match their house paint, they could have customised their design of house numbers if there were offered the opportunity to do so according to the guiding standard. This resulted in the implementation of a bottom-up approach of the pilot whereby local residents were fully involved in the process after complaints reached the Parliament. The bottom-up approach in this study is seen as when the stakeholders play a role in the decision-making process or requirement elicitation process after attempts to implement PAS stalled or failed, this usually offers a lot of promise particularly in democratic developing countries because the outcome is within the contextual boundaries of a case that is being studied.

### *Stakeholder Engagement*

Stakeholder engagement, collaboration and participation, have become key words in many management-oriented areas like organisational innovation. Stakeholder's involvement is now a "must" and clearly it's a positive development to bring stakeholder managers into a joint process of finding innovative solutions, where the

ultimate goal is organisation performance (Voinov and Bousquet, 2010). Linking stakeholder engagement with project management themes, the efficiency of the participatory process depends on the social relations and the social interaction of stakeholders. The stakeholder's aptitude to communicate, skills transfer and knowledge sharing, learnability and methods that can help them perform their roles. In addition to that, there is a clear need for technical, administrative and people skills, analytical and modeling tools that may possibly be utilised in the process (Voinov and Bousquet, 2010; Mendoza and Prabhu, 2006)

With a combination of contextual background of socio-technical, socio-economic, organisational culture, organisational management and developing country landscape for the introduction of the physical address system, it is hardly possible to come up with a generalised PAS project and stakeholder management framework. However, basic steps and some elements seem to be possible in most reviewed Information Systems studies from both stakeholder and project management disciplines as depicted by Figure 27.

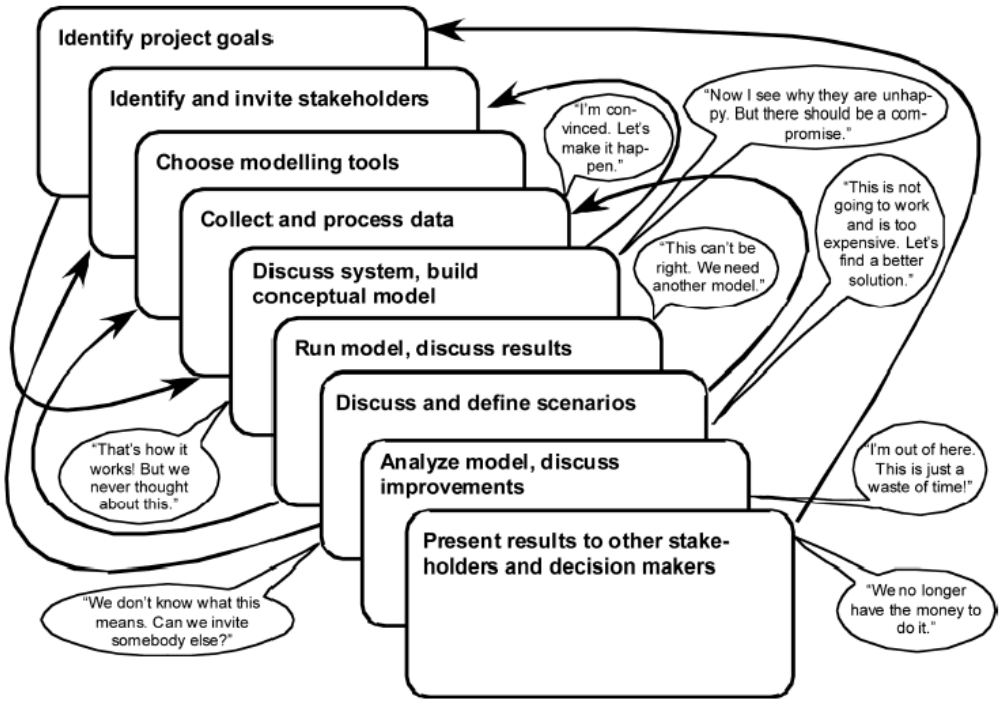


**Figure 27: Different stages of Project and Stakeholder engagement framework (Voinov and Bousquet, 2010).**

Procedures that stipulate the way Project and Stakeholder engagement framework to be carried out are explained as follows. In terms of Figure 27, the arbitrary loops

back and forth of stakeholder engagement has been added on the project management (PM) model, the PM model stages are put on cards to show that they can be shuffled at any moment. There is no particular order in how the process proceeds but the Project Manager may need to go back again iteratively or can jump several steps forward if the goals of the project or delivery tasks are already achieved and steering committee decisions are agreed upon. While the order is uncertain, the major components of the process seem to be quite generic.

Some generic principles of Project and Stakeholder engagement framework (adapted from Refsgaard *et al*., 2007; Voinov and Bousquet, 2010) are listed below:

- Keep it flexible and focus on the social process rather than the product.
- Contextual approaches on innovative systems are open in time and space. Make the process that deals with stakeholders also open and evolving.
- Promote adaptive management, adaptive modeling and adaptive decision making
- Maintain societal and scientific openness, and transparency of methods and models when developing PAS modules like postcode. Rely on collaborative research and development and open source models.
- Mind the people, always be aware of social and group dynamics, special power emanating from politics, interests and hierarchies which is common during stakeholder engagements and intervene accordingly.
- Facilitate and encourage learning - learn from each other within the social system.
- Go in circles and branch out - go back, reiterate, refine
- Accept a different kind of uncertainty - be certain about uncertainty
- Accept untraditional metrics of success - group validation and verification

This study established that Project and Stakeholder engagement issues were visible during the pilot project. The stakeholders came with different perceptions and vested interests, different attitudes, varying levels of expertise and training, and different expectations. However, the comments from participants paint a different picture on engagements of stakeholders:

*"From the GCC, we were three when we started with the LAPCAS Pilot Project and some of them lost interest along the way due to the issues of non-commitment from the Senior Officers of MLH. There were contentious issues of training and trips that were assigned for benchmarking at Block 7 and block 8, Thane, Palpate are there were excluded from the benchmarking trip." [Res_5_Vertical_ 1, Pg. 3:76-79].*

*"That's the engagement that we have from the Private side and I can't describe, in short, we have an unofficial memorandum understand and we do financial reconciliation later." [Res_4_Vertical_ 1, Pg. 3:83-84].*

*"This one is quite a difficult one because there is no laid out platform that we engage in. You just go to the DSM and tell them what information you want and they advise you from that point." [Res_7_Vertical_ 1, Pg. 2:45-46].*

The analysis of the above quotes from the empirical evidence was interpreted as, the Project and Stakeholder engagement enhances awareness, facilitate learnability, promote contextual innovativeness, cooperation, ideation and conceptualization. There was a need to evaluate the role Project and Stakeholder engagement played in the social learning process. However, there is always a trade-off between the context and the generalisation. A lesson drawn from a Project and Stakeholder engagement is that ideally the framework goes beyond a given local context.

#### *6.3.1.2 Group division and its formalisation (Structure)*

Organisational group division and its formalisation (structure) specify the formal protocol of communication, integrate and coordinate project activities; and define the allocation of stakeholder roles (Porrass and Robertson 1992; Chen and Tsou, 2007).

The Steering, Consultative Committees and Project Team were formalised. The committees were responsible for ensuring that the pilot project would be implemented successfully because of their technical prowess, experience and gave attention to all aspects in support. This is demonstrated by the following comment from participant:

> *"The way LAPCAS Pilot Project was arranged was that there was 10-15 Steering Committee and the 50 Stakeholders in order to get project buy-in, this Stakeholders were divided in National Project Team (NPT) which has representative on different 7 LAPCAS Components like Location Addressing. These groupings were flexible; if they needed someone with expertise\specialist\subject matter expect in the other group, the personnel will be called to assist with the expertise. No one was excluded; even the Private Sector was there. You can find that a personnel is at the Steering Committee, Consultation Committee or NPT levels according to the expertise."* [Res_11_Vertical_ 1, Pg. 1:55-61].

As articulated before, the quote above outline that the project scope was well defined with clear objectives. Few stakeholders we invited to the project ideation and were grouped according to the expertise to fit in the different committees.

***The Steering Committee***

This study established that a Steering Committee was assembled during the commencement of the pilot project to make decisions for the completion of every phase of delivery per project scope and also on the way forward of the next phase. A Steering Committee was essential to the project's success, usually the committee represents the project because they participate in providing useful information related to the project scope of work as outlined below by the comment from the participant:

> *"For the LAPCAS, I participated in the steering committee in terms of ideation championing or conceptualisation of the project and I have played a role in building capacity where I was running quite a number of short courses".* [Res_11_Vertical_ 1, Pg. 1:31-33].

The Steering Committee was supposed to meet towards report submissions ( i.e. once a month) or towards completion of every phase of delivery to perform an assessment. It seems the participants comments highlight a slack on the committee from their experience with the following comments:

> *"There is a project steering committee, I will admit that probably you might know, but those are just project issues and we don't meet as frequent or as much as we should I suppose, so for that reason, a lot now, our forums are reactive depending on whatever the case will be at the time. "* [Res_8_Vertical_ 1, Pg. 4:131-133].

During the analysis process, the researcher discovered that the Steering Committee core stakeholders constitute the Ministry of Transport and Communication, which has the Botswana Post is under its wing because they are custodians of postcode data. There was the Ministry of Local Government and Rural Development through which has the City, Town and District Councils which their role is to name, number and put signage on the streets and suburb boundaries. There was the Ministry of Land and Housing (MLH) which administer the project and finally the Department of Surveys and Mapping who are under MLH, they are regarded as standalone stakeholder under MLH which is the implementer because they are the custodian of all legal land surveys master drawings.

***Consultative Committee***

The researcher made findings that the Consultative Committee was created to respond to specific issues or technical needs. This is important to make sure that there is oversight on specific issues or technical needs of the project for it to be successful, they also assess the methodologies to be applied on task deliveries. The Consultation Committee constituted the private surveyors that provided surveying services where DSM did not have capacity, postcode expects that played advisory role on modeling postcodes for postal office postcodes.

During the workshop discussions that were held during the LAPCAS Pilot Project planning, the participants mentioned that stakeholder engagement on strategic planning, knowledge sharing and skills transfer improved during stakeholder seminars of the consultative committee. The team of locational addressing expects assembled at Mogoditshane Land Board. They were able to identify IT tools and other suppliers for the creation and maintenance of PAS. The interaction during seminars bought the belief that the Pilot project was going to be a success.

However, if there was a group of novices or no reputable names in the industry who were part of initial stakeholders list, it might cause a concern and stakeholders were not going to participate or be convinced to be part of the initiative, consequently they would not be persuaded to adopt the physical address system.

***Partners in PAS initiative***

Partners in PAS initiative are crucial just like for any organisation that is concerned with innovations. To have deeper insights into external cooperation, the stakeholder interests of particular external stakeholders in innovation-related process need to be considered. The researcher established that it was important to form a purposeful approach to shaping the PAS innovation partnership portfolio. This was demonstrated by the following comments from participants:

> *"BHC facilitate PPP, it could be engaged in Third Party arrangements and even assisting in terms of ideas on how you go about building houses, renting houses or if you are ordinary Motswana and in pursuit of help along those lines. BHC will be able to assist you or partner with you to develop whatever project you have that is related to housing." [Res 1_Vertical_1, Pg. 2: 8-12]*

> *"We have an agreement and partnership with FedEx for international deliveries and we communicate with the use of technology and handle transaction that way." [Res_10_Vertical_ 1, Pg. 1:24-25].*

Apart from the government, it is very important to have cooperation with Research and Development partners such as Botswana Institute for Technology Research and Innovation (BITRI) – described by one of the participants as "the new kids on the block" because just started doing research but they do not have capacity at the present moment. Other partners are private consultants and universities like BUIST as they are actively involved in innovation research.

#### *6.3.1.3 Governance*

Governance is a broad-ranging term which, amongst other things, encompasses the rules, relationships, policies, establishing standards, systems and processes whereby authority within organisations is exercised and maintained. In this study, Governance encompasses the PAS Standardisation, Address Policy Compliance and Attitude towards control (Organisation leadership).

***PAS Standardization***

Standards are important to organisations, especially developing countries regardless how poor they are, to handle disruptive information systems innovations. Standards are developed, updated and maintained locally by different stakeholders and upgraded to the international level by International Organisation for Standardization. Usually, the development of standards has a process or stages and it takes quite a long time for stakeholder participatory process. There is a need of funding, logistics and support from Managerial level or Organisation leadership so that standards expects within various stakeholders can complete the standard development tasks. The study revealed that a standard for physical addresses do not to exist and some participants were not quite sure of its existence. This is demonstrated by the following comments from participants:

> *"There are no really standards on road signage or house numbering, we are the ones who really have to come up with those standards and submit them the BOBS" [Res_5_Vertical_ 1, Pg. 1:85-86].*

> *"For the standards that we use, we are using BNG002 in Geodesy or geo-referencing. In terms of Cadastral, we are still a bit back in the Cape projections. CORS – Referencing System in Botswana." [Res_3_Vertical_ 1, Pg. 1:34-36].*

The analysis of the above empirical evidence by the researcher was interpreted to constitute physical address system standards issues. The PAS standards to be implemented can be used as a basis for the methodology and guidance for street,

suburb naming and numbering, types of addresses, address postcodes, digital addresses for ICT implementation and postal addresses.

The PAS standards might serve as a reference for the global approach as the Botswana Post Office is part of the Universal Postal Union (UPU). The UPU's mission is to develop communication between peoples through efficient postal services, and to contribute to cultural, social and economic cooperation and development. The UPU has S42, S53 international standards which every Postal Authority member shall conform and be compliant. It is an opportunity for the Botswana Post to create a Botswana postcode profile that is leveraged on the international standards. An international PAS standard will have significant benefits for global business as well as for government and international organisations. Botswana standard would improve address management and quality for online retailers and courier companies that deliver mail/parcels all over the world through system interoperability in the same platform.

The new regulations should be passed by parliament and to convince stakeholders for the continuous usage of PAS if it is introduced at Botswana or the protection of its existence. A series of comprehensive standards, a clear methodology to define, document and maintain a street and property address numbering system should be developed.

***Address Policy Compliance***

The researcher established that the PAS need to conform and be compliant to the Electoral Act because it has the potential means to stop Voter trafficking that is common during elections. It will be a useful tool to be able to know where the voters are geographically located and be helpful on data analytics of election by the IEC. There are also anticipated trial plans to link the PAS with the Electronic Voting Machines (EVMs) during the 2019 elections (Letswamotse, P. 2016b). It can be a tool to be used to conduct necessary strategic political campaigns which might be helpful to political parties and distribution of resources by IEC. This is demonstrated by the following comment from participant:

"*The strategy we will be able to know where the voters are and do necessary political campaigns."* [Res_11_Vertical_ 1, Pg. 3:82-83].

The Ministry of Lands and Housing new policy is encouraging all Batswana citizens to register their plots or land parcel to a new central database in order to issue a new certificate with security features. Once the PAS is introduced, it will add value to the security features as the plots or land parcel would be assigned a unique numbers. The Finance Act requires the Banks to request a proof of location or physical address when opening a bank account but currently those mandatory requirements are not happening because of the lack of comprehensive Physical Address System. For delivery mail and parcel item, the Botswana Communication and Regulatory Agency (BOCRA) regulate all postal operators as demonstrated by the following comments.

*"As private courier, we are regulated by BOCRA, like other Postal Operators."*[Res_10_Vertical_ 1, Pg. 1:7]

*"Postal is being regulated by BOCRA since 2012 and further to that, BOCRA has appointed us as the Designated Postal Operator (DPO), which means we are the main Postal Operator in Botswana for certain categories of postal services." [Res_8_Vertical_ 1, Pg. 1:18].*

*"It's a privilege and they (BOCRA) always make it clear that they are not obligated to give us that status of DPO and they can always take it away as they are other players in the space of postal operation." [Res_8_Vertical_ 1, Pg. 1:26-28].*

The analysis of the above quotes from the empirical evidence was interpreted as institutional arrangements should be initiated and managed by the government as the main stakeholder similar to BOCRA mandate. Such arrangements may entail the enforcement of policy compliance and legislations for stakeholders to be convinced to adopt the innovation if they have a view that the innovation would be supported by developing country regulations as a collective and it is of a public good initiative.

***Attitude towards control (Organisation leadership)***

Leading an innovation initiative is different from coming up with creative concepts or ideas. Without Organisation leadership, the innovative concepts would not be pursued to completion, and certainly not transformed into an anticipated, improved and unique solution that adds value to the end users. Organisational leadership is important to management control dimension.

The strong political will or buy-in will make the stakeholders in position of influence to understand, become aware, develop attitude and commit to the decision to adopt the innovation (Mintzberg, 1979; Langfield-Smith, 1997; Wieland and Ullrich 1976). There is evidence that the adoption of the PAS has a buy-in by the Presidency as a number 1 citizen of the developing country with regards to the LAPCAS Pilot Project. This is qualified by the comments from the following participant:

> *"We had too much political will or buy-in of the LAPCAS Pilot Project concept to the 1st Citizen (The President of The republic). He is quite keen, if you can talk to him, he will tell you all that about the project vision and he prioritized its success even during recession duration around the year 2008. [Res_11_Vertica_ 1, Pg. 3:84-86]*

> *"Right now we are under pressure because the President seems to like the project and he has put a strong words and said I want to see the LAPCAS as a success, his interest is also to monitor elections because of locational addresses that are part of the IEC Act that someone should be eligible to vote with a proof of residence/address and National Identity/Omang." [Res_3_Vertical_ 1, Pg. 3:103-107].*

Thus being said, the researcher analysed that the LAPCAS Pilot project had a clear and well documented scope of work. However, the participants outlined that it was not implemented properly as per the initial plans.

During the analysis process, an element of organisational politics and power emanated from the MLH and DSM leadership towards other core stakeholders. Harold Lasswell's (1936) is linked to the early concept of organisational politics , the author looked at it as who gets what, when and how while power encapsulate the execution of bestowed influence by events, actions and behaviors to be affected.

Holbeche (2004) gives an insight that politics is a fact and part of life in organisations. The politics and power is demonstrated by the following comments from participants:

> *"Politics definitely does play a role. Just last week we had a big argument, the issue is that they want us to fully align our postcodes to the cadastral data, and while that might be a noble idea in terms of Standardisation, but I have kept insisting to them that a postcode, first and foremost should work for the Postal Operator and the purposes of the Post but NO!!!, for them, they don't want to listen and mind you that their cadastral data keeps on changing because of frequent demarcation." [Res_8_Vertical_ 1, Pg. 6:161-165].*

In this study, politics seems to be involved in a way exercising power to make some stakeholder roles to be completed under duress, as well as to enhance and protect some vested interests of other stakeholders. Thus, the use of organisational politics suggested that political claims were used to overcome resistance and this implies that conscious efforts were not performed on the professional tasks for some stakeholder roles. This is outlined by following comment from participant:

> *"So they will start telling political reasons, if this thing is not going to happen, they will start making it in the same vein, in such profession that this is not going to pass or be approved through government" [Res_8_Vertical_ 1, Pg. 6:205-207].*

Organisational politics involves those activities undertaken within organisations to acquire, develop, and use power and other resources to obtain one's preferred outcomes in a situation in which there is uncertainty, (Morgan, 1986). It seems that funding allocations was used as a tool to cripple resources of other stakeholders.

To summaries this, in politics, perception matters more than substance or quality of work while power is the capability to effect or affect organisational outcomes (Mintzberg, 1983). In the field of Information Systems, it is called dark side of power (Hirschheim and Klein, 1994) while other authors like Mintzberg (1983) regard it as illegitimate power. In this study, it was the researcher belief to understand enablers and inhibitors of the adoption of the information system and the need to shed light on the dark side of power that emerged to make sense of power relations in the context

of information system within the management control dimension whether it will effect or affect the adoption of the innovation.

Organisation leadership from the government of the developing country should be flexible and provide a conducive environment for physical address system to proceed by providing a budget or mechanisms to find funding (public-private partnership or donors) and develop strategies on how the innovation would fund itself for sustainability in future to convince the stakeholders to adopt it.

### 6.3.2 Research Questions 2 (RQ2) or Theme 2

> *what is the role of context awareness and in what form does it manifest in the adoption of the PAS?*

The elements of Theme 2 are the emerged core concepts category of Context and Evolution of PAS. The thematic mapping of abstraction process and theme associations is depicted in Figure 28 and the discuss follows.

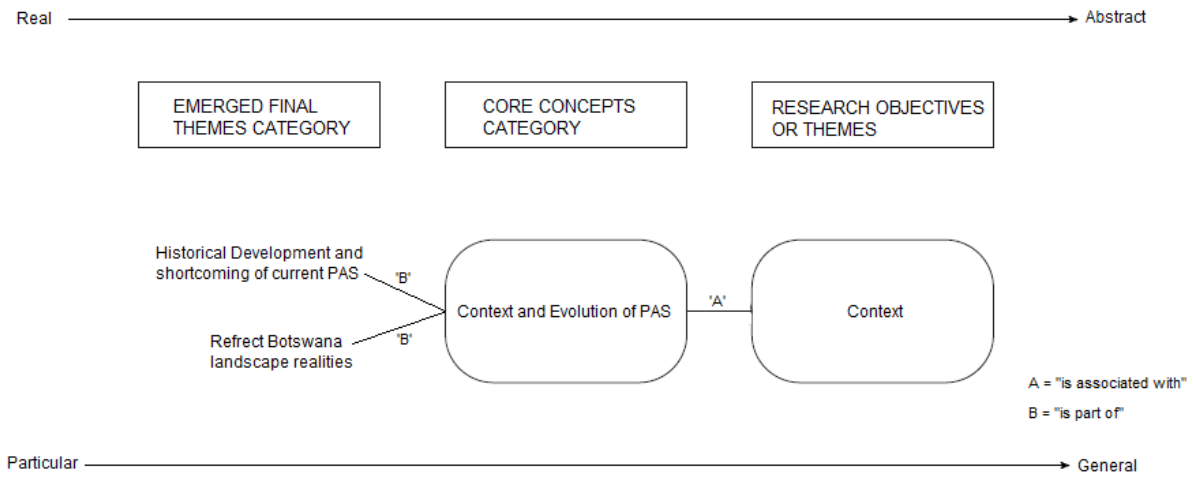


**Figure 28: Context thematic map**

The Context theme has “is associated with” relationship with Context and Evolution of PAS core concepts as outline by their connections. The emerged final themes have the “is part of” relationship to the core concepts. The next section discusses the

core concept on how they are applicable to the adoption of the physical address system.

#### *6.3.2.1 Context and Evolution of PAS*

The core concept is discussed with reference of the historical development and shortcomings of current PAS and reflection on Botswana landscape realities below.

***Historical Development and shortcomings of current PAS***

Physical Address System descriptions and traditional way to locate and reach destinations have always existed in different contexts. In the past, the descriptive physical addresses have helped the public with orientation through references to major roads, mountains, trees, points of interest, open trading markets and others. The rapid increase of human population and the complexity of cultural societies resulted to the need to uniquely identify locations. Furthermore, it resulted to territorial boundary demarcations and to accurately locate places on the ground so that the general public is not lost. Consequently, the introduction of street names and house numbering as the best practice of identification to navigate the street networks in order to reach a particular destination optimised the navigation of streets and made locational orientation easy.

Centuries back, the roads network infrastructure facilitated the organisational territories into governable entities that are nowadays called countries and promoted communication and exchange of goods through open free trading markets. The historical developments of these practices provide insights into the need for the adoption of the physical address system. Mokone (2011) state that there are cartographic information that exists in a form of a map and notes that was discovered by Christer Blomstrand, a Swedish history researcher. The discovered map depict what is today the official demarcation boundaries of northern Botswana, southern Zambia, southern Zimbabwe which is separated by the Zambezi River and the waterfall Mosi-oa-Thunya as it is locally known. Mokone (2011) outlines that the Swedish historian presented the map at the Royal Swedish Academy of Sciences in

Stockholm and intriguingly claimed that it was made in 1852, three years before Dr. Livingstone visited the waterfalls for the first time in 1855, which he purported that the map is remarkably correct and very detailed. However, when Livingstone arrived at Mosi-oa-Tunya and he renamed the falls to “Victoria Falls” after the British Queen Victoria and claimed all the credits for the discovery.

Amidst this historical confusion, Blomstrand views are that credits should be given to the rightful recipients, in this context – the indigenous people and tribes of Southern Africa who “participated to a great extent with information and sketches to the production of the early maps as well as guiding and leading the European, American and Asian explorers” (Mokone, 2011). The Swedish history researcher point out that “this fact was hardly ever mentioned in the representations that the explorers conducted when they went back to their home countries about the discoveries in Africa,” (Mokone, 2011).

Having been established in 1875, the Botswana Post is one of the oldest public parastatal in Botswana. Botswana Post in collaboration with the Botswana National Museum, Monuments and Art Gallery, hosted the Octagon Gallery in 2010 with the aim to exhibit the historical developments of the Postal Authority in the country from traditional way that was used for postal services from letters being dropped at the postal trees, runner posts and to the current express mailing system that uses Internet of Things (IoT) (Mokone, 2010). For the Postal trees, Mokone (2010) outlined that there were some designated trees as points of interests around the country which were used as Post Office branches. One of the trees was in Palapye and the other was located in Molepolole at the Main Ward (*Kgotla*). The history of the Botswana Post Office include runner post, people used to run in a relay race format to deliver mail/parcels. At the starting location, a person would run from a specific point and hand over the letter to the next person at the designated location until it reached the final destination (Mooketsi, 2010). This methodology is currently used as demonstrated by a comment from participant as follows:

> *“Our strategic positioning of our branches. We can easily network, like our services now becomes easily accessible like for example, like when our parcel need to be delivery for long distance, we have a relay type of methodology where our drives exchanges parcels until in the morning without*

*a single driver transport the parcel where there are a lot of risks involved. Our turnaround time is overnight or a day". [Res_10_Vertical_ 1, Pg. 1:13-16]*

The research made findings that relay methodology is the old innovative way to have mail/parcel to be distributed quickly within the network without delays and nowadays it is has been optimised with computerised new models of location based systems and it is currently been utilised. Other memorabilia at the exhibition were animal horns, drums and whistles that postmen used back in the days to communicate in villages before the postal service was introduced. As time moved on, the new developments involved the mail train which was used for deliveries (Mokone, 2010; Mooketsi, 2010). The initiative managed to inform the general public about the value of stamps, interest in philately - the art of collecting and studying stamps and their contribution to international recognition to the country.

Currently, there are lot shortcomings of the physical address system because it is based on descriptive and traditional way as outlined by the above historical discussions. Botswana lacks a coherent and comprehensive physical address system that makes it easy to identify individual unique street numbers and buildings. Nowadays, the Post Office delivers mail items to the post boxes that are located at the post office branches or designated malls rather than trees.

The absence of a proper addressing system has an impact to the postal sector's efforts to contribution significantly to the socio-economic development of the country. Five years back, the Post Office was unable to meet the demand for post letter boxes in Gaborone City and other Towns. The Post Office had to come with a turnaround strategy, the new post box numbering system was launched to meet the demand because the old way of numbering system reached a saturation point. Door-to-door delivery is currently conducted by the Courier companies and it is currently expensive for a lot of people. Consequently, the current way of physical addressing is unsuitable for the demands of e-commerce and other innovative way of providing service delivery.

***Reflect Botswana landscape realities***

With the notion of "Africa has its own problems hence it needs its unique Africa solutions", the innovation must be flexible enough and to take account of the customs, diversities, symbols and dynamics such as culture, and local practices to accommodate country's specificities. Stakeholders might be persuaded if context within the developing country reflect Botswana landscape realities incorporated. This is demonstrated by the following comments from participants:

> *"Location addressing will work because its just a system of doing number on what is already there and introduce it to people. They do have different types of numbers depending on the categories you have outlined. Urban areas are easily to be done. Village and Rural areas, they have Palapye as semi-village or hybrid place and they have done it, then they have Tshane, a very small and remote village in Kgalagadi District and it's the very first pilot in that category of piloting. In Tshane, there are no roads and streets, so it works with wards clustering strategy.* [Res_8_Vertical_ 1, Pg. 8:249-254]

The analysis of the above quotes of the empirical evidence was interpreted as villages have challenges due to the lack of streets and road networks infrastructure. The cluster model located at village wards to centralise box numbers to houses that are spatially distributed was applied. Similarly, Malatsi and Finnström (2011) corroborate the same scope of work of the LAPCAS Pilot Project that was agreed through stakeholder engagement workshops which were held in February 2011.

> *"I will say, urban areas are much better because all roads are planned and surveyed and get your orientation right. The village is possible unless you are where they call it planning areas. If its Tshane, it's a District council and I am not involved as I look at the Gaborone City Council only. I think it can work for Farms and Lands as Batswana are people who are known of rearing cattle's hence there are households around those boreholes that are regarded as water point, if we can get the coordinates of those water point, they we can always approximate or assume that there are household around then and then provide an address for people out there. If there is a farms, you can find*

*a bird scarecrow on a farm boundary or get farm number of some sort because at the end of the day you need to locate households."* [Res_8_Vertical_ 1, Pg. 4:109-117]

However, the second quote incorporate the settlement patterns of Farms and Lands as envisioned by this study, Batswana is a nation that rear cattle's and there are households around the boreholes that are regarded as water points. The Department of Geological Services deals with water tables, every boreholes is registered and has latitude, longitude (X, Y) coordinates as a reference point. There are also people who live at the farms which has farm houses infrastructure that need to be physically addressed and its ideal to use the unique farm numbers from the DSM as a close proximity address. Literature (Area KDCGA, 2015 and White, 1991) outline that studies have been conducted to improve livestock borehole database in Kgalagadi District communal grazing area as a basis for socio-economic development of district and land information at villages and rural communities (Malula and Veenendaal, 2015; Tembo and Simela, 2004; Manisa and Nkwae, 2007; Zhao, 1993; Maphanyane, 1993). These efforts can be used as unique referencing of households for citizens residing at Farms and Lands as they hold crucial information that can be used in the National Address Database for stakeholders to be persuaded to adopt the physical address system.

### 6.3.3 Research Questions 3 (RQ3) or Theme 3

*what are the determinants of innovation and how do they inhibit or enable the innovation adoption process of the Physical Address System?*

The elements of Theme 3 are the emerged core concepts categories of Address Format and Structuring, PAS Development and Implementation, Education and Training, Innovation Strategy and PAS for Public Good. The thematic mapping of abstraction process and theme associations is depicted in Figure 29 and the discuss follows.

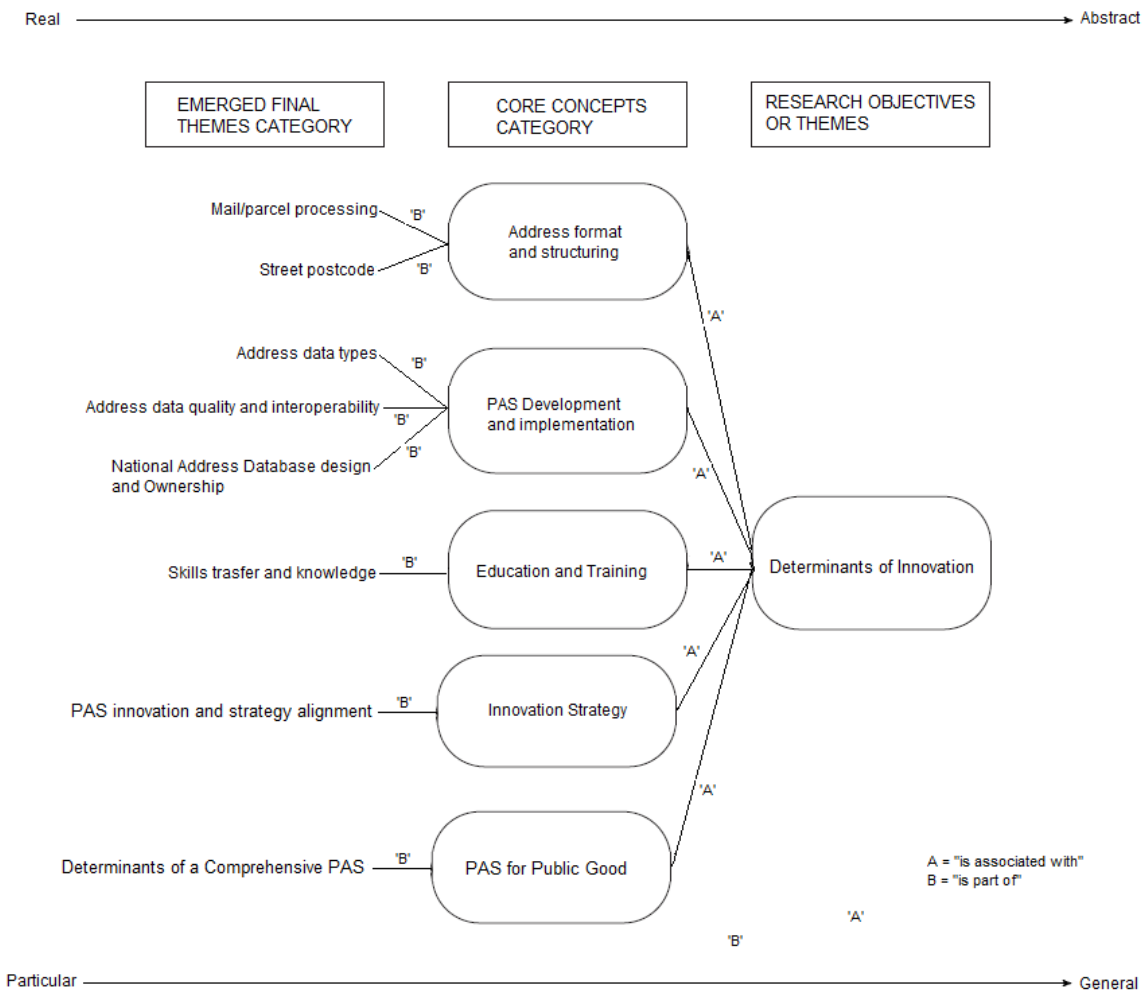


**Figure 29: Determinants of Innovation thematic map**

The Determinants of Innovation theme on Figure 29 has “is associated with” relationship with core concepts as outline by their connections. The emerged final themes have the “is part of” relationship to the core concepts. The next section discusses the core concepts on how they are applicable to the adoption of the physical address system.

### 6.3.3.1 Address format and structuring

The Physical Address System generally follows a simple structure incorporating the country existing hierarchy of administrative geographical area names or numbers of a nested set of spatial units. The Botswana Post has been given the status of

Designated Postal Operator (DPO) in Botswana by BOCRA, they have the mandate facilitate the correct data structuring that is required for the postal addressing system and postcodes need for door-to-door deliveries of mail/parcel items. Other postal operators like courier services would need to benchmark from Botswana Post. Walker (2008) state that a general approach to the physical addressing consist of the following levels:

- The name or number of a sub-unit within a building or property;
- The name or number of a building or property within a street;
- The name of a street;
- The name of (one or more) geographic areas (section, locality, town, county etc.);
- The name of a country.

The physical addressing hierarchy is often converted to or is represented by a code (e.g. a postcode or address code or zip code or area code). The exact definition of each of these levels in physical address usually is aligned to the country official administrative areas set-up, and is often defined in national standards. (E.g. BS 7666 in the UK).

***Mail/parcel processing***

In the postal industry, when a mail/parcel is not received, it can be seriously frustrating to customers after paying for the postal operator for their services and there are also cost implications from the postal operator. The cost implication from the postal operator comes in a situation where the mail or parcel has not been delivered. The process of the postal operator has to return the mail or parcel, the process means the operator uses costly resources. This is why it is important to write or print a return address on the back of your envelope but different postal operator will have different protocol with this regard.

For mail/parcel processing, Roussouw (2009) state that it is important that stakeholders responsible for address data quality comply with a standardised way of structuring addresses as depicted by Figure 30.

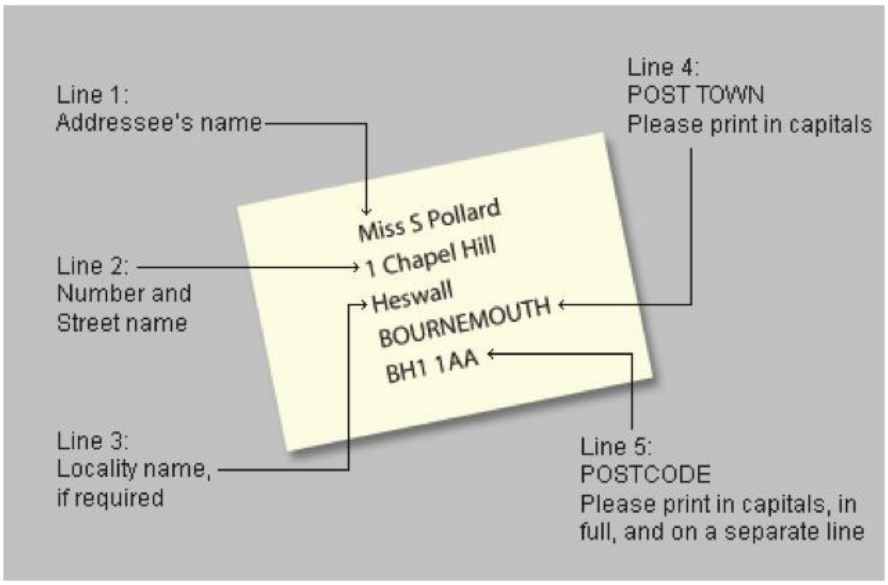


Figure 30: Physically addressed letter showing locational and postal information example (Ogbuagu, C. 2014)

Roussouw (2009) emphasise that the UPU S42 and S53 standard aims to structure physical addresses, it is a means of potentially improving all mail processing requirements (incoming, processing, delivery, tracking and reporting) by ensuring that a more standardised and universally recognised address format is practiced for international mailing. In this context, the S42 standard enables the researcher to set country-specific address components and templates (i.e. urban areas, rural and villages, farms and cattle posts specific address types and their structures) that reflect a standardised address format for improved deliverability of mail while the S53 standard facilitates exchange of name and address data between postal authorities, businesses, mailers and other organisations.

It is very important for Botswana Post to make Botswana Postal Profile similar to other countries as best practice concerning their address structures widely available and this has a beneficial effect on address quality and interoperability. Literature

(Botswana S42 Compliance, 2016) shows that Botswana is compliant to the S42 standard, a way forward on the right direction and acknowledged by this research.

***Street postcode***

The Universal Postal Union (UPU) defines a postcode as:

> *"an identifier for a given postal delivery point or collection of postal delivery points, normally comprising a string of numerical or alphanumerical characters. In practice, it is the most compact data element capable of specifying with precision the location of a mail addressee. In the absence of a postcode, sufficiently complete sets of other addresses may serve the same purpose."*

It has emerged that the Botswana Post have acquired a subject matter expect or scientist to model postal service address postcodes which add value to their transport network metrics. The network metrics is a route optimisation algorithm that adheres to the delivery times and hierarchy for routing which is tied to UPU delivery standards from their sorting centers to post office branches.

For street postcode, the Botswana Post is working with Department of Surveys and Mapping and Central Statistics Office (CSO) to model the national postcodes. In this type of postcode, scientific accuracy and rigour may be not compromised for the sake of communication of ideas and achievement of results. The postcode is going to be used by the whole nation because they offer granular locational details to reach geographic proximity areas on the ground. This means that the postcode model has to be spatially referenced to the existing geographical hierarchy of official and legal demarcated areas (i.e. Districts, City, and Suburb, ward or sections and others). The fundamental part about street postcode is that they are used as basic spatial dataset layer in geographic information systems (GIS).

The streets postcodes are meant to identify postal delivery proximity areas and most people will know their address postcodes. A table of reference place names that is associated with an allocated number can be easily provided to understand how they were designed and anyone can follow the simple instructions. This can be used as a

ready means of matching each postcode to a range of geographic areas and most people will know and remember their postcode in that instance. People can readily supply their postcodes when asked from the look-up tables.

On the benefit of research and development, this allows statistics to be created based on their street postcode level of analysis as a main geographic reference. This reference can be related to hierarchical geographic units used for statistical production by other stakeholders, this outline that streets postcodes are valuable.

#### *6.3.3.2 PAS development and implementation*

This section discusses the PAS development and implementation core concept, it involves the address types, address quality and interoperability, ownership, education and training, innovation strategy and PAS for public good.

***Address Types***

The Address type is made up by a combination of data elements of the physical address as outlined by Botswana compliance to the S42 standard (Botswana S42 Compliance, 2016). It has been recognised that a physical address is used for all forms of service delivery, and postal operator business.

The Botswana landscape is unique in terms physical addressing. It is utmost importance and to be acceptable that this uniqueness have to be catered for by different elements or addressable components of the physical address to be complete and stable to form an address type.

***Address data quality and interoperability***

Address data quality is a fundamental objective in data management within Information System domain and the physical address information is essential to software applications or systems to be interoperable. Stakeholders concern about the quality of the physical address datasets should be addressed by a formal quality

assessment. The specification of the dataset is assessed by looking at its completeness, currency, logical consistency, attribute accuracy, positional accuracy.

An error in the data layer has ripple effects to all the value added layers which results in cost implication, and it might be difficult to find and resolve it. On the contrary, a good data layer lead to better analysis in the data value chain. If data quality is not managed properly, this lead to poor insights and untrustworthy decisions by analysts. However, when statistical systems function properly, good-quality data are exchanged or shared or interoperable among all stakeholders. From a master data management perspective, they might be many address types: Postal Address, Physical or door-to-door address, and others that have an impact on interoperability. The address data has to link with other legacy of information systems or software applications from other stakeholders.

***National Address Database design and Ownership***

AppGeo (2016) defines National Address Database (NAD) as “an authoritative and publicly available resource repository that provides accurate address location information”. The expected main use of the NAD will be to serve the public available geographic data source from the authoritative sources (AppGeo, 2016). There are two ways to look at the National Address Database, the design depend on the purpose of it towards an organisation. Rhind (2016) state that the first approach is to design it as a subscription database that is intended to get publications or customers magazines be delivered as quickly as possible to the intended subscribers. The second view would be aiming to design the NAD for direct mailing as a purpose. The physical address system caters for different address types because it was conceptualise by stakeholders as a concerted efforts to improve the organisation performance on service delivery. The PAS makes a provision for aspects such as language, forms of address, address formats which are relevant and accommodates country context specificities (Rhind, 2016). A complete, current, and accurate address list including street number, street name, and settlement names (city, villages, rural areas, farms and lands). The less commonly used information like Latitude/Longitude, GML point geometry, and spatial reference system with their

associated metadata (meaning information about the data) is important for NAD as they are part of the digital representative context.

Ownership or custodianship outlines the various stakeholder roles involved in the creation, collection, aggregation and publishing of information to the National Address Database (NAD). In this study, stakeholder roles are dependent to others during project and stakeholder engagement. The Botswana Government has 16 Ministries. Three of the Ministries (through its various Departments) have been found as core stakeholders to play roles in the PAS development and implementation theme from the empirical evidence. They contribute the physical address information to the NAD which might persuade stakeholders on the participatory platform that the PAS can be realised.

AppGeo (2016) views ownership or custodianship in three ways as, 1) Authoritative Source 2) Address Aggregator 3) NAD Owner / Manager. The Author further highlight that the authoritative sources or aggregators can be a data contributor, depending on how they submit data to the NAD. This study is aligned on the AppGeo (2016) assertions on ownership point of view as indicated by Figure 31.

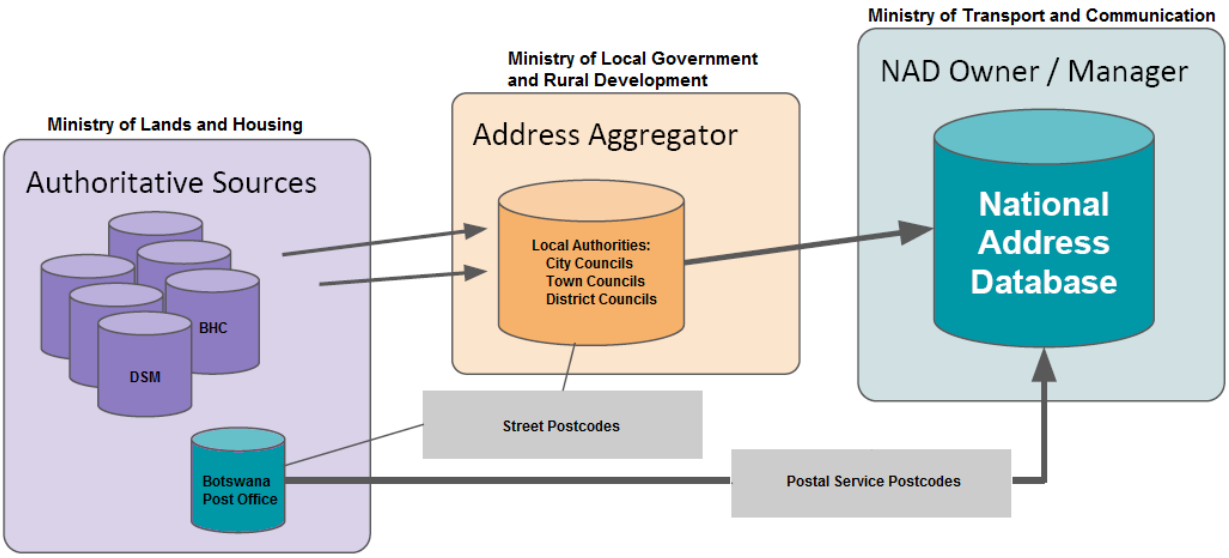


Figure 31: Key stakeholder roles and responsibilities for NAD (adapted from AppGeo, 2016)

AppGeo (2016) expands on the ownership or custodianship by defining them as:

*Authoritative source*

The Authoritative source or the content originator is the government institution responsible for the physical address geo-spatial data creation and maintenance (AppGeo, 2016). For its applicability in the context to this study, the DSM role is to survey land parcels and conduct cartographic work to create geo-spatial layers of point's data, polyline and boundary polygon data. As previously mentioned, their mandated is to supervise and control all surveys in Botswana and they are the custodian of the Land Survey Act. In 2010, the government of Botswana decided that BHC has to become a single housing authority in the country, in other words all matters related to Housing have to be undertaken by the BHC. After building house, they transfer the infrastructure to the Ministry of Local Government and Rural Development after a provisional period for operation, maintenance and sustainability. The Botswana Post is the custodians of streets and postal office postcodes. The streets postcodes are associated with spatial aspect of geographic data to offer granularity details of an proximate place of land parcels on the ground and that why Figure 27 depict two arrows on how the two different types of postcodes are to be updates for the database.

*Address Aggregator*

An address aggregator is often a government institution or state owned. The address aggregator is involved in the collection of data from the local authoritative sources, and aggregates it to a standard format for submission to the NAD repository process (AppGeo, 2016). In this study, Ministry of Local Government and Rural Development is seen as the aggregator as most of the implemented central government implemented infrastructure projects are handed to them upon completion. The BHC housing projects are transferred to the Local Authorities such as Cities, Towns and District Councils for operation and maintenance. The street postcodes will be aggregated with the land parcels data received from other Authoritative Sources. The street postcodes are spatially referenced to the existing geographical hierarchy of official and legal demarcated boundary areas or land related data from the Ministry of Land and Housing and its departments.

A continuous nationwide update of data with its associated geographic coordinates and spatially referenced suburb boundaries that meet the needs of Cities, Towns and District Councils would be conducted at the Address Aggregator level because physical addresses should be assigned and maintained locally. The inventory at the Address Aggregator must conform and comply with the adopted standards. An Address Aggregator should be seen as a distribution network of sources rather than a single centralised inventory. The data must be updated in a timely and quality-controlled manner (AppGeo, 2016).

*The NAD Owner / Manager*

The NAD Owner / Manager is usually the government institution or state owned that takes responsibility for accepting, reviewing submissions of data together with its metadata, hosting, publishing the data, and managing updates to the NAD (AppGeo, 2016). It is important to have a single authoritative national address database of the physical addresses covering the whole developing country. The NAD has to be maintained to reflect the most recently assigned addresses (Ditsela *et al*., 2011). The researcher views the Ministry of Transport and Communication (MTC) as the NAD Owner/Manager. The MTC are the custodians of the street and road network data through its various Departments and also has the Botswana Post Office, a parastatal under its wings which are custodians of postcodes. The street and road network is an import address element that often follows after the addressee information and ultimately route you to the exact location on the ground. Logically and technically, the NAD must have an accurately geo-referenced streets and road network because its supports the geocoding of addresses and allows address ranges (odd numbers on the left and even number on the right) to be built on the road networks which is used for navigating to the exact physical feature (household, land parcel, place of interest) on the ground.

Through stakeholder engagement, a minimum content standard that is benchmarked on international standards and involving Botswana Bureau of Standards (BOBS) is needed. The standard should be able to guide on what information will be included in the NAD, workflows for data extraction, transmission and loading (ETL), how data will be stored (the database schema) in the NAD. To make a clear distinction of not confusing the NAD as PAS, the NAD is a repository of spatial data and is also part of

the Physical Address System, just like designing of web forms for better data quality capturing on the internet which is addressed during website development task for the Physical Addressing System. The PAS set-up can be a three tier layer platform of the client services layer (web-forms), server layer and database layer (NAD).

This study is not concerned about the technicalities of showing street postcode development and the database schema of the NAD for the developing country, all this aspect have been modeled separately on unpublished related work to be submitted to the appropriate journals to be still identified. This section focused on the National Address Database design and Ownership as part of the PAS development and implementation core concept to persuade stakeholders to adopt the physical addressing system.

#### *6.3.3.3 Education and training*

This section discussed the education and training in terms of skills transfer and knowledge at the developing country. This might improve capacity at the developing country to persuade the stakeholders to adopt the physical address system.

***Skills transfer and knowledge***

An advanced education system would enhance the developing country capacity to drive the stakeholders to adopt the Physical Address System. Thus, the successful adoption of Physical Address System requires both the public and stakeholders in the entire developing country to be knowledgeable and become accustomed to the new physical address system. They need to be provided with support and training, to reap greater benefits beyond the change from descriptive and traditional way of physical addressing. The training of resources is demonstrated by the following comments from informants:

> *"In terms of LAPCAS, I participated in the steering committee in terms of ideation championing or conceptualisation of the project and I have played a role in building capacity where I was running quite a number of short courses.*

*I have trained quite a number of people, say close 650 personnel from the Ministry of Land and Housing with regard to the LAPCAS project." Res_11_Vertical_ 1, Pg. 2:31-35].*

An innovative system always dependent on how others ultimately grasp the concept, accept it and finally make it their own. For stakeholders to be persuaded, the quote above outline that an organisation has to create an environment where they provide sufficient training of the information system to persuade stakeholders to adopt the PAS. Then, a post-evaluation is required to understand if the public or stakeholders are able to learn new information system quickly else the challenges with regard to learning Programme need to be reviewed.

### *Innovation Strategy*

The innovative strategy is a plan of an organisation within its context and its way forward, this is necessary because it creates a foundation for systematic approaches of executing tasks, and improving processes in an organisation to make the Physical Address System a reality (Gates, 2010; Fogg 1994).

In this study, the innovation strategy therefore is seen as a set of behaviours and systematic approaches that are used to improve the Physical Address System using new technologies or current advanced approaches – meaning how to go about from the descriptive and traditional PAS that is currently used to the standardised and comprehensive Physical Address System. The initial step of innovation strategy process is centered on understanding and defining the developing country specific objectives or crucial steps that need to be achieved for the anticipated outcomes of the innovation adoption process of the physical addressing system.

*PAS Innovation and Strategy alignment*

Strategy alignment suggests that the effect of information system on performance will depend on how well the information system strategy and organisation strategy coincide (Chan et al. 1997; Palmer and Markus, 2000). A number of studies have shown that aligning information systems and organisation strategies is critical for

successful information system adoption and is positively associated with effective organisational performance (e.g., Chan et al. 1997; Henderson and Venkatraman 1993; Sabherwal and Kirs 1994).

The Botswana Vision 2016 is a National Strategy with a roadmap to push forward the agenda of socio–economic, sustainable development into recognisable, outstanding and proud nation. The adoption of an information system process occurs in different settings, For example, due to policy context, particular socio-economic context, particular socio-cultural context and others. These settings are referred to as contextual factors that may have an influence on the innovation adoption social process and need to be considered. In this study, adoption is foreseen to occur due to the PAS contexts and policy context (herein, the national strategy, Electoral Act, Finance or Banking Act and others).

#### *6.3.3.4 PAS for Public Good*

The physical addressable elements that make up the PAS to be regarded good, depends on how “good” the Physical Address Systems is going to be used by the public or the specific objectives of official use. However, Public good extend beyond the benefits of Physical Address Systems, the people mind maps as they will always have to remember their physical address and ubiquitous use of Physical Address Systems. Public goods can also be abstract or practical and concrete (Dayan, 2012).

For PAS as Public Good, the network of road names and house numbers which are part of physical address elements constitutes key components of functioning societies that always need to be remembered when an individual is being asked about their physical address from the people context perspective. The developing country physical address infrastructure need maintenance where by the citizen paint house numbers and erect address signage’s, surveyors producing master drawings of land parcels to be used for land registration process with unique numbers, people constructing roads, maintaining street and road networks of which it forms a part, is an essential public good as employment is created and citizen livelihoods are uplifted as an impact to the socio-economic challenges. The PAS provides access to

the rights and duties of people internationally and locally. The people can be identified or recognised to be originating from a certain Country. The latter provide the info where they reside which is constitutional right as required by Electoral Act, Census Act, Finance Act, Credit services and others. The PAS also provide businesses with access to markets through subscription and direct mail databases. Thus, all levels of society have equal access to the PAS for public good.

### *Determinants of a Comprehensive PAS*

There are critical, desirable determinants or features of a functional, standardised and comprehensive Physical Address System which are important to its appreciation to the public. Literature (CODI-Geo/DISD, 2005; DISD/ECA, 2005; Asfaw, 2005) emphasised that it is important to understand the determinants of a good Physical Address System. This will enable the increase of public knowledge and people to be cognisant of those determinants when designing and maintaining a functional and comprehensive Physical Address System. CODI-Geo/DISD (2005) discussed few criteria's of the determinants of a good Physical Address System. The Physical Address Systems are part of the smart cities initiatives and allow the general public to participate in the governance and management of the developing country and become active citizens. The following list might persuade stakeholders to adopt the Physical Address System if it is appreciated of being public good, the determinants are:

*Easily identifiable*

PAS for Public Good should be identifiable, easily understood and useful to the public. The strategic placement of signpost that indicate their local culture, language used and their visibility of the displayed information play a role towards identifying a location. The researcher made findings that there were contested issues with regard to the Pilot Project naming of some Suburbs as there claims that public participation was not conducted to the Residents. This is demonstrated by the following comments from participants:

> *"We know lately that there is Ditimamodimo (new name for Block 7) that is meant the facilitation of settings or localities."* [Res_1_Vertical_ 1, Pg. 3:104-105]

> *"We just agreed that we need to start pronouncing these names (Ditimamodimo instead of Block 7) and let the public know them but its been a lot of chaos about the names."* [Res_3_Vertical_ 1, Pg. 4:136-138]

The analysis of the above quotes from the empirical evidence was interpreted as there was no proper public participatory process or public engagement to make people aware of the names that are officially registered at the MLGRD for the particular suburbs. The public did not resonate well with Ditimamodimo name shown by the signboards rather than Block 7 name as the area is known by majority. Due to the lack of the Physical Address System, technical surveying names within the planning master drawings like Blocks or Extensions or Phases given to people when they requested Title Deeds information is known by most people. If the suburb name is identifiable, this can make stakeholders to adopt the Physical Address System, otherwise they will be resistant to "forced" name changes and by virtue of that action, it will results to the rejection of the Physical Address System.

*Accuracy, reliability and accessibility of information*

The accuracy and reliable information in the database should be frequently updated and its accuracy checked in a formal processual way by the PAS owner. This is demonstrated by the following comments from participants:

> *"We don't have the updated information in our gadgets"* [Res_7_Vertical_ 1, Pg. 4:119-120].

> *"The last I heard, people always said Botswana maps are not uploaded or so many things to that effect."* [Res_8_Vertical_ 1, Pg. 9:305-306].

The researcher interprets the quotes above as, the participants are not sure about the digital mapping information updates. It is important to make sure that accurate and reliable information is uploaded in the database after it has been checked for quality. The data producers, data auditors and data owners or custodians of PAS should be able to not only access the system and maintain accurate and reliable information but to understand, utilise it as well so that they can be exemplary to the general public (Asfaw, 2005).

*Simplicity and uniqueness*

The simplicity of the PAS should be prioritised to increase the PAS usability to the public (CODI-Geo/DISD, 2005). The uniqueness of the Physical Address System enables an understanding and makes the Physical Address System simple.

*Consistency*

Consistency should be one of the critical principles of a comprehensive PAS, which facilitates identification of location. The name changes from Block 7 to Ditimamodimo name should have its own formal naming conversion standard that incorporates the public consensus. When the name is displayed on the signage, it should be consistent without causing confusion or disputes.

*Broad-base, interoperable and homogenous*

A comprehensive PAS should facilitate the use of the similar and consistent data by various stakeholders for their business interest. The PAS should be interoperable or connect to other legacy systems of Banking, National Identity cards, driver's licenses, during elections, emergency services and security cluster like Police and Intelligence Services. It should be strategically aligned to various Botswana Acts or Policies or National Strategies of other Ministries within the government.

*Logical, sequential and practical*

The sequential numbering system of house number is important for an easy identification of an address. This is demonstrated by the following comments from participants:

> *Location addressing is a systematic and sequential way of identifying plots and land parcel. The physical addressing is done with relation to the streets, street number and it is also sequential where the left side is 1,3,5 (odd numbers) and right side is 2,4,6 (even numbers).* [Res_8_Vertical_ 1, Pg. 2:60-61].

The researcher interprets these quotes above as the odd numbers should be assigned on the left and even numbers on the right as a best practice around the world and it should be applicable to Botswana. This would not cause confusion to visitors or international users of the Physical Address System.

*Flexibility and Maintenance*

The flexibility of a PAS facilitates its maintenance by the PAS owner or custodian, the physical features that change on the ground like constructing a new road or new infrastructure development need to be updated, changed or status indicated active or not active. Deleting the information is not the best practice in data management principle because at some point there might be a need to roll-back due to some contingency circumstances or politics, the change of status from active to not active of physical address in the database is rather the acceptable way. This study made findings that the name of Ditimamodimo is debated at the Parliament. If it is cancelled, the suburb will revert back to the old name of Block 7 or the GCC will have to engage the general public on the new name through a public participatory process.

*Cost effectiveness and sustainability*

The design and implementation phases can make stakeholders believe that the PAS can become a reality. The government must approve the PAS strategy and provide a budget for it because at the end it is for public good, the other way is to pledge for donations without red tapes attached to it from the International Community. The government should find a way or a model how the PAS can finance its sustainability through subscriptions or licensing when requests are received for connecting to the physical address system by private institution just like how the DSM is selling its spatial datasets of Botswana Atlas through a third party in the United States of America (USA).

The next section discusses the research question four and the framework development.

### 6.3.4 Research Questions 4 (RQ4) and the Framework Development

This section summarise the interpretation of all the findings that was presented in the previous sections to develop a theory of adoption of the Physical Address System at a country level. For the framework development, the research question four was:

*in what ways should a developing country adopt a Physical Address System?*

The findings related to the embedded case units within a case study, the conceptual research framework elements and findings related to the research questions (RQ 1, RQ 2 and RQ 3) were aggregated, consolidated, and refined. The findings produced the theoretical conjecture to show the social process, decision making and outcome of the adoption of the Physical Address System at a country level. The interpretations outlined that adoption of PAS is a multi-dimensional and multi-level phenomenon where stakeholders proceeded through a complex social decision making process to be persuaded to adopt the Physical Address System in a developing country perspective. Figure 32 shows the graphical representation of the theoretical conjecture.

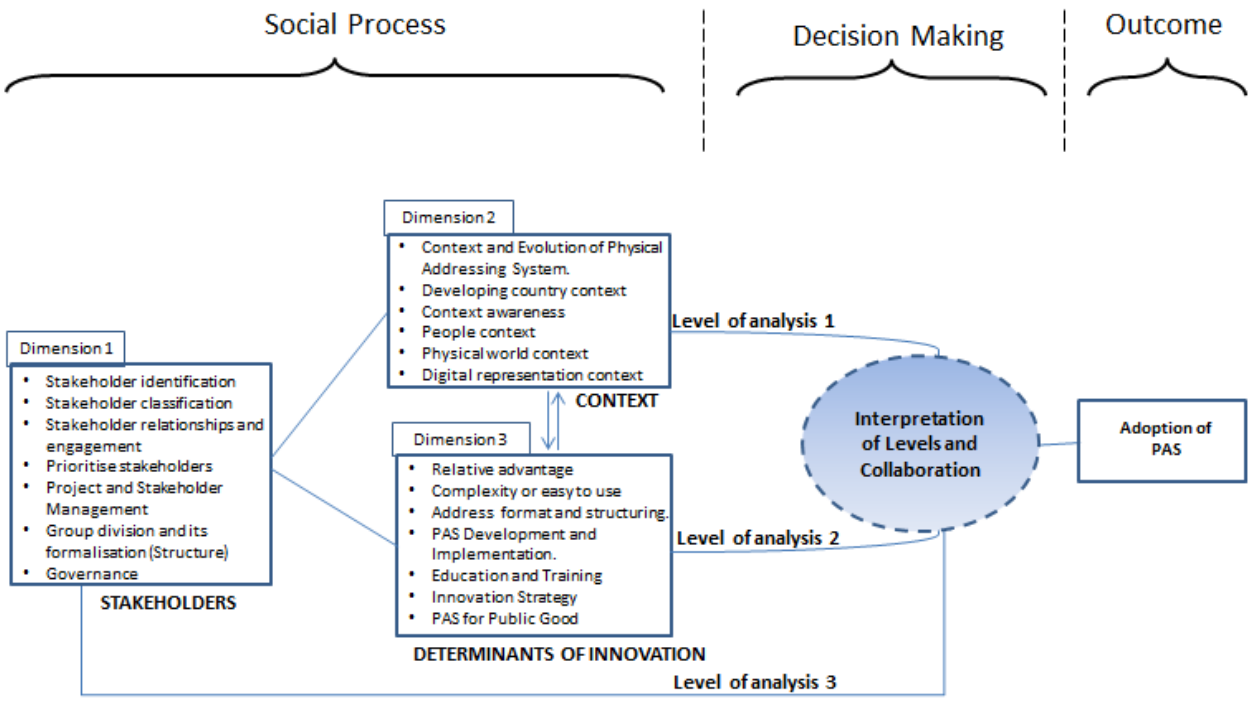


Figure 32: A multi-dimensional framework for the adoption of PAS

There are accepted comprehensive and systematic frameworks that guide researchers on innovation adoption at the organisational level and it was not clear which one was appropriate. This study closed the gaps with this investigation by conceptualising a multi-dimensional framework, which showed how the dimensional complexities are structured. It also outlines how the emerged new knowledge of core concepts together with significant elements from conceptual research framework (Section 3.4.1) are aligned within the dimensions (stakeholders, determinants of innovation and context) from a developing country perspective as supported by views of Fleuren et al. (2004), Aladwani (2001) and Crossan and Apaydin (2010). These add to the attempts to understand the organisational innovation phenomenon within Information System as the general theory does not yet exist

The framework elements that make up the Multi-dimensional framework on Figure 32 are discussed below:

#### *6.3.4.1 Social process*

With reference to Figure 32 from the top, it shows the Multi-dimensional framework of adopting Information System in a developing country through a social process. The emerged core concepts are mapped to the dimension of the framework. This study has shown that the adoption of the information system is not a linear sequence of phases (social process, decision making and outcome) because it intertwines into complex ideas or scenarios (Kimberly and Evanisko, 1981; Damanpour and Wischnevsky, 2006; Rogers, 1983). The arrows, connecting lines and oval dotted shape indicate that innovation is a collaborative, iterative and mental phenomenon of interpretation of levels from the multi-dimensions.

*Stakeholders*

The empirical evidence was collected from the stakeholders, analyses and interpreted. The core concepts of the stakeholders theme from the findings of the study are project and stakeholder management, group division and its formalisation (structure), and governance in order to persuade the stakeholders to adopt the PAS.

Moreover, there were other conceptual research framework elements such as stakeholder identification, stakeholder classification, stakeholder relationships and engagement and prioritise stakeholders with stakeholder mapping need to be considered. This specifies protocol in a form of a formal line of communication and helps in controls (budget, quality, team norms and organisational cultural norms), integrate and coordinate task activities, defines and articulate task allocations or job descriptions for each stakeholder roles (Porrass and Robertson 1992). This offers the possible continuity and sustainability of the physical address system. The stakeholder management was useful in this aspect because it essentially mapped the identified stakeholders according to their roles and also identified knowledge flow within the social system for the adoption of the Physical Address System through stakeholder analysis.

Stakeholders are important to the innovation adoption process of the Physical Address System at the country level. Stakeholder management is driven by the stakeholder top management team, country policies (like Act, NDP's, Electoral Act, Banking Act, Census Act and others), and their roles rather than solely on the opportunities and benefits of the innovation.

*Context*

From the findings of the study, the applicability of the PAS to the country specific context of the developing country (urban, villages and rural areas, and lands and farms) where the innovation was going to be implemented had convinced stakeholders. The history or evolution of physical addressing system is very important as the building blocks of a comprehensive and standard system physical address system. The developing country context, context awareness and PAS context (people, physical and digital representation) from the conceptual research framework surface as important contextual background that need to be considered (Dilley, 1999). This study showed that adoption of the Information System start with context or understanding the status-quo of the county and its landscape. This led to Davison and Martinsons (2015) say "context is king" by relating it to organisation culture.

*Determinants of Innovation*

The determinant of innovation is linked to the persuasion stage of the innovation adoption process phase. The core concepts of the stakeholders theme from the findings of the study are the innovation strategy, address format and structuring, PAS development and implementation, education and training and PAS for Public good. The determinants of innovation of Relative advantage, Complexity or easy to use from the conceptual research framework outlined factors that the decision makers need to be cognisant about to be in place for the PAS to become a reality at the developing country. The determinants of innovation also articulates a detailed guide posts to help the developing country on how to develop, use, sustain and maintain physical addresses.

### *6.3.4.2 Decision Making*

The DoI Theory by Rogers (2003) posit that collective decisions is the organisation or country choice to adopt or reject an innovation as an outcome made through consensus among members (stakeholders) of the social system. The study analysed and interpreted the multi-dimensions on different levels which led to the adoption of the information system.

*Multi-levels of analysis*

For the multi-level part of the multi-dimensional framework, the analysis of the emerged core-concepts and embedded case units gave insights during cross case analysis that some of the core concepts apply at the same level and some at different levels. Hameed (2012) posit that innovation is researched from multiple perspectives or diverse levels of analysis. Context, stakeholders and determinants of innovation themes involves the government and private sector level. The stakeholders theme only is applicable to the government sector level as outlined by Table 24 of the themes verification. The reasoning might be a view that the government through its institutions or as the main stakeholders would be the owner of the Physical Address System if adopted hence the need to control budget, quality

control of the innovation and other pertinent controls (Slappendel, 1996; Damanpour and Schneider, 2009).

The multi-level frameworks must include the dynamic nature of the relationship between other stakeholders like the general public or residences (Ashraf et al. 2008) as it often emerged from the empirical evidence. The general public or residences is concerned with the determinants of innovation dimension. The general public as individual will be hired to build roads, paint house numbers, maintain street and road networks of which it forms a part an active society within a developing country.

Although the general public or individuals was not part of the conceptual research framework. However, the participants often mentioned that there was a need to conduct public participation and create awareness to the general public or citizens because it was key to a successful innovation adoption process. Currently, the LAPCAS Pilot project concepts or ideas are known by stakeholders only and when the time came for Pilot Project implementation at the selected communities or residences, there was resistance as the general public or individuals were not informed. This study outlined that it is imperative to integrate the general public in the pilot projects and inform them widely on the benefits of adopting the Physical Address Systems following the global approach. This might lead to high-level commitment to support the initiative and participation on all levels of a functioning society in a collaborative way.

#### *6.3.4.3 Outcome*

*Adoption of Physical Address System*

This study outlined that the stakeholders collectively agreed with the introduction of the Physical Address System at the developing country. The collectively agreement was based on stakeholders understanding the multi-dimension aspects of the framework elements.

The following section discusses the summary of the interpretation of finding and the framework development.

## 6.4 Summary of the Chapter

The interpretation of findings and the framework development Chapter discussed the findings related to the embedded unit and the research questions. The stages of the Framework Analysis method contributed to the rich rigour of the research process and enhance the sincerity, credibility, resonance and meaningful coherence of the findings of core concepts as articulated by Tracy (2010). This enabled the researcher to track the interpretations and review them iteratively which ensured that the links between the original empirical evidence accounts and findings are maintained and transparent.

This chapter interpreted the findings related embedded case units to capture the depth and breadth of empirical evidence collected within a bounded case. This offered greater insights of perceptions and lived experiences on understanding the social process of the adoption of the Physical Address System from participants from government and private stakeholders through cross case analysis technique. The technique involved making inquiries with similar questions in the same way to the participants within the developing country.

The findings related to the embedded case units of a developing country and research questions (first, second and third) were consolidated and refined to produce the theoretical conjecture to develop Multi-dimensional framework. The framework shows multi-dimensionality, multi-level, social process and adoption outcome for adopting PAS at the developing country.

The next chapter discusses the importance of the research contributions by reflecting on research objectives, evaluating the social inquiry, the research limitations, research recommendation and finally concluding the Thesis.

# CHAPTER 7: EVALUATION OF THE RESEARCH

## 7.1 Introduction

This chapter concludes the research work conducted and outline why it was indeed necessary for the journey undertaken. This thesis was about the adoption of an Information System (IS) at a country level. Information Systems literature addresses adoption of IS at an individual level, organisational level or national/country level. Each level of analysis has its own complexities. This chapter outlines the rich insights and offers thoughts derived from the conceptualisation of the multi-dimensional framework of adopting the Physical Address System in a developing country, this addressed the complexities and multi-dimensionalisms.

This chapter is organised into six sections, the first section discusses the overview of the research. The second section revisits the research objectives and discusses how each objective was addressed. The third section discusses evaluation of the social inquiry, it gives implications on practical and methodological contribution by discussing the adoption of IS research at country level, knowledge building process of qualitative research, unit of analysis and site selection, and data collection is discussed. The fourth section discusses the relevance of the research with respect to literature, practice, theoretically and whether the topic was worthy, it discusses if the outcomes of the research can be used in practice and if readability of the thesis can be understood by academic and professionals. The firth section discusses the research contribution in a form of theoretical perspective. The limitations for this research which are converted to recommendations and ideas for further research are addressed.

The last section concludes this Thesis, with a title “A multi-dimensional framework for adoption the Physical Address System in a developing country”. Firstly, to evaluate the research, the overview of the research is discussed in the next section.

## 7.2 Overview of the Research

The thesis is structured in seven chapters. Chapter 1 was laid as follows, the first section introduced the field of study. The sub-sections followed with the discussing of the adoption of the IS at organisational level, developing country versus developed countries and contextualised the IS study. The second section discussed the relevance of the research in brief. The problem formulation from the identified theoretical and practical gaps from literature is discussed. The gaps were converted to the statement of the problem and the research argument is stated. The research objectives and questions were formalised from the identified gaps in knowledge to drive the investigations. Having discussed the research gaps in knowledge from literature, the research purpose followed, the researcher brought forward the research framework graphical representation that depicted the social process that facilitated the social inquiry of the adoption of the Physical Address System. Finally, the research delineation and how the thesis is structured was outlined.

Chapter 2 is about survey of scholarship and theoretical foundations. The systematic review of literature discussed multi-level and multi-dimensional theoretical frameworks for IS organisational innovation, the physical address system phenomenon and the contextual approach. The physical address system history was discussed from its evolution, its current status and how it was used in different countries. The thesis clarified the confusion surrounding the applications like Google Maps, What3Words, MapCode, Posttudes and Geotudes as they are technical solutions looking to solve a problem as part of the digital representative context. The research outlined that technical solutions cannot be called Physical Address Systems. Rather, they play a part in the PAS context awareness where they are complimented by the people and physical world contexts.

Chapter 3 introduced the theoretical frameworks that grounded the study. The theoretical lenses discussed are the Technology Organisation Environment (TOE), Theory of Reasoned Action (TRA), Theory of planned behaviour (TPB), Social Cognition Theory (SCT), Technology Acceptance Model (TAM), Stakeholder Theory, Upper Echelon Theory (UET), Diffusion of Innovation (DoI) Theory and finally the

conceptual research framework that guides this study. The conceptual research framework shaped the types of interview questions for data collection and analysis.

Chapter 4 discussed the methodological approach and its rationale to answer the research questions and purpose of the study by looking at how the research was practically conducted in terms design of the research and methodological approach. The research methodology chapter lays out the research ontological stance, epistemological stance, research philosophy, research approach, research strategy and the research design of the social inquiry. The research methodology outlined how stakeholders transform their knowledge of this social inquiry to understand what reality exist in the real world and the way to acquire knowledge as the research engaged theoretical perspectives of the conceptual research framework.

Chapter 5 and 6 used thematic Framework Analysis as type of qualitative data analysis method. The method of analysis straddles between the two chapters because of the interconnectedness of its analytical stages. Chapter 5 discussed the empirical data analysis process and discussions. The Framework analysis method has the flexibility in qualitative data analysis process because it permitted the researcher to either collect all the data and conduct the analysis at a later stage or perform the two stages in parallel. On Chapter 5, the gathered empirical evidence was transcribed, reduced, summarised, discussed, coded, categorised to develop emerged final themes and core concepts which were charted in accordance with the research themes. Chapter 5 involved four of the five stages of Framework Analysis method being Familiarisation, Identifying Thematic Framework, Coding and discussions, and Chatting. A list of core concepts emerged from this Chapter using the abstraction process.

In Chapter 6, the researcher has to go beyond the initial impressions obtained from the empirical evidence by mapping and interpreting core concepts with the last stage of the Framework Analysis method. In order to obtain a deeper understanding of the phenomenon of the social inquiry and build the research picture. Firstly (1), the chapter discussed the findings related to the embedded case units or strata of the case, and secondly (2), the findings related to the research questions. The

interpretation of all the findings that was presented developed a theory of adoption of the Physical Address System at a country level as depicted on Figure 32.

Chapter 7, it is the evaluation of the research that is being currently read. The next section revisits the research objectives and reflects on them.

## 7.3 The Research Objectives Revisited

The research objectives are similar to the research activities or mini-projects performed to finding information while conducting the research process. They are clear, concise, declarative statements that are feasible to achieve in order to guide the investigation journey or research process. At the end of the investigation of the phenomenon in the social inquiry, they need to be revisited on how they were addressed, hence the sub-section that follows.

### 7.3.1 Reflections of the Research Objectives

The goal of research was achieved by reflecting on the following research objectives:

Objective 1:

*to identify potential stakeholders and describe the stakeholders roles and relationships that might influence the adoption of a Physical Address System.*

For a developing country to move forward in terms of delivering services to its people. It is a norm that the government institutions conduct business with each other in a clustered format seen here as relationships. For example, the security cluster, infrastructure planning cluster, human development cluster and others. Usually, clusters are formed to foster an integrated approach to governance aimed at improving government institutions planning, decision-making and service delivery. The potential stakeholders as clusters who are custodian of address information

were initially identified though the anticipated address letter on Figure 2 and others were added to balance the industry match on the usage of locational information.

There is a concept of “key players” and it is important to the process of conducting business with each other. The key players concept reasoning is to answer the question that always comes when there is a collaboration like “who brings what to the table or platform”, “who has the task of selecting and assessing them?”, “who is special and why?”. In this study, key players are synonymous to government and private institutions as stakeholders within a developing country. By virtue of those government and private institutions being in business together or dependent on each other for certain resources or playing different stakeholder roles in the same platform. This is seen as a “social process” in social science research from the Information System literature (Teo *et al.,* 2003; Zorn *et al.,* 2011 and Wang, 2009). Thus, the stakeholder’s roles manifest in the social process to enable an activity to happen.

Rather than the traditional gate keeping selection process, the social process needs to be managed so that stakeholder engagement and allocation of tasks is conducted according to their specific roles. The practice is called project and stakeholder management. Stakeholder management helped in the analysis to identify possible stakeholders and described the stakeholder’s roles and relationships that might persuade the adoption of a Physical Address System. Stakeholder analysis is now a “must” in most projects and clearly it is a positive development to bring stakeholder managers into a joint process of finding way forward with regard to innovative solutions. The ultimate goal is to persuade stakeholders to adopt innovations. Project management looks at allocating tasks to stakeholders with respect to their roles and capability, most importantly to know when to bring which stakeholder during the continuous progress of the project life.

This study has shown that innovation is not all about the "technology" at an country level. In this study, the innovation was seen as stakeholders coming together to solve the country social grand challenges in new way, where each stakeholder plays a role in the social process and innovation adoption outcome. Counter to some understandings or definitions, organisation innovation fundamentally involves a *social process*, this process require stakeholders to operate in social interaction and

with continuous interrelations rather than operating in silos. There are different diverse skills that can be tapped into when stakeholders engage within the social process. The research exhibited the need for collaboration. Innovation is a social process, which means collaboration is key, where there is a need to manage demanding stakeholder roles and relationships.

Objective 2:

*to determine the role of context awareness and the form it manifest in the adoption of the Physical Address System.*

In Information System studies, the contextualist approach brings to the fore the importance of considering context when studying organisational change and processual nature of how it unfolds socially (Sharma, Barnett and Clarke, 2012). On this basis, the contextual approach is deemed suitable for a developing country change from the descriptive and traditional PAS that is currently used rather than the standardised and comprehensive Physical Address System. The Information Systems was contextualised on the people context, the digital representation context, the physical world contexts and developing country context.

The findings outlined that in the past, the descriptive physical addresses have helped the public with orientation through references to major roads, mountains, trees, points of interest, open trading markets and others. On this background, this addressed the people context.

However, the current way of physical addressing is unsuitable for the on-demands systems of e-commerce and other innovative ways of providing service delivery and to accurately locating places on the ground. Consequently, the introduction of street names and house numbering has been realised to the best practice to navigate the street networks and buildings. For people to reach a particular destination or locational addresses, nowadays the navigating gadgets optimise the streets routing with advanced computer processing, this made locational orientation easy. This addressed the physical world and digital representative context.

The rapid increase of human population and the complexity of cultural societies resulted to the need to uniquely identify locations. Furthermore, it resulted to territorial boundaries and official demarcation boundaries we currently call countries. The historical developments of these practices provide insights into the need for the adoption of the physical address system.

With the notion of "*Africa has its own problems hence needs its unique Africa solutions*", the innovation must be flexible enough and to take account of the customs, diversities, symbols and dynamics such as culture, and local practices to accommodate country's specificities. For the country context and the cultural aspect, it can be said that stakeholders might be persuaded if context within the developing country is incorporated to be applicable Botswana landscape realities. The landscape realities are settlements patterns of urban, villages and rural areas, farms and lands.

Objective 3:

*to identify and determine how the determinants of innovation may inhibit or enable the innovation adoption process of the Physical Address System, in context.*

The findings of the study outlined that the determinants of innovation are critical for understanding how they can enable or inhibit the innovation adoption process. The identified determinants of innovation as core concepts are Address Format and Structuring, PAS Development and Implementation, Education and Training, Innovation Strategy and PAS for Public Good. However, the determinants of innovation such as Relative advantage, Complexity or Easy to use from the conceptual research framework are the factors that the decision makers need to be cognisant about to be in place for the PAS to become a reality at the developing country.

Rogers (1995) who indicated that the main attributes of an innovation should be elicited from the participants prior to measuring them also support the identified determinants of innovation. The stakeholders would want to know if the stakeholders

have the resources and capability to execute or address the identified determinants of innovations in a developing country in way that they can be persuaded to adopt it.

Objective 4:

*to determine ways in which a developing country can adopt a Physical Address System.*

The interpretation of all the findings that was presented resulted the development of a theory of adoption of the Physical Address System at a country level. The developing country need to change its way of physically addressing land parcels to a best practice way that is new and relevant to its environment (Knight, 1967) by considering new core concepts of the developed Multi-dimensional framework in Figure 32.

The findings related to the embedded case units in a case study and findings related to the research questions (RQ 1, RQ 2 and RQ 3) were aggregated, consolidated, and refined. The findings produced the theoretical conjecture to show the social process of the adoption of the Physical Address System at a country level. The interpretations outlined that adoption of PAS is a multi-dimensional and multi-level phenomenon where stakeholders proceeded through a complex social decision making process. This persuaded stakeholders to reach the adoption outcome of the Physical Address System in a developing country perspective.

## 7.4 Evaluation of the social inquiry

Adoption of the Information Systems at country level has great challenges and due to level of analysis complexities and multi-dimensionalism. Following the interpretivist philosophy, a case study was employed as a research strategy, using Botswana as a developing country case. The research design included semi-structured interviews with stakeholders, observations, policy documents. The data was analysed, discussed, synthesised and interpreted using thematic framework analysis method. Informed by the empirical evidence and the existing literature, this thesis has shown that the adoption of the Physical Address System ought to be done sensitive to the developing country as a multi-dimensional social system. This multi-dimensional social system includes the roles of stakeholders, determinants of innovation and context.

The next sub-section discusses the evaluation of the practical and methodological contribution.

### 7.4.1 Evaluation of the Practical and Methodological Contribution

The interpretive research community has interest on IS scholarship to justify the appropriate methodological approach adopted in a particular research. Walsham and Sahay (1999), Locke (1993), Klein and Myers (1999), Lincoln (1995) and Tracy (2010) have published articles on intensive research on the criteria of excellent and the quality of qualitative research. What is outstanding on the articles was to state explicitly what was their criteria for practical and methodological appropriateness.

In case study approaches, literature has outlined that the scope in methodology sections in articles published in journals and books offer limited details on the decisions taken in particular studies (Yin 1989, 1993; Hamel, Dufour, and Fortin 1993; Stake 1995; Hartley 1994; Silverman, 2000; Pettigrew, 1990; 1992). The case study methodology differs with other qualitative research such as grounded theory and ethnography (Glaser and Strauss 1967; Strauss and Corbin 1990; Gioia and Chittipedd, 1991). Often, it has a provision to use theory or conceptual research framework that guides the research data collection and analysis. In contrast, the other two methodologies presuppose that theoretical perspectives are grounded in and emerge from the empirical data. This led to scholars such Hartley (1994) to argue that theoretical research frameworks are important because their absence in a study might lead to providing descriptions without meanings. In addition to that, Gummesson (1988) state that time might be wasted on obtaining basic information that could have been shaped by conceptual research framework.

#### *7.4.1.1 Why was case study a relevant approach to information systems research*

This section discusses the rationale behind choosing a case study as a strategy and research design. Case studies are often used as research strategy mostly in qualitative research studies compared to quantitative. Given the contextual nature of the case study because of its strength to addressing contemporary phenomena in real-life contexts. The following discusses the relevancy of case study to information systems research from the qualitative research approach.

The case study was used as the research strategy. This was important to investigating the Physical Address System in the social inquiry within its context rather than using a population sample which leads to generalisation but case study offers context-independent contribution. The focus was to understand stakeholders from the social context and their contextual reasoning from their lived experiences on physical addresses especially when the boundary between phenomenon and context is not clearly defined or evident.

Case study was also used as research design, data was collected using phenomenology method within a bounded case hence it is termed phenomenological case study (Miles and Huberman, 2004; Lee, 1999; Maxwell, 1996). The phenomenology case study approach brought to the fore lived experiences and perceptions of stakeholders from their own accounts as the adoption of the PAS was philosophically internalised within the developing country.

#### *7.4.1.2 What is the Research Theme, is it relevant to Information System?*

The thesis is about adoption of Information System at a country level. The concept of "adoption" research theme in organisations has been subject to different scholarships. Recently, the adoption theme has become questionable if it has an appropriate representation of the theoretical concepts.

There are continuing debates over various aspects of the theoretical concepts such as being its benefits to the organisation (Camison-Zornoza *et al.*, 2004), bringing new value proportion (Dervitsiotis, 2010), its implementation (Hobday, 2005; Klein and Knight, 2005), its intentionality (Lansisalmi *et al.,* 2006), its necessity and sufficiency (Pittaway *et al.,* 2004), and its diffusion (Holland, 1997) to qualify as organisation innovation. Amongst varied viewpoints about organisational innovation, this study exclude the innovation diffusion as it refers to a process taking place after innovation adoption has happened.

Information System literature outlines that IS researchers consider DoI Theory-determinants of innovations to be important in innovation adoption studies and have combined them with other contextual factors to provide a multi-dimensional frameworks, an approach similar to this research. Researchers like Chau and Tam (1997) combined innovation characteristics with external environmental and organisational characteristics to make explanations of organisation adoption of open systems. Other Scholars like Premkumar *et al.* (1997), looked at organisational and environmental characteristics combination with innovation characteristics to make assumptions and explanations of the organisation adoption of electronic data interchange. A combination of the Information System as an innovation, environmental, organisational and decision-maker characteristics by Thong (1999) was used to make explanations of IS adoption in Small Medium Business (SME). Grover (1993) research is aligned to this thesis because it makes explanations of organisation adoption decision of Customer-Based Inter-Organisational System (IOS), the researcher combined factors of IOS, organisation, environment, policy and Information System support from different theories.

The organisation innovation research theme is relevant to Information System. Thus, this study is not an exception, more efforts are required to integrate different theoretical perspectives to develop multiple dimensional, multi-levels and multiple theoretical innovation adoption frameworks at country level. The framework developed is grounded on its contexts at the country level point of view to add value because the theoretical lens still under-developed in Information System scholarship. This thesis adds to the efforts to contribute to the body of knowledge on the under-developed theory of organisation innovation.

#### *7.4.1.3 Where does the research purpose fit in the knowledge building process of qualitative research*

The purpose of the research was to explore and describe the adoption of a physical addressing system, in a developing country.

The research contributed to qualitative research studies towards understanding the social process as a way of exploring and describing the adoption of the Physical Address System at the developing country which was not understood. The stakeholders played a role in the process and outcome. The process had an effect, affect and affected by stakeholder roles as outlined by the empirical data analytical process and ultimately, reaching the collective decision making as an outcome. This is valuable to the adoption of the information systems knowledge building process.

#### *7.4.1.4 Is the Unit of Analysis and Site Selection most appropriate for the IS study*

The unit of analysis of this research is a developing country as organisation and the level of analysis is the government and private sector. Benbasat *et al.,* (1987) state that factors that dictate a case design also determine site selection. The author emphasise that site selection should be carefully thought out rather than being opportunistic. The nature of the topic is usually the determinant on the site selection. In this research, the topic is “A multi-dimensional framework for adopting Physical Address System in a developing country”. The topic articulates that the scope and the site selection of the research is the developing country that lacks a standardised and comprehensive Physical Address System.

Currently, stakeholders at Botswana do not have a common structuring of physical addresses and does not use postcodes as a best practice like other countries. The current situation has resulted to multiple unique numbers to be placed by stakeholders on one household door for service delivery purposes like water, power, telecommunication services and others. This does not only look tedious and less

attractive when different unique numbers are on a single door but the practice confuses the general public.

The research on organisation-level requires site selection based on the characteristics of organisations (Benbasat *et al.,* 1987). These may include the industry, company size, organisational structure, public or private ownership, geographic coverage and others. This research selected Botswana as the site because it lacks a standardised and comprehensive PAS. The empirical evidence was collected at the urban setting-Gaborone City. The country structure has the spatially distributed settlement patterns of the villages and rural areas, and farms and lands which are governed or administered at Ministry of Lands and Housing (MLH) and Ministry of Local Government and Rural Development (MLGRD). For the geographic coverage factor, all the Ministry Headquarters are based in the Capital City of Gaborone where data was collected which made it convenient for the researcher but this has been addressed as one of the limitation of the research. The research acknowledges that much richer observations and descriptions of authentic context could have unfolded at the other two settings of villages and rural areas, and farms and lands. However, information about their context is readily available at their representing Ministry Headquaters as stakeholders within Gaborone City at the Government enclave or precinct.

#### *7.4.1.5 Does the collected data capture the contextual complexity and support the research findings?*

The research strategy is case study and data collection employed phenomenological method. This study used thematic framework analysis method as a method to analyse data. Context is further addressed during the analysis and interpretation of case study empirical evidence, especially within-case analysis. This next section discusses whether the collected data captured the contextual complexity and whether it converged to support the research findings through the framework analysis method.

**Collected data capture the contextual complexity**

The research intended understanding the social process of introducing the Physical Address System at the developing country. The data capture was focused on the stakeholder roles, context and determinants of innovation. It was analysed and interpreted to conceptualise the Multi-dimensional framework. The research conducted face-to-face interviews on stakeholders and then used thematic framework analysis method.

The photographs were taken at the stakeholders site with consent and allowed the research to have much richer observation and descriptions of authentic events as they unfolded. The field notes were scripted of the sequence of the events that presented itself. The observations were conducted to understand the social process on how stakeholders go about their activities when using the current Physical Address System in an authentic setting of the contemporary phenomena bounded in real-life context.

*Framework Analysis method*

This study is one of few to use thematic framework analysis method on adoption of the information system studies. The research contributed methodologically to an evolving set of framework analysis guidelines and demonstrated how framework analysis was rigorously applied to the field of Information Systems study. The framework analysis method share insights that can be used by other scholars to understand the process of using framework analysis method to analyse data particularly when the study has a conceptual research framework.

*Reflection on the rigour of the research using Framework Analysis method*

The Framework Analysis method has been used successfully in research for over 25 years within qualitative health science research. The evaluation of quality of qualitative research has been highly debated by Walsham and Sahay (1999), Locke (1993), Klein and Myers (1999), Lincoln (1995) and Tracy (2010). For the framework Analysis method applicability on adoption of the information system studies. Its

stages ensure rigour and transparency in analytical process, which is very important because qualitative research is known by its complexity and abundance of large volumes of empirical data.

Rigor is judged by the care and practice of data collection and analysis procedure. There are many ways to conduct rigorousness of the study in the qualitative research. Strauss and Corbin (1990) state that in qualitative research, rigour is evaluated on the criteria of sample selection, contexts, documentation of the research process, triangulation of sources, sensitivity and reflexivity of the researcher and others. For the inquirer to persuade others that the findings of the study are worthy of paying attention, Lincoln and Guba (1985) emphasise trustworthiness in qualitative research. The trustworthiness is addressed by credibility, transferability, consistency and conformability. The views of Strauss and Corbin (1990) and Lincoln and Guba (1985) informs the approach for addressing rigor and relevance of this study.

For this study, the rigorousness of the study is aligned to Tracy (2010), the author state that rich rigor is generated through 1) theoretical conjecture, 2) date and time on the field, 3) data sources, 4) context and 5) samples. With combination of Tracy (2010) and, Srivastava *et al.,* (2009) for the framework analysis to be deemed appropriate, the following reasons for rigor were followed:

- In this study, semi-structured interviews, observation or field notes was the methods used collect empirical evidence from 11 participants labeled participants 1 - 11(Res 1- Res 11). Using the Framework Analysis method, the themes emerged both inductively from the lived experiences and perceptions accounts of participants. An appropriate sample size for a qualitative study most of the time is not defined but it should answer the research questions. Smith and Osborn (2003) point out that sample size depends on a number of factors and that there is no ‘right’ sample size. Enough information was gathered within the strata’s. This study conducted 11 semi-structured interviews and the saturation point was reached. This aspect addresses samples as articulated by Tracy (2010).
- The interviews were conducted around June and July 2016. The researcher travelled to Botswana to interview participants at selected stakeholder site.

After completing one interview, the researcher transcribed, reflected on the interview and updated the notes from the field while the sequence of the day events are still fresh the mind. This provided an opportune time to improve the interview strategy and technique towards the next participants for the next day. This aspect addresses date and time on the field, and context as mentioned by Tracy (2010).

- Primarily based on the observations and empirical evidence accounts of the participants. The first stage of Framework analysis method is called Familiarisation, this stage involves the researcher to be immersed in the empirical data and other materials that were useful to the study (Ritchie and Lewis, 2004). This addresses data sources, the next bullet points that follows describe the theoretical conjecture as outlined by Tracy (2010).
- The Framework analysis is dynamic, it allowed changes or additions or amendments throughout the analytical process. Coding and discussions stage required critical thinking by the researcher to analyse all the textual data that has been gathered from the Familiarisation (1$^{st}$ stage) and Identifying a thematic framework (2$^{nd}$ stage). The researcher needed to apply preliminary thoughts or comments on how participants responses or empirical evidence were coded, discussed the links between broader or sub-themes and themes, and also discussed the links between initial categories and initial themes (Ritchie and Lewis, 2003). This stage created the coding matrix table.
- The Framework Analysis method was systematic in that it allowed a methodological treatment of the empirical data. After categorisation matrix, the list of initial themes (with indexed number as per their tables) were grouped under higher order heading of refined categories (McCain, 1988; Burnard, 1991). Creating categories also provided means of describing the phenomenon, aided a transparent process and helped on the understanding of how to generate body of knowledge from real to abstract level (Cavanagh, 1997). The abstraction process continued as far as it was reasonable and possible, it depended on the aim of the study.
- Comprehensive in nature, Framework Analysis method allowed a full rather than partial or selective, review of the material collected as shown by the coding and discussions third stage.

- The access to original textual data or quotes demonstrates its transparency. This can allow readers of this research work or examiner to formulate judgments other than the researcher. (School of Nursing and Midwifery, 2002; Archer, et al., 2005; MORI Social Research Institute, 2003) as shown by the chatting stage.
- The Framework analysis method allowed within-case and between-case analysis, it enabled comparisons between and associations within case or cross case analysis to be made as outlined by the chatting stage.
- Finally, there was a clear audit trail from original raw data to the emerged core concepts, including the illustrative quotes at the last stage of mapping and interpretation of core concepts. The interpretation of core concepts was influenced by the research questions or themes as well as emerged final themes from the empirical evidence. The core concepts were discussed and interpreted, supplemented by triangulation method with participant's quotes, literature, observations, field notes, documents and others.

The next sub-section discusses the relevance of the Information System research.

## 7.5 Relevance of the IS Research

The Information System research has often been criticised by IS Scholars for lack of relevance. Benbasat and Zmud (1999) recommend how IS study can attain relevance that overshadows the contribution to knowledge. Table 26 outlines the basis for evaluating the relevance of this research and the research researcher viewpoints on literature, practical perspective and theoretically.

**Table 25: Dimension of Relevance (adapted from Benbasat and Zmud, 1999; Kekwaletswe, 2007)**

| Category | Dimension of relevancy | Description | Researcher Viewpoints |
|---|---|---|---|
| Thesis Content | Interesting | Does the research address problems that are of concern/ issues to IS professional? | Literature: The adoption of PAS as an information system at country level is still a burning issue because it is not well addressed in IS literature |
| | Current | Does the research focus on the current technologies and business issue? | Practical: This study is relevant as it may inform practitioners. The physical address system incorporate geo-information technologies, policies and standards and its important for mail/parcel deliveries, transport networks and locating households or empty land parcels. |
| | Applicable | Does the research produce knowledge and offer prescriptions that can be utilised by practitioners | Contextual: This study shows the unique context of a developing country at urban, village and rural areas, farms and lands |
| Thesis Style | Accessible | Can the research be understood (in terms of tone, style, structure and semantics) by IS professionals. It is written in a style that professionals would enjoy reading? | Theoretical: the adoption of Information Systems was all about understanding the psychological behaviour or intent of stakeholders on the adoption on physical address system as a social process, in a developing country. The theoretical and philosophical perspective is on what really exist at the developing country with regard to the PAS and what may persuade the stakeholders to adopt it. |

The next sub-section discusses Table 26 and the description column:

### 7.5.1 Is the thesis topic of Interest to practitioners, researchers and focused on current technologies?

This section is discussed from three aspects with regard to the Thesis topic being focused on current technologies, if the thesis topic interest practitioners and researchers and if the Thesis topic is worthy. The discussion that follows is articulating whether the Thesis topic is it topic focused on current technologies.

#### *7.5.1.1 Thesis topic focused on current technologies*

The adoption of Physical Address System as an information system at country level is still a burning issue because it is not well addressed in literature. There is a need to design a functional and comprehensive Physical Address Systems. The design should be benchmarked on a set of local standards at developing country supported by geo-information technologies, policies and standards, such as geographic information systems, information systems and spatial data infrastructures. The advent of current technologies make world to become more digitised, use real-time data on location based services about developing country geographies especially at the urban setting - cities. The Physical Address Systems can help to manage cities better and make cities smarter. Thus, the Physical Address System is part of the smart city initiatives.

As an example, towards the end of 2016, there was a call by the City of Johannesburg (CoJ) to find digital solutions to counter social challenges that exist around street addresses and locations of the City of Johannesburg (http://www.geojozi.joburg/). Although, the call dwelt more on the digital representative context as part of the PAS context, This brought the importance of street address because it informs the physical address users about the digital location features on the ground and answers the question: “Where?”, the question brings the Geographic Information Systems (GIS) as a critical discipline because it deals with a specific location or coordinates on earth. With this realisation, street addresses need to be accurate and available for City of Johannesburg (CoJ) to work

smartly, otherwise it can lead to serious social challenges. With this call, it attests that this topic is focused on current technologies but the people within the CoJ and the physical infrastructure plays a role within the notion of context awareness.

#### *7.5.1.2 Is the thesis topic interest practitioners and researchers*

Botswana is also currently implementing the Land Administration, Procedures, Capacity and Systems (LAPCAS) pilot project which started in 2009 in three settings, i.e. Block 7 and 8 as urban area, Tshane as village and rural area and Palapye as hybrid areas or semi-urban area. The LAPCAS Pilot Project has 7 components and one of them is named the Location Addressing. The LAPCAS Pilot Project analysis gave rich, in-depth and deep profound insights for this study on the attempts to implement the Physical Address System at the developing country. The pilot can be halted or be fully implemented by decision makers depending on its progress and other factors.

Lesson leant from the LAPCAS Pilot Project analysis was that stakeholder conflicts which could have been long been anticipated if stakeholder management principles were applied. Contingencies and interventions could have been made if proper management control was put in place and oversight committee established. As it stands, this hampered Pilot Project progress as legal matters are behind the Courts of Law. The pilot project has been delayed and millions of Pula's from taxpayer's money are lost due to the initial non-consideration of management control that emerged from this study as a whole. The Pilot Project was hindered by controversies and its life span is in doubt to see its full implementation all across the country. This might due to the fact that adoption phase of the LAPCAS Pilot Project was not executed properly but there are positive highlights of best practice attempts from the collected documents scope of the pilot project.

The study looked at informing practice and to add invaluable lessons from academic viewpoint at the developing country, if the Pilot Project is to be revived or lesson learnt to survive after courts interdicts, this Thesis is useful to decision makers. It also might help practitioners and researchers to be cognisant of the determinants of

innovation and other dimensions with regard to dealing with adoption of innovations at the country level. This research topic is worthy and of interest to practitioners and researchers on how the emerged new knowledge can help them to conceptualise their future studies. The developing country effort on providing physical addresses are part of the initiatives like “Addressing the unaddressed” by United Nation (go code, 2010) and "Addressing the world - An address for everyone" by the UPU (UPU, 2009) which is supported by United Nations agencies.

#### *7.5.1.3 Is the research topic worthy*

Worthy topics always emerged from disciplinary priorities and therefore are theoretically or conceptually compelling. This topic was motivated by the identified gaps in knowledge from the Literature. Organisation innovation concept is part of the efforts from different scholarships and often, contribute specific components and suggest different, inter-disciplinary, multiple competing perspectives because a general theory of organisation innovation still has not yet emerged.

However, worthy topics can also easily emanate from timely societal events. The physical address system has more significance to various stakeholders and the general public as it is absent in Botswana. Part of its ubiquitous use is unique identification for electricity meter, water meter, refuse collection, sewage and emergency services, land ownership in title deeds, mail/parcel deliveries and other service deliveries. Without a Physical Address System to identify a unique location in developing countries, its citizens will be affected. Tracy (2007) suggests that contextual proprieties are integral when developing a topic.

The current political climates or contemporary controversies also sparked the research topic. Botswana is going for the general elections in 2019, the LAPCAS Pilot Project was supposed to be completed few years back so that the location address component can be used in the prototype for Electronic Voting Machines anticipated to be used for Botswana 2019 General Elections. The machines are foreseen to play a part that requires the proof of a physical address, to avoid voters

trafficking on the voters roll as it need to be verified with the National Identity when casting a vote which is part of the Electoral Act.

### 7.5.2 Can the outcomes of the research be utilised by practitioners

This study is relevant as it may inform practitioners through its outcome. Practitioners can utilise the stakeholder map to priorities stakeholders through engagement interventions and influential strategies. The stakeholder map is an analytical tool that enabled the researcher to map stakeholders based on their power versus interest. There is a variance in the degree of influence toward the intent to adopt the Physical Address System amongst the group of stakeholders which were selected in this research. It was realised after analysing key stakeholders direct dependence on resources of others. The empirical evidence analysis for the stakeholder resource dependency based on the level of power versus interest matrix grid lead to map the stakeholders into categories or clusters, and each category has its engagement strategies. The outcome of stakeholder analysis process can be used in general to engage the PAS stakeholders for the LAPCAS pilot project at the developing country – Botswana. Stakeholders can be managed closely, keep satisfied, monitored and keep informed stakeholders that are relevant to the adoption of the Physical Address System.

The sections that can be utilised by practitioners are the emerged core concepts, the practitioners are cognisant of what need to be in place for the adoption of the physical address system. The GeoJozi challenge can look-up to the section of situating the research and digital representation solutions like Google Map, What3Words, MapCode and others. This might help and inform the GeoJozi challenge organisers that organisation innovation is not about technology which seeks to solve problems but there is context from people and physical world that need to be considered for PAS context awareness. Organisation innovation is a collaboration platform in a form of a social process to take advantage of vast skilled resources at disposal during stakeholders engagement.

### 7.5.3 Does the research produce knowledge and offer prescriptions that can be utilised by practitioners and academics

This study showed the unique context of a developing country, it produced new knowledge and offered prescriptions that can be utilised by practitioners and academics. The case study was used a strategy, it covered the contextual conditions deemed to have an impact on the phenomenon and also offered context-independent contribution for the developing country - Botswana. Botswana has settlement patterns of urban, villages and rural areas, and farms and lands, which is a unique context on its own rights compared to other countries.

### 7.5.4 Readability of the thesis: Is the thesis written in the style that can be understood by professional and academics?

This thesis is an academically written research work in terms of tone, style, structure and semantics that may be understood by both scholars and practitioners. The thesis, "A multi-dimensional framework for adopting Physical Address System in a developing country", was written in an English language and style meant to be understood by both an IS professionals and Social Science academics. The researcher has shown the ability to understand the research process and produced the research Chapters in a meaningful and simplified way which are introduced and summarised at the end, the summaries signified guide posts to the reader on what the Chapters were about and what next chapter entails. The research can be understood (in terms of tone, style, structure and semantics) by processionals and academics. It is written in a style that professionals would enjoy reading and understand.

Theoretically, the thesis conceptualised a multi-dimensional framework for the adoption of the Physical Address System at the developing country. At the end, objectives were revisited and reflected on the research process, overview of the research summarised, contributions outlined, and limitations of the study which

addressed the research recommendations were outlined. The study was concluded and references were stated in the evaluation of the research chapter.

The next section discusses the research contribution in terms of theoretical and contextual contribution for the adoption of the physical address system.

## 7.6 Research Contributions

Theoretical contribution is seen as academically implicative within the Information Systems scholarship and it extends, build, problematises current theoretical assumptions and critique disciplinary knowledge (Tracy, 1995, Tracy 2010). Theoretical contribution examines how the existing theory(s) or concepts of theoretical foundations were used to guide the study on data collection and analysis. The preceding sections of the chapter have discussed the rigor and relevancy of the study, practical and methodological contribution. In this section, the study argues that the findings make sense in a new way to adopt for the adoption of innovation at the country level and offers context-independent contribution to knowledge.

This section examines the emerged core concepts at the country level to extend, build and critique disciplinary knowledge of organisational innovation at the developing country context and its implications to theory. Tracy (2010) outlines that the contribution of the study need to be provided theoretically, practically, methodologically and heuristically as recommendations. Using the contribution aspects from Tracy (2010), practical and methodological contributions has been already been dwelt with from the previous sections and the next section tackle conceptual or theoretical contributions, limitations of the research which is then addressed heuristically or as recommendations for future research. Firstly, the discussion of theoretical contributions follows.

### 7.6.1 Theoretical Contribution

> *"Theories without data are empty; data without theories are blind." (Harrington, 2005)*

The above quote by Harrington (2005) suggests that with the absence of theory in a study, make the empirical evidence lacks "order, sense, and meaning". Aligning to this quote and highlighting how important the role that theory plays in the qualitative research studies. This study developed a conceptual research framework. Theoretical engagements from conceptual research framework helped the researcher to surmise and integrate prior theoretical issue or conceptual elements to guide the study. The data collection and analysis resulted to the developed theoretical conjucture of emerged new core concepts. The theoretical conjucture is a theory in a form of multi-dimensional framework for the adoption of the physical addressing system at the developing country.

Eisenhardt (1989) and Walsham (1995) state that when theory is used at the beginning, researchers need to be aware of the different roles the theory plays depending on the nature of the study as discussed by the conceptual research framework – revisited (Section 3.4). The researcher also ensured theoretical abstraction process was conducted, and then the interpretation of the emerged core concepts and reflection on the rigour of the research using thematic Framework Analysis method. This study is aligned to Tracy (2010) and Urquhart *et al.* (2010) with regard to theoretical contributions in qualitative research. The interpretation of findings and framework development chapter was critical on developing the Multi-dimensional framework (Figure 32).

This study went beyond the application of existing theory and exhibited data analysis, discussion and interpretation of the findings as new knowledge. A theory of adoption of information system at organisational level was developed through a framework. These contributions offered an understanding of the body of knowledge that emerged from the empirical data at the developing country on the organisation innovation.

The conceptualised a *multi-dimensional* framework helps to explain the social process in new and unique way from the new knowledge of core concepts at the

country level to understand the complexities of adopting an information system. This study builds on past research but provides new conceptual understandings that can be used by future researchers when adopting innovations at the country level. The research has theoretical significance on the organisational innovation phenomenon.

### 7.6.2 Providing rich insights

Providing rich insights to the scholarly community focused on ideas for improving scholastic researcher worldview on understanding nature of knowledge compared to the more fundamental challenge and the journey of obtaining the degree and becoming a “Dr”. In reality, the research is all about publishing to communicate the empirical studies with other scholars but it also depends on the researcher career path. Publishing shows that the researcher is actually knowledgeable or gained expect knowledge about their field. It also indicate that the researcher has the potential of advancing or contributing to the field of their scholarship in many ways.

The researcher presented papers (see Page *xi*) and shared knowledge about the phenomenon in the social inquiry to practitioners and academia through peer reviewed conference publications before and after enrolling for the degree in 2014 at the University of the Witwatersrand. The publications are Ditsela J, Coetzee S and Copper A.K, 2011 and Coetzee S, Cooper AK, and Ditsela J, 2011 as a necessary means of evaluating the PAS and also not only to confirm the validity and credibility of the research but also contributing rich insights.

The sub-section that follows is the limitations of the study surfaced from conducting the research process.

### 7.6.3 Limitations of the Research

The following section discussions were foreseen as the limitations of the study. This includes the Organisation Innovation phenomenon, data collection method and methodology at the developing country, resources, time constraints and the learning curve on the analytical process, resistance of participants. The multi-dimensional framework provided was not implemented.

The next section discusses the Organisation Innovation phenomenon.

#### *7.6.3.1 The Organisation Innovation phenomenon*

The concept of organisation innovation phenomenon is seen as new concept and literature articulate that the ability to innovate contributes to the success of an organisation performance. This requires organisations to allocate necessary resources in the collaborative platforms to create an organisational climate that allows and encourage innovative ideas. The phenomenon leads to an understanding on how simply the social process and collaboration of stakeholders with different roles can make organisations to innovate.

The challenge and limitations in the adoption of IS at organisational level has been the integration and clear understanding of the linkage between individuals and organisational level in the adoption of IS innovations (Jeyaraj et al., 2006; Gallivan, 2001). Previous IS studies has used the theories of innovation at the individual level to try to force the issue of adoption at the organisation level but there has been no conclusive evidence. Many developed frameworks articulate clear social process for the adoption of Information Systems but it is not known which one is the best in the theoretical and contextual resonance.

The capacity to innovate at a country level represents the capability to continuously contribute new knowledge and ideas, and theoretical implications from other theories. This study borrowed concepts across other disciplines to address the

organisation innovation as there was no general theory that existed, hence it is regarded as one of the limitations.

#### *7.6.3.2 Data collection method and Methodology at the developing country embedded units geographies*

The data collection method used for this study was phenomenology, it has limitation over the control of original accounts of stakeholder experiences and perceptions which occurred in the natural settings and it is extremely difficult to conduct validity and reliability similar to quantitative studies.

In this study, a case study was used as research strategy and research design. A case study is always not clear about the generality of its findings. A case study can be bracketed on the empirical evidence of one person, group, organisation, country or continent. The empirical evidence of the unit of analysis may or may not reflect the empirical evidence of similar entities. Case studies may be suggestive of what may be found in similar organisations, but additional research would be needed to verify whether findings from one study would generalise elsewhere and this is seen as a research limitation.

For this study, the research strategy was a bounded case of developing country context - Botswana. The settlement patterns of the country are urban, village and rural areas, and farms and lands settlements. Empirical evidence for the village and rural areas, and farms and lands settlements was collected from the Ministry of Lands and Housing and Ministry of Local Government and Rural Development that governed the two settlement patterns as shown by the permission on Appendix 2. The geographies of the two settlements are limitations to this study.

However, all the Ministry Headquarters are based in the Capital City - Gaborone where data was collected. The Ministries are referred as the Central Government and other is the Local Government which manages the Cities, Towns and District councils. Every decision or all national projects are initiated and implemented at the Central Government and later transferred to the Local government for operation and maintenance. The researcher used the opportunity offered by the proximity of the

geographic area to collect data at Gaborone City as all the contextual information was available from central and local government. Thus being said, the research acknowledges that much richer observations and descriptions of authentic context could have unfolded at the two geographically location rather at the Ministries.

#### *7.6.3.3 Resources, time constraints and the learning curve on the analytical process*

Without exception to other qualitative analysis methods, the Framework Analysis method is time consuming and resource-intensive. More time and logistical resources needs to be factored into the study from its inception.

There was a learning curve from the researcher to successfully use the framework analysis method. The researcher had to learn how to code, index, and chart data. The researcher had to think reflexively about how participant identities, perceptions and lived experiences affect the analysis process.

The process of learning is part of the research process, this study hope to have made a contribution to demystify the process of Framework Analysis method as complex. This study gives insights and recommendations to other social science researchers to consider Framework Analysis method which may be suitable to investigate phenomena within social inquiries, especially those within the IS scholarship or at developing countries.

#### *7.6.3.4 Resistance of participants*

Another problem encountered in this study was the refusal or selection to answer some part of the questions by one of the participant as shown in Appendix 6.2. The stakeholder did not feel comfortable to divulge the information of the roles they play within the developing country. The researcher has to observe the ethics protocol from the University of Witwatersrand and the Applied Research Office from Ministry of Local Government and Rural Development in Botswana. Even though insights

were gained from other security cluster stakeholder, the researcher accepted the reality on the ground and did not conduct the interview. This is regarded as a learning curve to encounter resistance, lesson learnt is seen as a contribution on gate keeping perspective when collecting empirical evidence. The lesson learnt was, whatever is planned on paper might not always manifest on the ground, the dynamics are different and it was a reality check.

#### *7.6.3.5 The multi-dimensional framework provided was not implemented*

The conceptualised multi-dimensional framework was not implemented and tested with the stakeholders at the developing country. The research contributed to qualitative research studies towards understanding the social process as a way of exploring the adoption of the Physical Address System at the developing country which was not known because the theory does not exist.

The stakeholders played a role in the process and outcome. The process had an effect, affect and affected by stakeholder roles as outlined by the analytical process complexities. Ultimately, stakeholders reached a collective decision making as an outcome where core concepts emerged during the research process.

The non-implementation of the multi-dimensional framework is seen as a limitation because often academia informs practices. It is always up the implementing bodies in the country where the innovation is going to manifest to consider the multi-dimensional framework or rather part of it.

### 7.6.4 Heuristic/Recommendations and Ideas for Further Research

For ideas of future research, the core concept themes as new knowledge about the adoption of the Physical Address System as an information system in the broader perspective presented in this study will assist future researchers. Their applicability in the practice still need to seen or tested if they can constitute to the organisation performance on the PAS use.

The contribution to knowledge presented here presents a coherent substantive theory of how practitioners working on Physical Address Systems should be cognisant dealing with this complex emergent social phenomenon. The following areas, topics and ideas for further research are recommended:

- The researchers can look into innovation diffusion which has been excluded from this study. Diffusion refers to a process taking place after organisation innovation has already occurred or after the stakeholder is persuaded to adopt the innovation. The innovation diffusion include *implementation phase* that ensures the innovation is in place after the innovation adoption decision has taken place and the *final stage of confirmation* according to Rogers (1983).
- Other researchers can undertake this study under the quantitative research approach to explain and describe the causal relationships of independent and dependent variables of the adoption of the physical address system at the country level.

The next section concludes of the research.

## 7.7 Conclusion of the research

The research has communicated and provided an understanding of the social process to persuade stakeholders to adopt the physical address system at the developing country. The research observed the transition of the innovation journey and understood it by way of interpreting the empirical evidence. Stakeholder's interrelationship and social interaction outlined their influence through resource dependencies on how they should be managed in the adoption the physical address system at the developing country.

The multi-level analysis at the developing country emerged as government, private sector and the general public. The general public emerged from the empirical data analysis process. The levels of the analysis process address the complexities of adopting an information system at the country level. The new knowledge of core-concepts emerged from analysing empirical evidence aligned to stakeholder roles, context, and the determinants of innovation as multi-dimensions.

The thesis conceptualised a multi-dimensional framework for the adoption of the Physical Address System in a developing country as an achieved goal of the research. The adoption of the innovation is a multi-level, multi-theoretical and multi-dimensional phenomenon that is aligned to a social process. This study outlined the interrelationships and social interactions of stakeholders who arrived at the collective decision making as an outcome. The framework uptake amongst the IS researcher and practitioner is not part of the scope of this study but rather to inform practice and add to the efforts to conceptualise theoretical frameworks of the organisation innovation as the theory does not yet exist

In this study, the new and less common used Framework Analysis method in IS studies was applied to uphold the quality of qualitative studies. The Framework Analysis method demonstrated both rich rigour and relevance of the research to put aside the arguable doubts that surround the qualitative research studies. For methodological contribution, the thesis followed an interpretive philosophy and a case study as appropriate for understanding the complexities of adopting an information system, employing a case. Practically, the thesis, through the framework,

may inform practitioners with ways to adopt a physical address system. Contextually, the thesis gives insight into the uniqueness of a developing country adopting an information system at urban, villages and rural areas, and farms and lands. The evaluation of the research was conducted in this chapter to conclude the research process that was conducted.

Rather than at the beginning of thesis, the Thesis ends with this quote, to stimulate more thoughts about the adoption of the Physical Address System as an Information System for other scholars to tackle societal grand challenges at the developing countries rather than looking at smart cities initiatives that are mostly seen at developed countries.

> *"Four billion people are excluded from the rule of law, as the lack of a legal identity often prevents them from enjoying their rights as citizens. Setting up an addressing system is the first step towards tackling that issue."* (Commission on Legal Empowerment of the Poor, United Nations Development Programme)

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# Appendices

Appendix 1: Letter of approval from the University of Witwatersrand.

Appendix 2: Letter of approval from Ministry of Local Government and Rural Government to conduct research in Botswana.

Appendix 3: Interview Recording Consent Form

Appendix 4: Participant Information Letter

Appendix 5: Stakeholder email sent to request permission to conduct interview.

Appendix 6: Letter of Approvals from Stakeholders

Appendix 7: Interview Questions

Appendix 8: Responses to Interview Questions

## 9.1 Appendix 1: Letter of approval from the University of Witwatersrand.

Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R14/49 Ditsela

| | |
|---|---|
| **CLEARANCE CERTIFICATE** | **PROTOCOL NUMBER: H16/05/44** |
| **PROJECT TITLE** | A multi-dimensional framework for adopting Physical Addressing System in a developing country |
| **INVESTIGATOR(S)** | Mr J Ditsela |
| **SCHOOL/DEPARTMENT** | Economics and Business Science/ |
| **DATE CONSIDERED** | 20 May 2016 |
| **DECISION OF THE COMMITTEE** | Approved unconditionally |
| **EXPIRY DATE** | 04 August 2019 |

**DATE** 05 August 2016 **CHAIRPERSON** J. Knight
(Professor J Knight)

cc: Supervisor : Professor R Kekwaletswe

**DECLARATION OF INVESTIGATOR(S)**

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10005, 10th Floor, Senate House, University.

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to completion of a yearly progress report.**

Signature Date

**PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES**

## 9.2 Appendix 2: Letter of approval from Ministry of Local Government and Rural Development (MLGRD) to conduct research in Botswana.

TELEGRAMS: MERAFE
Telephone: 3658400
Fax: 3902263/1559

REPUBLIC OF BOTSWANA

Ministry of Local Government
& Rural Development
Private Bag 006
Gaborone
Botswana

Ref Number CLG 4/14/3/1 I (44)

July 22, 2016.

Mr. Jeofrey Dlsela
University of the Witwatersrand
Private Bag 3
Johannesburg

Dear Sir,

**RE: RESEARCH PERMIT**

This serves to acknowledge your application for a research permit in order to carry out a study entitled "**A multi-dimensional framework for adopting Physical Addressing System in a developing country".**

We are pleased to grant you the permit. This permit is valid for a period of three (3) months – commencing on 25 July 2016 to 25 October 2016. and it is granted subject to the following conditions:

1. Copies of the final product of the study are to be directly deposited with the Ministry of Local Government, National Archives and Record Services and WITS University Library.
2. The permit does not give you authority to enter any premises, private establishment or protected areas. Permission for such entry should be negotiated with those concerned.
3. You conduct your study according to particulars furnished in application you submitted taking into account the above conditions.
4. Failure to comply with any of the above stipulated conditions will result in the immediate cancellation of the permit.

Yours Faithfully,

Shephera Monyeki

.....
For Permanent Secretary- MLG

cc: PS, Ministry of Finance and Development Planning
PS, Ministry of Labor and Home Affairs
PS, Ministry of Youth, Sports and Culture
Director, National Archives and Records Services
Director, National Library Service
Director, Research and Development, University of Botswana

## 9.3 Appendix 3: Interview Recording Consent Form




Title of research project: **A multi-dimensional framework for adopting Physical Address System in a developing country**.

Dear Participant

You are herewith invited to participate in an academic research for the degree purposes conducted by Mr. Jeofrey Ditsela, Telephone: +27731585795, Email: jeffy.ditsela@gmail.com or 987271@students.wits.ac.za. A PhD student in the Information Systems Division at the University of the Witwatersrand, Johannesburg.
The purpose of this study was to explore and describe the adoption of a physical addressing system, in a developing country.

**I acknowledge the following:**

- I agree to participate in this research project and that the participation is voluntary and that there will be no gain whatsoever from the participating in the study.
- I agree that the interview will be recorded for the purpose of capturing information accurately and agree that direct quotes can be used in the final write-up of the research. Yes ☐ / No ☐
- I have read this consent form and the information it contains and had the opportunity to ask questions about them.
- I agree to my responses being used for education and research on condition that my privacy is respected, subject to the following:
  - I understand that my personal details will not be included in the study.
  - I understand that I am under no obligation to take part in this project.
  - I understand I have the right to withdraw from this interview at any stage or not to answer a question without negative consequences.

Signature of Participant:

Date:

## 9.4 Appendix 4: Participant Information Letter




Receive address:

Date:

Dear Prospective Participant

My name is Jeofrey Ditsela and I am a PhD student in the Information Systems department at the University of the Witwatersrand, Johannesburg. I am conducting research on **A multi-dimensional framework for adopting Physical Address System in a developing country.**

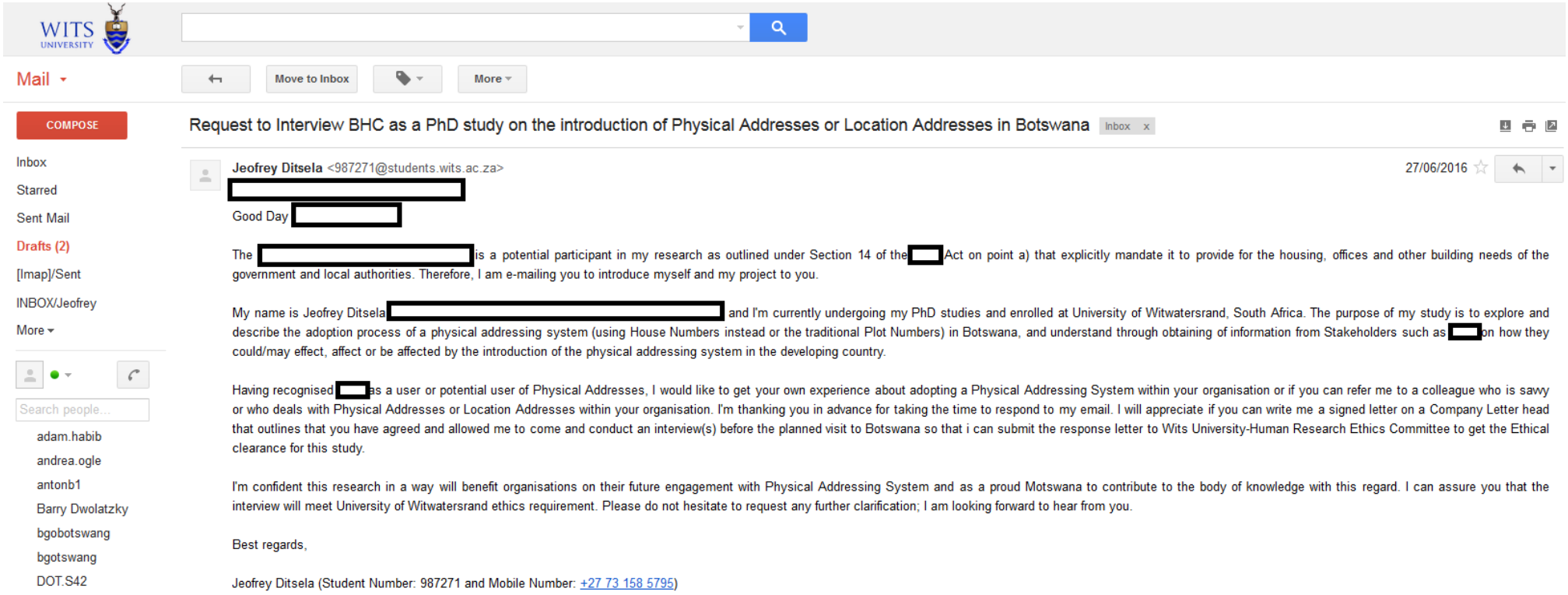
The researcher would appreciate if you can take some time to complete the following interview questions which will help the furtherance of this research. Your response is important and there are no right or wrong answers. The interview is both confidential and anonymous. Anonymity and confidentiality are guaranteed as there is no need to reveal names or other identity related information. Your participation is completely voluntary and involves no risk, penalty, or loss of benefits whether or not you participate and that there will be no gain whatsoever from the participating in the study. You may withdraw from the interview at any stage or not to answer a question without negative consequences. The interview should take about 30-45 minutes. Hard copies of your answers will be stored by the researcher for a period of 5 years in a locked cupboard/filing cabinet at the University for future research or academic purposes; electronic information will be stored on a password protected computer.

Thank you for considering participating in this study. Should you have any questions, or should you wish to obtain a copy of the results of the interview, please contact me at jeffy.ditsela@gmail.com or 987271@students.wits.ac.za or +27 73 158 5795 or My supervisor's Prof. Ray Kekwaletswe – ray.kekwaletswe@wits.ac.za or +27 82 685 2903.

Kinds and regards,

Jeofrey Ditsela (Student Number: 987271

## 9.5 Appendix 5: Stakeholder email sent to request permission to conduct interview.



WITS UNIVERSITY

Mail

Move to Inbox | More

COMPOSE

Inbox
Starred
Sent Mail
Drafts (2)
[Imap]/Sent
INBOX/Jeofrey
More

Search people...
adam.habib
andrea.ogle
antonb1
Barry Dwolatzky
bgobotswang
bgotswang
DOT.S42

**Request to Interview BHC as a PhD study on the introduction of Physical Addresses or Location Addresses in Botswana** Inbox x

**Jeofrey Ditsela** <987271@students.wits.ac.za> 27/06/2016

[redacted]

Good Day [redacted]

The [redacted] is a potential participant in my research as outlined under Section 14 of the [redacted] Act on point a) that explicitly mandate it to provide for the housing, offices and other building needs of the government and local authorities. Therefore, I am e-mailing you to introduce myself and my project to you.

My name is Jeofrey Ditsela [redacted] and I'm currently undergoing my PhD studies and enrolled at University of Witwatersrand, South Africa. The purpose of my study is to explore and describe the adoption process of a physical addressing system (using House Numbers instead or the traditional Plot Numbers) in Botswana, and understand through obtaining of information from Stakeholders such as [redacted] on how they could/may effect, affect or be affected by the introduction of the physical addressing system in the developing country.

Having recognised [redacted] as a user or potential user of Physical Addresses, I would like to get your own experience about adopting a Physical Addressing System within your organisation or if you can refer me to a colleague who is savvy or who deals with Physical Addresses or Location Addresses within your organisation. I'm thanking you in advance for taking the time to respond to my email. I will appreciate if you can write me a signed letter on a Company Letter head that outlines that you have agreed and allowed me to come and conduct an interview(s) before the planned visit to Botswana so that i can submit the response letter to Wits University-Human Research Ethics Committee to get the Ethical clearance for this study.

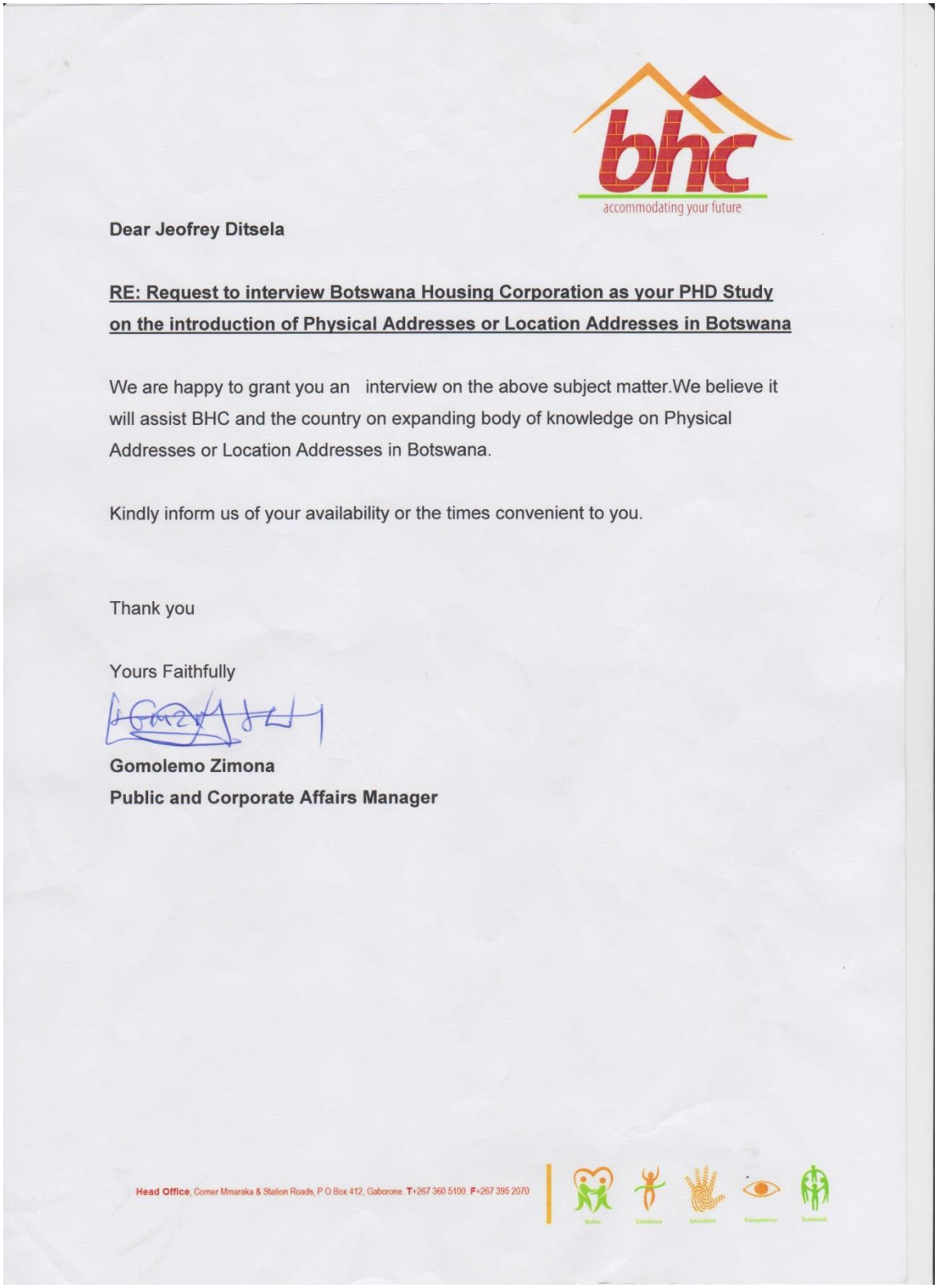
I'm confident this research in a way will benefit organisations on their future engagement with Physical Addressing System and as a proud Motswana to contribute to the body of knowledge with this regard. I can assure you that the interview will meet University of Witwatersrand ethics requirement. Please do not hesitate to request any further clarification; I am looking forward to hear from you.

Best regards,

Jeofrey Ditsela (Student Number: 987271 and Mobile Number: +27 73 158 5795)

## 9.6 Appendix 6: Letter of Approvals from Stakeholders

### 9.6.1 Appendix 6.1: Letter of Approval from BHC



bhc
accommodating your future

**Dear Jeofrey Ditsela**

**RE: Request to interview Botswana Housing Corporation as your PHD Study on the introduction of Physical Addresses or Location Addresses in Botswana**

We are happy to grant you an interview on the above subject matter.We believe it will assist BHC and the country on expanding body of knowledge on Physical Addresses or Location Addresses in Botswana.

Kindly inform us of your availability or the times convenient to you.

Thank you

Yours Faithfully

**Gomolemo Zimona**
**Public and Corporate Affairs Manager**

**Head Office**, Corner Mmaraka & Station Roads, P O Box 412, Gaborone. **T**+267 360 5100 **F**+267 395 2070

## 9.6.2 Appendix 6.2: Letter of Approval from Botswana Police Service

**Telephone:** (267) 3951161
**Telegrams:** COMPOL
**Fax:** (267) 3973723 (General)
(267) 3957386 (Direct)

**Commissioner of Police**
Private Bag 0012
Gaborone
Botswana

**REF:** Pol. 39/13/3 IV (70)

21st July 2016

Mr. Jeofrey Ditsela
P O Box 505061
Gaborone

Dear Jeofrey,

**RE: REQUEST FOR INFORMATION ON PHYSICAL ADDRESSING SYSTEM**

Reference is made to your letter through which you requested for information pertinent to the above captioned matter.

2. Kindly be informed that, we are so much willing to assist you regarding your pursuit of the above mentioned topic of study. However, while we perused through your questionnaire, it emerged that you have integrated issues of Physical Addressing System of which we do not have any problems with, and those concerning the Botswana Police Service's confidential information such as its operational duties or mandate.

2. We are therefore constrained to grant you permission to undertake the interview unless you restrict yourself to the Physical Addressing System issue.

3. We hope you find this in order.

Yours faithfully,

**S. Mantswe**
For/Commissioner of Police

Botswana Police Service Headquarters
Date Despatched
22 JUL 2016
P/Bag 0012
Gaborone
Tel: 3622360 Fax: 3914012

## 9.6.3 Appendix 6.3: Letter of Approval from Botswana Post

BotswanaPost

*We deliver, whatever wherever*

Dear Jeofrey Ditsela

RE: Request to Interview Botswana Post as part of PhD study on the introduction of Physical Addresses or Location Addresses in Botswana

With reference to the above-mentioned subject, we would like to inform you that we will be happy to grant you such an interview.

The Addressing project is a flagship which BotswanaPost holds in high regard; therefore it pleases us to see external parties, especially academics, showing keen interest in these developments.

We will await your confirmation as to when you will avail yourself. The Project Manager is Pearl Ntlotlang and she will be the one meeting with you.

Yours sincerely,

Mompati Christos

For/Chief Executive Officer

All correspondence must be addressed to the Chief Executive.
BotswanaPost, Khama Crescent, Plot 50950
P.O. Box 100 Gaborone, Botswana. Tel: (+267) 395 3131, Fax: (+267) 397 3909

## 9.6.4 Appendix 6.4: Letter of Approval from Debonairs Pizza



DEBONAIRS PIZZA
EVERYBODY TUCK IN

Plot 64 Unit 3 Gaborone International Commerce Park

Suite 289, Postnet Kgale Mall, P/Bag 149, Gaborone

Tel: 390-5024 FaxL 393-7772 Email:debmain@retailgroup.co.bw

Dear. Jeofrey Ditsela.

***Re: Request to interview Debonairs Pizza as part of PhD study on the introduction of Physical Addresses or Location Addresses in Botswana***

As per the above Reference with regard to the PhD Study on the introduction of Physical Addresses or Location Addresses in Botswana, we are happy to grant you permission to interview one of our experienced driver or motor biker as they are the ones doing deliveries of pizza.

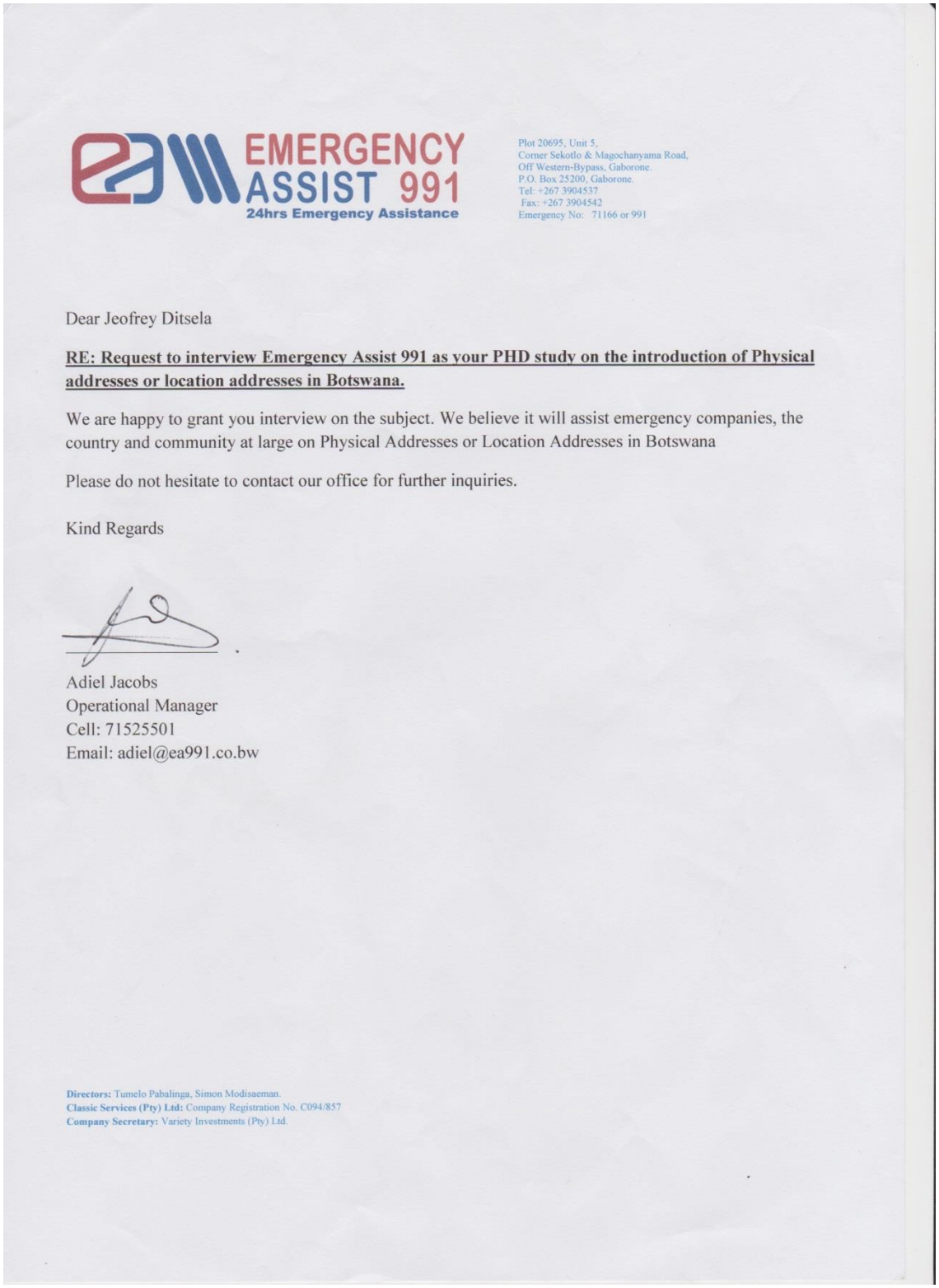
We hope our information will be resourceful to the furtherance of your research.

Regards,

Tumi

Morning Shift Supervisor

## 9.6.5 Appendix 6.5: Letter of Approval from Emergency Assit 991



EMERGENCY ASSIST 991
24hrs Emergency Assistance

Plot 20695, Unit 5,
Corner Sekotlo & Magochanyama Road,
Off Western-Bypass, Gaborone.
P.O. Box 25200, Gaborone.
Tel: +267 3904537
Fax: +267 3904542
Emergency No: 71166 or 991

Dear Jeofrey Ditsela

**RE: Request to interview Emergency Assist 991 as your PHD study on the introduction of Physical addresses or location addresses in Botswana.**

We are happy to grant you interview on the subject. We believe it will assist emergency companies, the country and community at large on Physical Addresses or Location Addresses in Botswana

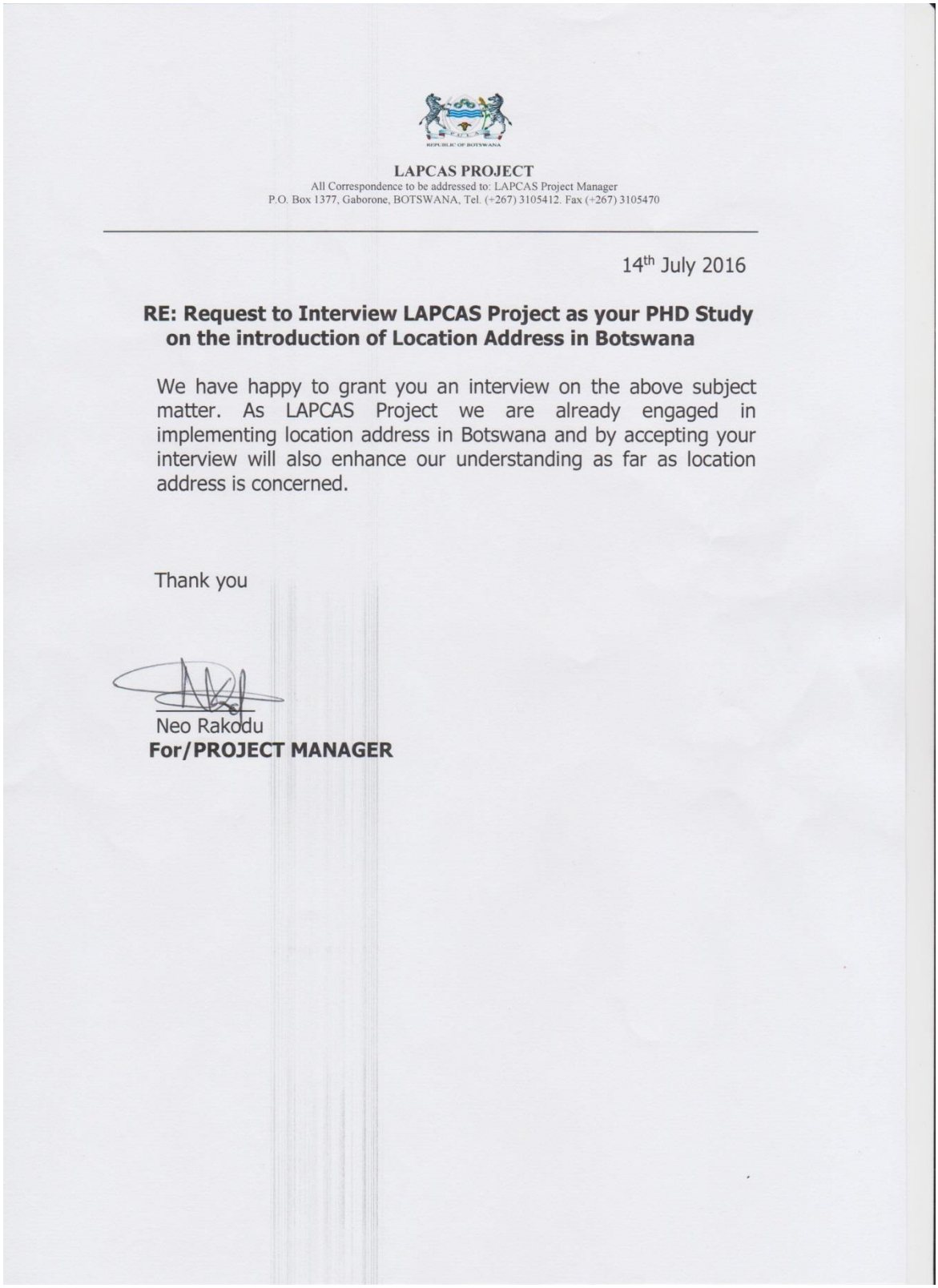
Please do not hesitate to contact our office for further inquiries.

Kind Regards

Adiel Jacobs
Operational Manager
Cell: 71525501
Email: adiel@ea991.co.bw

**Directors:** Tumelo Pabalinga, Simon Modisaeman.
**Classic Services (Pty) Ltd:** Company Registration No. C094/857
**Company Secretary:** Variety Investments (Pty) Ltd.

## 9.6.6 Appendix 6.6: Letter of Approval from LAPCAS Pilot Project



REPUBLIC OF BOTSWANA

**LAPCAS PROJECT**

All Correspondence to be addressed to: LAPCAS Project Manager
P.O. Box 1377, Gaborone, BOTSWANA, Tel. (+267) 3105412. Fax (+267) 3105470

14th July 2016

**RE: Request to Interview LAPCAS Project as your PHD Study on the introduction of Location Address in Botswana**

We have happy to grant you an interview on the above subject matter. As LAPCAS Project we are already engaged in implementing location address in Botswana and by accepting your interview will also enhance our understanding as far as location address is concerned.

Thank you

Neo Rakodu
**For/PROJECT MANAGER**

## 9.6.7 Appendix 6.7: Letter of Approval from NOA Survey Consulting Pty Ltd

**NOA Survey Consultants (PTY) LTD**

Cadastral, Topographic, Engineering and Sectional Title Surveyors
P.O. Box 10126 Gaborone
Plot 2419, Corner of North Ring Road and Buffalo Crescent Gaborone
Email: noasurvey2012@gmail.com Cell 73527202

VAT REGISTRATION: C28783401113

Mr. Jeofrey Ditsela

University of Witwatersrand,

South Africa.

REQUEST FOR INTERVIEW
OF
NOA SURVEY CONSULTANTS
ON
LOCATION ADDRESS SYTEM IN BOTSWANA

Thank you for having interest in acquiring information from our company. I can avail myself for the interview.

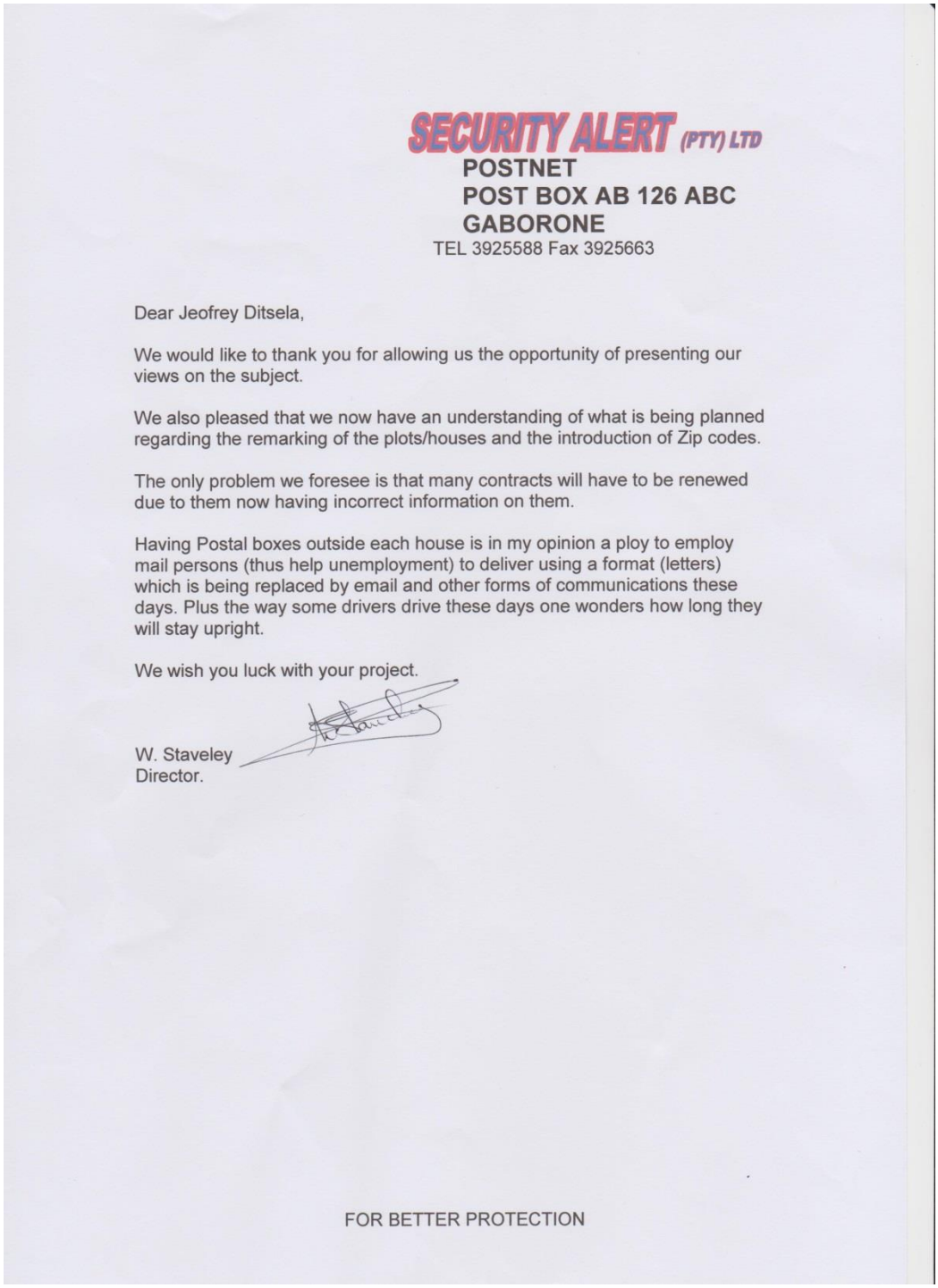
Once in Gaborone, you can contact me at our office number 73527202 or directly at 72948876.

Thank you.

Yours faithfully

Njabulo Ziga

## 9.6.8 Appendix 6.8: Letter of Approval from Security Alert Pty Ltd



SECURITY ALERT (PTY) LTD
POSTNET
POST BOX AB 126 ABC
GABORONE
TEL 3925588 Fax 3925663

Dear Jeofrey Ditsela,

We would like to thank you for allowing us the opportunity of presenting our views on the subject.

We also pleased that we now have an understanding of what is being planned regarding the remarking of the plots/houses and the introduction of Zip codes.

The only problem we foresee is that many contracts will have to be renewed due to them now having incorrect information on them.

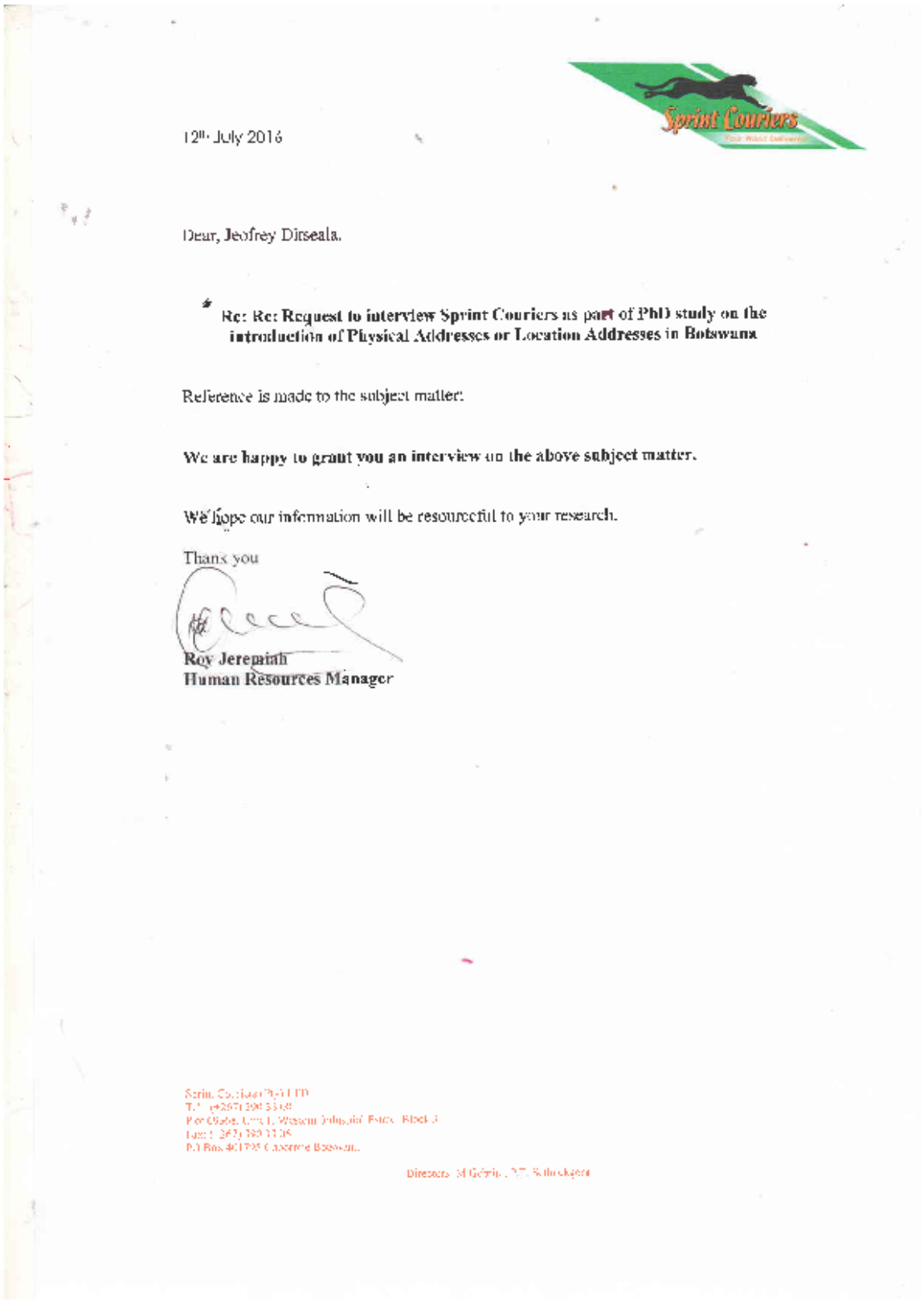
Having Postal boxes outside each house is in my opinion a ploy to employ mail persons (thus help unemployment) to deliver using a format (letters) which is being replaced by email and other forms of communications these days. Plus the way some drivers drive these days one wonders how long they will stay upright.

We wish you luck with your project.

W. Staveley
Director.

FOR BETTER PROTECTION

## 9.6.9 Appendix 6.9: Letter of Approval from Sprint Couriers



12th July 2016

Dear, Jeofrey Ditseala.

**Re: Re: Request to interview Sprint Couriers as part of PhD study on the introduction of Physical Addresses or Location Addresses in Botswana**

Reference is made to the subject matter.

**We are happy to grant you an interview on the above subject matter.**

We hope our information will be resourceful to your research.

Thanks you

**Roy Jeremiah**
**Human Resources Manager**

Sprint Couriers (Pty) LTD
T: (+267) 390 5368
Plot Globe, Unit 1, Western Industrial Estate, Block 3
Fax: (+267) 390 5326
P.O Box 401795 Gaborone Botswana

Directors: M Gebrie, J.T. Schuckgard

## 9.7 Appendix 7: Sample Interview Questions

***Stakeholder Analysis***

***Identifying stakeholders and their stake/claims/ roles***

***1. What is the mandate or role for your Ministry/Department/Unit/Institution?***

***2. How do you carry out your mandate or role, is there any a policy or acts you comply with?***

***Stakeholder Classification***

***3. What makes your department relevant to carry out the prescribed mandate or roles?***

***Stakeholder relationships and engagement***

***4. To what extent is your department/ministry processes, task, and operation dependent on other departments/ministries/units/private entities?***

***5. How do you engage each other as stakeholders, is there any institutional initiative? (i.e Lekgotla, Pitso, Task team, Ministerial Cluster Committee e.t.c)***

***Priorities the stakeholders***

***6. From your point of view, who do you think is important to be part of the stakeholders? How are they selected?***

***7. In your views, who do think will adversely affect the process of engagement if not part of it?***

***Determinant of Innovation***

***Prior Conditions (Previous practice and Norms of the social systems)***

***8. Please tell me your physical address or locational address where are having this interview?***

***Compatibility***

***9. Is the current way of physically locating residences, land parcels or places of interest working, how is working well or not working well for your organisation?***

***Perceived Easiness***

***10. How easy is your organisation currently finding their assets, land parcels, places of interest within the country?***

***Perceived Advantage and PAS Outcome***

***11 Finally, If the physical addressing or location addressing is introduced, would your organisation adopt it to be in place in Botswana (Yes or No), please give a reason(s)?***

***Context***

***Tool-in-Context***

***12. Please share with me your understanding of physical addresses or location address.***

***Developing country context***

***13. In your opinion, do you think is easy or difficult to find a location at 1) urban areas,2) villages and rural areas and 3) farms and lands as a Botswana cultural social setting, please explain why?***

***Digital representation context***

***14. In your experience, how easy is to go around using a gadget with a navigation capability?***

***Physical world context***

***15. In your view, can I find your organization assets, land parcels, places of interest, on my own without assistance given the GPS coordinates?***

***People context***

***16. What is your take on this, does being given directions for a particular location by someone or using local knowledge easier to find a residence, a land parcel or a place of interest***

## 9.8 Appendix 8: Sub-Theme coding matrix table and Categorisation matrix of initial emerged themes

### 9.8.1 Appendix 8.1: Data analysis and presentation of Research Objective 1

**Research Objective 1**

to identify potential stakeholders and describe the stakeholder's roles and relationships that might influence the adoption of a Physical Address System

**Table 26: Stakeholder Classification coding matrix table**

| **Broader Codes** | Stakeholder Classification | | |
|---|---|---|---|
| **Interview Question (IQ)** | IQ13: What makes your department or institution relevant to carry out the prescribed mandate\role? | | |
| **Responses (Res) or Experiences** | **Fine Descriptive Codes** | **Researcher's Preliminary thoughts or Notes (What is this about?)** | **Initial Categories** |
| Res 1:<br>It's because of the ***experience*** we have as an organization, we have more than ***45 years of experience*** in this industry<br><br>We have the ***capacity*** and know exactly ***what is happening***, ***we know how to go about it*** and we believe we have the ***relevant expertise*** in executing our mandate.<br><br>Res 2:<br>We are ***different from other competitors*** because ***we deliver to the door steps of customers*** at the ***physical addresses***. ***Delivering pizza at the door steps is convenient*** in some way because **customer can utilize the** | 45 Years of experience playing the role in this industry.<br><br>Capacity and relevant expertise. | Year's Experience.<br><br>Knowledgeable of the in's and out in the industry. | Experienced player of the industry.<br><br>Knowledge driven and capacitated. |

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| **time to do other things** when ***they were supposed to drive to the store in a busy traffic***.<br><br>Res 3:<br>We are the ***only Department delegated to deal with land issues in Botswana.*** We are ***the only department licensed to do mapping***, ***surveying*** and ***dissemination of land information in that regard in Botswana***.<br><br>Res 4:<br>Can I point out the ***different first between us and the Government emergency services*** for our relevancy, ***the government will tell you about demarcation and jurisdiction*** and ***they cannot go there***, you ***better go to the nearest clinic***. EA 911 ***goes everywhere*** around the country ***irrespective of the jurisdiction***.<br>"QUOTE"<br><br>Res 5:<br>You will ***need someone more knowledge on roads aspect*** and that why we are relevant institution to ***maintain, naming and put up signage*** because ***we are under the MLGRD***. We also ***competent and we had the capacity.***<br><br>We follow the ***standards from ISO and BOBS for compliance***. It also goes to the materials that are being used to put us the signage, they are prescribed in the standards which we follow.<br><br>Res 6:<br>The ***LAPCAS project was ongoing before MTC (Addressing Botswana Project)***, that came at the time when the ***Country was going on recession around 2009***, so ***new project were not being financed by the government,*** that also made ***things easier*** (for the project to be on our | Door step delivery is convenient delivery and time saving.<br><br>Only delegated department for the land issue responsibility the only licensed.<br><br>Government restricted to services areas.<br><br>Knowledgeable on roads networks. Maintain signage and naming rights because of our competent and capacity.<br><br>Our work is aligned to standards with regards to the street signage materials.<br><br>Multiple attempts of conceptualizing Physical | Door-to-door delivery.<br><br>Custodian for land related issues.<br><br>Demarcation and jurisdiction free.<br><br>Knowledgeable of roads networks and responsible for operation and maintenance of signage and street naming.<br>Follow the International and local standards. | We differ because of door step delivery.<br><br>Custodian of land data the only licensed. Department in Botswana.<br><br>Deliver Services country wide.<br><br>Knowledgeable on maintaining signage and street naming.<br><br>Standards conformance and compliant. |

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| side) ***administer LAPCAS***.<br><br>So, ***through the collaboration, we said OK, we will work together to come up with the structures***, to see that ***they benefit both of us and*** moving forward by doing the ***pilots and implementation***,<br><br>So ***during implementation of the pilot, we could see that we are different Stakeholders,*** so each institution has to play their role.<br><br>Res 7:<br>The surveys that we do as NOA Consulting Pty Ltd, its mainly ***deals with sub-divisions of land,*** if we have a ***big piece of land which might be 1 hectare*** and you ***want to turn it into residential plots***, this means ***that you have to survey smaller pieces ranging from 4-1000 square meters***<br><br>The procedure is that the ***owners of land*** who wish ***to sub-divide*** has to ***first seeks permission to sub-divide*** such a land by coming up with ***a plan which has to be submitted to a City Council*** or ***the Local Authority for their intent*** on how they want ***to sub-divide their land***.<br><br>Res 8:<br>I stand to be correct, its the organisation that we are or ***our reputation*** in the postal industry and because we are ***100% government owned***, so for that ***might be the reason***. I take it that's why we are relevant and ***given that preference***. It's a ***privilege*** and they always ***make it clear that they are not obligated to give us that status of Designated Postal Operator (DPO***), and they ***can always take it away as they are other players*** in the space of ***postal operation***.<br>Res 9:<br>We don't provide security guards like G4S and Security Systems in Botswana. As Security Alert, we ***concentrate on innovative technology***, we ***focus one thing and we do it well***. | Address System. There was LAPCAS launched first by MLH then Addressing Botswana second by MTC Due to recession in 2009, projects were prioritized and LAPCAS was one of them. The MLH administer LAPCAS and we have done stakeholder's engagement for mutual benefits.<br><br>LAPCAS Pilots with various stakeholder involvements.<br><br>Survey small scale jobs for Individuals.<br><br>Our known reputation and its DPO status because of being 100% government owned. | Physical addressing (LAPCAS) ideation but constrained by budget.<br><br>Promoting SMME through sub-contracting. | Innovation Ideation dependent on budget.<br><br>SMME Partnerships with Government |

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| Res 10:<br>Our ***strategic positioning of our branches***. We can ***easily network***, like our ***services now become easily accessible***.<br><br>Res 11:<br>Our part as University of Botswana, we were coming from ***capacity building side of things***, of course ***we had a Memorandum of Understand (MoU) with the Ministry of Lands and Housing***.<br><br>I have ***trained quite a number of people***, say ***close 650 personnel from the Ministry***. I ***designed those short courses and actually running them***, I have also ***designed certificate courses and long term courses*** such as the ***Degree and Diploma in Land Management which incorporate LAPCAS components ideology***. | Don't use security guards like other companies but what differentiates us is the use of innovative technology.<br><br>Branch strategic positioning and services easily accessible.<br><br>Capacity building through course to employees of MLH that we have put Memorandum of Understanding to incorporate LAPCAS components ideation. | Advantage of being under government compared to others who doesn't have DPO status.<br><br>Security company that is innovative technology driven.<br><br>Strategic Positioning to access services.<br><br>Skills development and have MoU with MLH aligned to LAPCAS objectives. | Because of institutional arrangements for regulations and legislations.<br><br>Innovation technology driven<br><br>Because of key turnaround strategic<br><br>Reputable skills development and training. |

**Table 27: Stakeholder relationships and engagement index 1 table**

| **Broad Codes** | Stakeholder relationships and engagement 1 | | |
|---|---|---|---|
| **Interview Question (IQ)** | IQ14: To what extent is your department/institution processes, task, and operation dependent on other entities? | | |
| **Responses (Res) or Experiences** | **Fine Descriptive Codes** | **Researcher's Preliminary thoughts or Notes (what is this about?)** | **Initial Categories** |
| Res 1:<br>We subscribe to the ***Ministry of Lands and Housing***, there is ***forum*** that brings us together to discuss issues pertaining to ***development***, ***planning, land issues*** and we know exactly what is happening ***where*** and ***how as*** we engage.<br><br>The MLH will ***allocate us land*** to go and ***build*** or ***set-up an Estate in certain area***. We have somebody responsible of ***Land acquisition***, we are able to tell what kind of a land is this, whether is ***State Land***, ***Residential***, or ***other types***.<br><br>Through the forum, we ***share the ideas***, ***share skills***, we ***share experiences*****,** and ***information*** where we seat together and there are presentations. With this presentation from different stakeholders (Real Estate Institute of Botswana (***REIB***),Real Estate Institute Advisory Council(***REIAC***), ***Permanent Secretaries***, ***BHC***, ***MLH***, ***Land Information System***, ***Land Boards*** and ***Work Improvement Teams***), we are able to know what's happening and informed as BHC.<br><br>In addition to the forum, we organized a ***Conference*** on affordable housing in 2015. We brought together a lot of stakeholders such as ***Water Utilities***, ***Botswana Power Corporation (BPC)*** and others so that we can go together and appreciate their ***strategies going forward***.<br><br>We also invited ***stakeholders*** from our sister companies in ***Lesotho*** (Housing Corporation from Lesotho), ***Swaziland*** and ***Namibia*** to share and | We depend on MLH and its Department's to discuss issues related to development, planning and any land information to know the staus-quo in the country.<br><br>Others dependents are REIB, REIAC, Government Permanent Secretaries and Land Boards. | MLH and its Department's update us the status quo of the land issue.<br><br>REIB and REIAC helps on property valuation. | Land related information.<br><br>Property Regulations and oversight. |

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| understand how they doing things in their respective countries so that we try to ***benchmark***, ***borrow ideas*** that could help us from the ***Southern African perspective***.<br><br>Res 2:<br>We ***don't rely on anyone, we use our own motorbikes***. So we ***don't depend on anyone***.<br><br>Res 3:<br>The whole ***Government Ministries and its department***, ***Private Sectors***, ***BPC***, ***WUC, Telecommunications Providers***. What we used to do ***ten years back after every NDP***, we ***will follow with the Ministries for their NDP new strategies and ask*** for project plan for ***short term***, ***mid-term review*** and ***long term review***. Looking at that, we ***can position ourselves and map and survey the areas***.<br><br>We ***came up something like PPP agreement of spatial information for those who want data for us***.<br><br>Res 4:<br>Yes, we depend on other institutions like the ***Private Hospitals***, ***Ministry of Health*** and its ***Hospitals*** who actually ***give us some of the jobs***.<br>The ***ministry seeks our help*** or requests ***our service*** and we ***benefit financially as a business***.<br>***We have the Pula Medical Aid*** which we have an ***agreement*** to be the ***first contact on issues of emergency.***<br>Most of the time***, we work hand in hand with our competitors***<br>***Motor Sport Industry in Botswana*** (like ***Toyota Desert Race***, ***Khawa Desert Race***) and the ***Organization doing excursions*** of ***extreme sports*** are ***stakeholders who always work with us*** because we are covering them for the ***emergency standbys***.<br>The general population ***is the core people that assist our business and*** | SADC Housing Corporation like Lesotho (LHC), Swaziland (SHC) and Namibia(NHC) are useful on benchmarking on the development of housing strategies.<br><br>Don't depend on anybody but we map for our deliveries to our customers who are individuals and corporates.<br><br>We are dependent on government ministries and its departments, parastatals and the private sector with their utilities service networks.<br><br>Individuals, Private Hospitals and Ministry of Health hospitals, medical schemes, Extreme sports because they request our emergency service and benefit financially. | Collaboration with other SADC countries housing corporation<br><br>We are solely focused on delivery to are individuals and corporates.<br><br>Utilities make major dependency as we are interested on the network of power lines, water pipes lines and telecommunication cables information. For Government, looking at their strategies (NDP) to plan the way forward. For private sector, we have agreements (PPP) in place.<br>Emergency services saves life and its needed everywhere whether is Government or private health institutions hence that's how we have a sustainable Business. | Housing corporations benchmarking and collaboration.<br><br>An Independent stakeholder resource wise and deliver to individuals and corporates.<br><br>Government and private sector utilities service networks information and national strategies.<br><br>Individuals and those who institutions in need of social and emergency services. |

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| ***behind us, for instance,*** Those are the ***people behind us*** and ***we are behind them 100% dependency wise.*** Whether ***they are in medical aid or not in medical aids, they keep us in business***.<br><br>Res 5:<br>It depends on the magnitude of the project, ***some stakeholders should be on the ground before we come*** or we ***work in parallel***.<br><br>***BHC*** has to ***build their houses and roads***, then we come to put the ***road signage that have been officially submitted*** to us.<br><br>The ***DSM*** should ***have completed the survey master diagrams*** before we resume the ***naming of the Area boundaries, Suburbs and other things***.<br><br>Res 6:<br>MLH: we plan and survey the plots.<br><br>MLGRD: they put the ***street names*** and ***signage***, and ***suburb names***<br><br>When this TWO ministries are done,<br>Botswana Post under MTC should come up with postcodes, ***then the Address is complete.***<br><br>Res 7:<br>Some of the ***services on land are underground*** and ***we cannot see them physical as Surveyors***, we have to ***get information(wayleaves) from the City Councils***.<br><br>Then we need to get the information from ***the engineers of those pipes or electric grid (BPS) above*** or below ***through wayleaves diagrams*** that the ***hidden service lines of water (WUC) and phone lines (BTC) or others***. | Some stakeholders should be on the ground before we come to do road and suburb signage that have been officially submitted to us, it's determined by the project.<br><br>MLH plan and survey land, MLGRD for street naming and signage, MTC through the Botswana Post are responsible for the | The road and suburb signage depends on the project priorities and deadlines.<br><br>Stakeholders have different roles for surveying, naming and postcodes development on a project. | The street network and suburb signage is contingent to the project.<br><br>Various stakeholders' roles are key on surveying, naming and postcodes development. |

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| Res 8:<br>One key dependency is ***Botswana Couriers***, who happens to be somehow our subsidiary or our sister company even though they operate as independent private company.<br>We have a ***huge dependency to them because we have outsourced all our logistics***, all ***our network in terms of the cars or the delivery mechanisms***, they ***manages/control or the own the fleet per say***.<br>Res 9:<br>Our individual ***clients or customers*** because they give us jobs. They ***Police*** have a satellite office here at Phakalane Suburbs.<br><br>Quite often the ***Police don't have vehicles at their satellite office***, in that event we will take them to ***one of our client who has a problem to do the processing of the scene*** so that our client can be helped quickly.<br><br>Because of that ***strategy of making sure we help with our cars***, this ***helped us to expand in the market*** by signing other clients from this reputation through word of mouth ***but created more enemies*** from the likes of ***G4S because they were not taking care of their customers when they had problems***.<br><br>Res 10:<br>Maybe ***Internationally***, ***locally*** we are ***still fine***.<br>We ***use FedEX is we had some parcels to send international***. | postcodes data.<br><br>City council has to provide wayleave information from Utility Service Providers network to know what wires or pipes are on the ground in a certain locations.<br><br>Botswana Couriers act as private company for the Post because we have outsources logistics tasks to them and is part of our group of companies.<br><br>Our clients or customers are valuable to our business and we keep growing depending on how we service them by using new strategies. | City Council wayleave system for information is very important.<br><br>Botswana Couriers act as the commercial arm of Botswana Post and is positioned to compete with competitive couriers companies.<br><br>We depend on Individuals or citizen stakeholder to keep going in this security business. | Physical Planning department.<br><br>Competitive Courier market.<br><br>Individuals or Citizen stakeholder is important. |

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| | Locally tasks are well manageable but Internationally we use FedEX. | We have created partnerships with International courier service providers. | International mailing and postal systems partnerships and global presence. |

**Table 28: Stakeholder relationships and engagement 2 index**

| **Broad Codes** | Stakeholder relationships and engagement 2 | | |
|---|---|---|---|
| **Interview Question (IQ)** | IQ15: How do you engage each other as stakeholders, is there any institutional initiative? (i.e Lekgotla, Pitso, Task team, Ministerial Cluster Committee etc.) | | |
| **Responses (Res) or Experiences** | **Fine Descriptive Codes** | **Researcher's Preliminary thoughts or Notes (what is this about?)** | **Initial Categories** |
| Res 1:<br>They are part of the ***ministerial leadership forum*** which all players ***engage*** through, there is a council (Real Estate Institute of Botswana (REIB),Real Estate Institute Advisory Council(REIAC)) that is responsible for the *Valuers*, ***Land Management*** and they have associations and council ***that act as an oversight this players***.<br><br>Res 3:<br>At the moment we ***have committees which includes other stakeholders*** (government, private and parastatal) that we engage with especially when | Forum platform for discussions and engagement. | Getting all land related development, housing and regulator stakeholders through forums in one room helps the industry | Ministerial leadership forum to share ideas and insights.<br><br>National Committees. |

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| we go to ***National Spatial Data Infrastructure*** (NSDI) ***meetings***<br><br>Res 4:<br>I think there is an ***association but I am not quite sure***. Most of the time ***we find ourselves working hand in hand with our competitors*** to ***improve health emergency wise to save life's,*** we are with MRI(992) and Boitekanelo (996).<br><br>***It's not like we always have an ambulance parked*** here every day at our offices, ***if we are overloaded, we request help from them and vice versa.***<br><br>***That's the engagement that we have from the Private side and I can't describe it, in short, we have an unofficial memorandum understand and we do financial reconciliation later.***<br><br>Res 5:<br>I d***on't think there is a committee as per say***, there ***are meetings we are involve in*** and there are ***meetings that are part of LAPCAS project***. The ministries are ***MLH, MLGRD and MTC***.<br><br>Res 6:<br>What is happening is that most tasks ***depend on each other***, we ***need to start together***, whatever we do, we should know that ***we are facilitating each other***. We should ***do things together***.<br><br>We engage each other through ***seminars, workshops, email communications*** and ***meeting***s<br><br>Res 7:<br>This one is quiet a difficult one because ***there is no laid out platform that we engage in*** as ***Private Companies***. You just ***go to the DSM*** and ***tell*** | Committee meetings include other stakeholders and are fundamental for engagements.<br><br>Not affiliated to any association but collaborate with competitors unofficially.<br><br>Meeting as part of LAPCAS.<br><br>There is task dependence for stakeholder to engage in order to facilitate each other. | National committee helps to keep track and create platforms like National Spatial Data Infrastructure (NSDI).<br><br>Not aware of any association but keep our enemies closer.<br><br>Stakeholders have different roles on a project and engage through seminars, workshops and email communications.<br><br>The engagement is dependent on the important resource suppliers are to an organisation in facilitating each other. | Unofficial participatory collaboration.<br><br>Engaged in delivering project tasks through seminars, workshops and email communications.<br>Engagement depend on the important resource through seminars, workshops, email communications and meetings |

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| ***them what information you want*** and ***they advise you from that point***.<br>There is ***nothing like a body or association*** with that regard where you will get all the information.<br><br>Res 8:<br>There is a ***LAPCAS project steering committee,*** I will admit that probably you know, but ***those are just project issues*** and ***we don't meet as frequent or as much as we should I suppose***, so for that reason, a lot now, our ***forums are reactive depending on whatever the case will be at the time***.<br>***"QUOTE"***<br><br>Res 9:<br>There is ***a security association*** and ***we are no longer members of it***. You are ***not forced to comply or conform*** with the association.<br><br>Res 10:<br>We have ***agreement and partnership with FedEX***. We ***communicate*** with ***technology*** and handle transaction that way.<br><br>Res 11:<br>The way LAPCAS was arranged was that there was 10-15 Steering Committee and the 50 Stakeholders in order to get project buy-in, this Stakeholders were ***divided in National Project Team (NPT***) which has ***representative on different 7 Components like Location Addressing***.<br><br>These groupings were flexible; if they needed someone with ***expertise\specialist\subject matter expect*** in the other group, the ***personnel will be called to assist*** with the expertise. ***No one was excluded***; even the ***Private Sector*** was there. You can find that a personnel is at the ***Steering Committee, Consultation Committee or NPT*** levels according to the expertise. | No official platform for Private companies, we just walk-in to the DSM.<br><br>Project-steering committee exists but we don't meet frequently as in the planned schedule. It seems that the forums are reactive to contingency situations.<br>"QUOTE"<br><br>Security association forum that we once part of its membership until certain players has issues.<br><br>We engage as per partnership agreement and use technology. | Not aware of any engagement platforms but walk-ins is a strategy that works in order to obtain the information.<br><br>The Project steering committees are reactive reporting and continuous progression of the project during accountability, transparency and audit time.<br><br>Security forum has different agendas rather than its intended purpose.<br><br>Good relationships with partners and use convenient means of technology.<br><br>Stakeholder engagement plan was conducted during the project ideation. | Walk-in to seek help to get information from DSM.<br><br>Contingency meetings in war rooms depending on whatever the case will be at the time.<br><br>Sabotage and backstabbing complaints by security association forum members at public meetings.<br>We engage through the use of technology.<br><br>Stakeholder engages according to the project plan. |

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| | Steering Committee, National Project Team representatives from LAPCAS Project. | | |

**Table 29: Priorities the stakeholders 1 index**

| **Broad Codes** | Priorities the stakeholders 1 | | |
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| **Interview Question (IQ)** | IQ16: From your point of view, who do you think is important to be part of the stakeholders? How are they selected? | | |
| **Responses (Res) or Experiences** | **Fine Descriptive Codes** | **Researcher's Preliminary thoughts or Notes (what is this about?)** | **Initial Categories** |
| Res 1:<br>I think the ***most important Stakeholder*** that BHC need is ***Water Utilities***, if you don't have ***water*** you cant literally ***do anything*** or ***build an infrastructure(houses, sewage).***<br>***"Quote"***<br><br>The other important Stakeholder within the Ministry of Land and Housing is the ***Department that*** is responsible for ***the Provision of Infrastructure Development***, it becomes expensive and that is why people we rarely build houses at the rural areas and the man on the ground who is going to buy this houses because of ***electric lines (BPC)***, ***plans of water connections (WUC)*** and other ***envisaged services (GCC for garbage removal, BTC for Telecommunications e.t.c) are not connected***. | WUC for need water to build infrastructure from the ground. | Water is a core commodity in utilities and infrastructure development like it's a basic need of life. | WUC because water is a basic need of life. |

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| We could be ***talking about the private sector***, we able to facilitate the private sector, be it in terms of engagement. BHC has ***no company that does construction***, but we do ***engage with Construction companies to build for BHC*** and we ***pay*** those companies.<br><br>BHC can also ***partner with Investors*** who are into ***building*** or ***renting out*** or ***selling***. For investment example, If you look at Galo mall in Francistown, ***it's a joint venture between some partners and BHC***, what we get from ***this deal on yearly basis is a dividend of our investment***.<br><br>Res 2:<br>We ***rely on our customers*** (whether ***individuals*** or ***corporates***) to be ***in the business of selling pizza***, they are ***very important to us at all time***.<br><br>Res 3:<br>In terms of process, it's a ***work flow for a surveyor to execute their mandate***, they need an approved plan. After that they will ***call the committees to evaluate*** and ***its examined and approved***. From ***DSM***, its depend on which ***task you are working at*** and ***who you need at the time***.<br><br>Res 4:<br>Let me say, the important stakeholder is the ***general population or customers***, the ***people we serve***, or ***citizen stakeholder.*** The general population ***is the core people that assist our business and behind us, for instance,*** Those are the ***people behind us*** and ***we are behind them 100%.*** Whether ***they have medical aid or don't have medical aids, they keep us in business***.<br><br>Secondly, Having said that, ***I don't necessarily mean that Ministry of Health doesn't have to call us everyday for the assistance of our service***. | Private as construction companies to build because BHC don't own a company. WE also have Investor's partnerships on property development.<br><br>Our customers (individuals or corporates) to be in the business of selling pizza<br><br>The importance depends on the task.<br><br>General population or customers or citizen | BHC is open for partnerships as it has many government initiative (Self Help Housing Agency (SHHA),Public Officer Housing Initiative (POHI), District Housing, Installment Purchasing Scheme, Youth housing initiative) to rent, sell and build infrastructure.<br><br>Pizza is consumed by individual and corporates during functions.<br><br>Whoever is important to us is contingent on the task on hand.<br><br>The general public and Ministry of Health to back our business through our services. | Partners are construction companies, individuals, corporates companies and investors are important.<br><br>Individuals and corporate companies who by pizza.<br><br>Contingency partners at a particular time.<br><br>The individuals and Ministry of Health for keeping us in business. |

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| Res 5<br>The ***MLGRD (Gaborone City Council), MLH (LAPCAS Project owner), DSM, MTC (Botswana Post)***<br><br>When I look at it, there are ***junior officers*** involved in the LAPCAS project ***but they can't take a final decision which is frustrating*** as the junior officers just submit the reports.<br><br>It will be ***important for Senior Officers to be part of the project so that the delays or decision does not take too long***.<br>From the GCC, we ***were three when we started with the LAPCAS Project and some of them lost interest*** along the way ***due to the issues of non-commitment from*** the ***Senior Officers***.<br><br>There were issues of ***training and trips that were assigned for benchmarking*** at Block 7 and block 8, Tshane, Palapye and the ***GCC team*** were ***excluded from the benchmarking trip***.<br><br>Res 6:<br>***DSM under MLH:*** for the ***land plan and survey the plots***.<br><br>***GCC under MLGRD:*** they put the ***street names*** and ***signage***, and ***suburb names***<br><br>When this TWO ministries are done,<br>***Botswana Post*** under MTC should come up with ***postcodes***, ***then the Address is complete.***<br><br>Res 7:<br>Actually, the way I see it is that the biggest client is ***Department of*** | stakeholders and Ministry of Health because they assist us and behind.<br><br>Stakeholder roles are outlined in the ideation of locational addressing initiative. | The order of importance are the GCC for naming and signage, MLH as a LAPCAS project owner and Botswana Post for postcode development in Urban areas like Gaborone***.***<br><br>Stakeholder roles for locational addressing initiative are GCC, DSM and Botswana Post. | The core team is the GCC, MLH, and Botswana Post with different roles. |

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| ***Surveys and Mapping*** and ***Deeds Registry***. That is where you should start if you want to know if that piece of land has been surveyed or not. If it has been ***surveyed***, that is where the ***information pertaining to the survey***, then ***the ownership as well is held***. A ***surveyor will need documents from Deeds registry*** to prove **the ownership** or the ***Chief*** to ***vouch on his or her that the person owns the piece of land.*** | DSM for plans and survey the plots. The GCC for naming and signage. The Botswana Post for postcode. | | DSM under MLH, GCC under MLGRD, Botswana Post under MTC are import and then the physical address is complete. |
| We also deal with ***individuals*** who might have a piece of land that has been acquired through **inheritance through common law**. | | Plots need to be surveyed and registered by the institution of DMS and the latter by the Deeds registry. | DSM and Deeds Registry are key stakeholders. |
| If you want to register that piece of land, you will have to come up **with a proof that you have been given the land** or **lease agreement from land board if its tribal land**, surveyor should also look for **proof that the Land is really in the hands of legitimate owners before surveying**. | DSM for information pertaining to the survey and Deeds Registry for land ownership. | | |
| Res 8:<br>***The LAPCAS*** project is run ***primarily by the Ministry of Lands and Housing (MLH)***, because I think at ***its inception***, its primary core mandate ***was land registration and land administration***. The MLH are ***the custodians of the land related issues, the LAPCAS project is run from them***.<br>The other key Stakeholder is ***Ministry of Transport and Communication (MTC)***, which the ***Botswana Post is under***.<br>Then we have the ***Ministry of Local Government and Rural Development (MLGRD) through which it has the City Councils, Town Councils, and Land Boards***.<br>Others are DSM, because ***they are the custodians of all the mapping information and geographic data***. I mentioned DMS who are under MLH, even though there are there, ***they are regarded as a team as they stand alone under MLH***. That's it like ***there are four stakeholders in this project as the core team***.<br>We ***developed postcode structure*** together with the ***DSM because they are the custodian of the geographical data***, and our friends from the | Legitimate owners of land can be individuals who own land through inheritance and common law. | Land can be owned by individuals in many ways until they show proof of ownership or the Chiefs vouch on them in terms of inheritance.<br>The Ministries of MLH, MLGRD and MTC have representative Departments for the LAPCAS conceptual project. The MLH is playing hard ball with two roles, firstly as Project owner at the highest level and with DSM as the custodians mapping information | Individual through common law and inheritance.<br>MLH for administering the LAPCAS and also through DSM again. |

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| ***MLGRD*** as they are ***responsible for naming suburbs,*** registration of ***names or*** putting ***signage.***<br>Res 9:<br>When you want to get ***the security license in Botswana***, you get it ***through the Office of the President, Directorate of Information Security Services (DISS)*** or it used to be that but ***nowadays a lot of things have changed***. However, for people like us, I think we are the only company that specializes in the innovation technology, ***there is no license available***.<br><br>Res 10:<br>I will say ***corporate customers***, we run ***corporates business which are our core clients***, but ***individuals are not many*** but we service them also.<br><br>Res 11:<br><br>The Government at large, The ***Ministry of Land and Housing*** though its ***various Departments*** like Housing Department. Those dealing ***with Infrastructure within MLH were not actively involved initially because they didn't have a role***. In terms *of* ***training***, we ***didn't exclude anybody***. Even ***Top Management*** had their ***special training***. Some did show ***interest,*** and some ***other groups didn't***. | MLH for administering the LAPCAS Project. Botswana Post under the MTC for developing postcodes. City Council, Town Council and District Councils (Land Boards) under the MLGRD for naming and signage. DSM are regarded as a team as they stand alone under MLH are custodians of mapping information and geographic data.<br><br>Office of the President offers Security Licensing through DISS. | and geographic information data. The MLH seems to be the player and the referee at the same time.<br><br>The Presidency manages, regulates and conducts vetting of the Country security through DISS.<br><br>Corporates makes a bigger portion of our business compared to individuals.<br><br>MLH and various Department leadership or TMT were interested and some not on training and knowledge sharing conducted by University of Botswana. | Botswana Post under the MTC.<br>City Councils, Town Councils and District Councils (Land Boards) under the MLGRD are all important.<br><br>The Presidency Office.<br>Directorate of Information Security Services for accountability and vetting.<br><br>Corporate and Individuals are our precious clients. |

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| | Corporates business which are our core clients and not so many individuals.<br><br>The whole Government and more especially the MLH and its 7 Departments. The Top management Team (TMT) has a special training but some showed interest and other groups did not show interest. | | MLH and Department Leadership.<br>University of Botswana for skill development. |

**Table 30: Priorities the stakeholders 2 index**

| **Broad Codes** | Priorities the stakeholders 2 | | |
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| **Interview Question (IQ)** | IQ17: In your views, who do think will adversely affect the process of engagement if not part of it? | | |
| **Responses (Res) or Experiences** | **Fine Descriptive Codes** | **Researcher's Preliminary thoughts or Notes (what is this about?)** | **Initial Categories** |

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| Res 1:<br>BHC for many years, ***has not been relying on Government funds*** but it ***generated its funds*** for ***sustainability***. Recently ***because of the extended Mandate***, we do ***receive funds form the Government*** for ***SHHA Housing and other government projects***.<br><br>Previously, ***BHC used to buy land from Lands Boards but lately BHC is given land for free***, it ***didn't make sense because BHC as part of MLH within the Government,*** buys land while we ***provide the cheapest entry level housing for 1st time buyers*** and ***government employees***.<br><br>***Its much better now*** because there is ***collaboration*** and hence ***leadership is facilitating smooth operation*** of running of things. If the ***government is not part of the engagement process***, it will ***adversely affect the forum***.<br><br>Res 3:<br>***The MLH*** (DSM, Land Boards), ***MLGRD*** (City, District and Town Councils), ***MTC*** (Botswana Post) are ***communicating***, ***conducting workshops and meetings*** but the ***people on the ground (individuals) are not being informed on what is happening***.<br><br>Right now ***we are under pressure because the President seems to like the project*** and ***he has put a strong words and said I want to see the LAPCAS as a success***, his interest is also to ***monitor elections because of locational addresses that are part of the IEC Act*** that says ***someone should be eligible to vote with a proof of residence/address and National Identity/Omang***.<br><br>Res 4:<br>***Ministry of Health*** is very important to be part of all process we do because is the regulator of what we do in the Health Industry and the | BHC used to generated its own fund and was sustainable. Nowadays, Land Boards gives BHC land for free and build houses for 1st buyers and others.<br><br>People (individuals) are neglected.<br><br>President seems to like the LAPCAS project for monitoring elections for proof of residence/address or use it in Electronic Voting Machine (EVM). | Government supportive leadership for increasing our mandate and giving us free land to facilitate their projects.<br><br>Individuals are not involved in addressing but they are the ones who are going to use address.<br><br>Presidency agenda of interest is different. | Government ministries and departments.<br><br>Individual and the Presidency |

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| Ministry offer us jobs to assist them.<br><br>Res6:<br>The ***MLH*** survey the lands and ***we need MLGRD to put the street names, suburb names and all the signage which is their role***. ***Botswana Post*** for ***postcodes*** to ***complete the address***.<br><br>The ***Presidency or Ministry of Finance*** belong to the ***accountability and monitoring side of things*** because the project has been ***already budgeted but we need them when we want the money which is a process on its own***. They can slightly ***hamper the process*** if there is ***no productivity on the project***. I focused on ***the Core Mandate*** or ***Roles of the implements*** (***MLH, MLGRD and Botswana Post***)<br><br>Res7:<br>If you don't If ***you don't consult people (Individuals or citizen stakeholder),*** sometimes ***what you see is not really a complete picture.***<br><br>One will ***have to do a research*** if you have such cases and then DSM is the department that is very important in this instances to ***validate and verify***.<br><br>If you ***go to the villages or rural areas***, you report at the ***Ward (Kgotla)*** to ***introduce yourself*** and ***what are you going to do around that area*** so that they ***can help you with their local knowledge and orientation.***<br>That's ***how Setswana culture place a role when you are visiting villages and rural areas***. For example, for the LAPCAS project, we have to go to the ***landboard***, the ***land board*** then goes to the ***chief to de-brief him about the surveys in his village,*** then the ***chief will call his people to alert them and ask them to help*** or ***cooperate*** where ***they are needed*** as surveying ***involves a form of trespassing on some people properties*** when you are ***checking land parcels boundaries***. | Ministry of Health as a regulator and its department gives us jobs.<br><br>MLH though its departments manages the land. MLGRD for naming and signage. Botswana Post for postcodes. Presidency for reporting and accountability. Ministry of Finance for the paying suppliers on time and budgeting.<br><br>Its important to consult people (Individuals or citizen stakeholder).<br>DSM important to validate and verify land data.<br>Ward or Chieftaincy leadership to help with their local knowledge and orientation.<br>In Setswana culture, you are introduced to the | Ministry of Health its core to the emergency service.<br><br>Different stakeholders should not be distracted on performing their roles.<br><br>People tend to know a lot on what is happening on the ground, if a surveyor doesn't to public participantion and network, might not know the magnitude of the job | Ministry of Health<br><br>MLH.<br>MLGRD<br>Botswana Post<br>Presidency<br>Ministry of Finance |

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| | Chief. | or revolt his/her presense in the | Individuals |
| Res 8 | Then the community will be alerted to | village. This is part of Setswana | DSM |
| The ***public consultation*** with the people of the ground is a big issue on the ***participatory process***, there has been a big ***challenge with that regard***. | corporate else resistance. | culture which require visitors to be | Ward Leadership |
| We had a ***big challenge and issues*** because we are about to ***introduce a home mail delivery***. | Public consultation with people (Community) is a big issue. | introduced in order to complete their processes without issues. | (Kgosi/Chief or Kgosana/Sub-Chiefs) |
| Res 10: | It's a stumbling block because we are about to introduce home mail delivery. | | Chiefs |
| | | | Community |
| We didn't have ***the Botswana Post***, but ***we brought them later***. | | | |
| People like ***State Enterprise Development Agency (SEDA)***, ***sometimes we invited them to our meetings*** and they were appreciated to be there on the activities that we were doing. ***Local Authorities*** ( City Councils and | | | |
| District Councils), ***Police*** and the ***BDF*** were sold the project***. BURS and Banks were invited at the beginning during the brainstorming*** because they have ***the electronic statement (eStatements) and*** they are ***cognizant*** of the ***fact that majority of people don't use internet*** | Public consultation with residents is still lacking and it's a big issue. | Creating awareness its very important so that people know what is happening and to make the introduction of the PAS easy. | |
| Actually the Bank saw the opportunity because they have to always prove ***the proof of the locational or physical address*** of a ***particular household*** which is in the ***Financial Act***. | The Botswana Post, was brought in later. | Botswana Post was not included during the location ideation. | |
| Our ***Information Systems*** are still behind on ***innovation to prove and validate physical addresses***. One of the driving factors of the implementation of LAPCAS project ***was the Election Act to know where the voters stay***, well I don't know whether is written. | BURS and Banks because they require proof of residence as per Financial Act. | The Tax Revenue Collection and Banking sector institutions need to comply with Financial Act. | Individual and Community. |
| During the ***recession in 2008***, when the President was prioritising project, ***he didn't stop the LAPCAS project because of the potential to stop Voter trafficking that is common***, he understood and was of a view that if this LAPCAS project is finalized, we will be ***able to know where the voters are*** and do necessary ***geo-political campaigns*** or ***validate the voters*** | | | Botswana Post |

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| ***registry in particular locations.*** | | The IEC would want to know how the Voters Roll looks like. | |
| We had ***too much Political Will or buy-in of the LAPCAS*** (Location Addressing) project ***to the 1st Citizen***. He is quite keen, if you can talk to him, he will tell you all that about the project. | IEC who drives Election Act to know where the voters stay. | | BURS<br>The Banks |
| ***The Programme Manager (Mr Malatsi) who reported to the President (HE)is passionate about the project*** because one of the challenges in terms of the project was that this ***location addressing is supposed to be the Councils (Cities and Town) mandate as the laws of Botswana***. It's ***not supposed to be Department of Surveys and Mapping*** and any other. | The Presidency prioritized the project during 2008 recession.<br>Important for geo-political campaigns and validate voters registry. | | IEC |
| | Programme Manager and Presidency from MLH.<br>The concept was supposed to be Cities and Towns mandate as per Botswana laws. Its not supposed to be MLH who administer it. | The programmer manager is passionate about the project but its confusing where he position himself because he is the project owner at the Ministry of MLH and DSM Director as part of the core team while the initial incepts outline that the ownership was meant to City, Town and District councils. | The Presidency<br>City Councils<br>City Councils<br>Town Councils |

## 9.8.2 Appendix 8.2: Data analysis and presentation of Research Objective 2

### Research Objective 2

*to determine the role of context awareness and the form it manifest in the adoption of the Physical Address System*

**Table 31: Tool-in-Context index**

| **Broad Codes** | Tool-in-Context | | |
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| **Interview Question (IQ)** | IQ21: Please share with me your understanding of physical addresses or location address. | | |
| **Responses (Res) or Experiences** | **Fine Descriptive Codes** | **Researcher's Preliminary thoughts or Notes (what is this about?)** | **Initial Categories** |
| Res 1:<br>Location of addressing means ***identification of areas*** within a ***specific setting***. We know latterly, there is Ditimamodimo (new name for Block 7) that is meant the ***facilitation of setting or localities***. | Identification of areas at specific setting.<br>Facilitation of setting or localities. | A unique Identification of places.<br>Providing a service at a location | Unique Identification of locations.<br>A point of service delivery a location. |
| Res 2:<br>We **are using a simple printed map to look up for our areas** where we ***need to deliver***. | Areas for delivery. | A place for service deliveries. | A point of service delivery |
| Res 3:<br>***Similar to your published papers***, consists of a hierarchy of, i.e. place name, street name and address number, with numbers assigned sequentially along the street. | Hierarchy of place, street and address number assigned sequentially along the street | Hierarchy of addressable elements. | Hierarchy of addressable components. |
| Res 4:<br>It's a ***certain place that you carry out an activity***, either a ***business***, ***homestead***, an ***exact location on the ground*** where you ***can be found or located***. | Certain place that there is activity. | A place of activity. | A place of activity. |
| Res 6:<br>A ***system that involves street naming*** and ***numbering of properties***. | Involves street naming and numbering of properties. | Process of naming and how to assign property numbers. | Process of numbering and naming streets. |
| Res 8: | | | |

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| Location addressing is a ***systematic and sequential way of identifying plots and land parcel***.<br>The ***location addressing*** is done with ***relation to the streets name***, ***street number*** and it is ***also sequential*** where the left side is ***1,3,5 (odd numbers)*** and right side is ***2,4,6 (even numbers).***<br>Res 9:<br>There is a problem for the fact that we ***don't have a Zipcode***, but its not a problem because that ***does not make any difference to the way we operate***<br>It can become a barrier only to ***someone who doesn't know how to use the internet*** and ***might find those difficulties*** when the other countries ***website requires zipcode***.<br><br>Res 10:<br>A physical Address are ***very crucial*** in our business because we do not ***use Box numbers at all***, we ***don't deliver to Box numbers like the main Botswana Post Office***.<br><br>***Our business needs proof of delivery*** that ***outline that the clients received the parcel*** as a form of ***signing with an official Identity document at particular physical address***. So physical addresses are so ***crucial to us in this courier industry***.<br><br>The way the concept been discussed, they will be useful to us, looking at ***the fact that they are easier to understand*** for ***a swift delivery which is part of our mandate***.<br><br>Res 11:<br>The physical address ***is the spatial location of where you are?*** | Systematic and sequential way of identifying land parcels.<br><br>Done with street name where odd numbers on the left and even on the right.<br><br>There is a problem there is no zipcode.<br><br>Physical addressing core to business.<br>Don't use box numbers like Botswana Post.<br><br>Delivery of documents at a particular address.<br><br>Physical address are easier to understand and for a swift delivery.<br><br>Unambiguous spatial location of an object? | Comprehensive and best practice way of addressing locations.<br><br>How to assign address numbers.<br><br>Postcode issues.<br><br>Street delivery addressing.<br>Post box delivery addressing.<br><br>Door-to-door delivery process.<br><br>Physical address saves time and easy of use.<br><br>Geographic referencing of a specific point. | Standardized addressing.<br><br>Process of assigning numbers and naming streets.<br><br>Lack of postcodes.<br><br>Street address delivery.<br><br>Post box address<br><br>Door step delivery<br><br>Time savior and easier to locate a place.<br><br>Spatial reference of a point on the ground. |

**Table 32: Developing country context index**

| **Broad Codes** | Developing country context | | |
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| **Interview Question (IQ)** | IQ22: In your opinion, do you think is easy or difficult to find a location at 1) urban areas,2) villages and rural areas and 3) farms and lands as a Botswana cultural social setting, please explain why? | | |
| **Responses (Res) or Experiences** | **Fine Descriptive Codes** | **Researcher's Preliminary thoughts or Notes (what is this about?)** | **Initial Categories** |
| Res 1:<br>It can work, that has to be a deliberate effort stating from planning. ***Every process start with planning***, with the ***Department of Towns and Regional Planning*** and ***bring in other people to the party who will assist (participatory process)*** them ***to name the area or to demarcate this area with specific post codes***. | It can probably work in Towns, if they are properly planned. | The towns are physically planned areas. | Urban areas are physically planned. |
| Res 2:<br>Its easier in the ***Urban areas because of the way the plot are being arranged***. | Urban areas, plots are planned. | Urban areas plots are physically planned. | Urban areas are physically planned. |
| In the ***Rural areas where they are all scattered***. | Rural areas, it's also possible because scattered plots. | Possible at rural areas but plots have scattered pattern. | Rural areas are physically unplanned. |
| ***Farm and Lands (Cattle post) is difficult to find*** because ***the plots/households are also scattered and the roads are bad to locates households***. | Farms and Lands is difficult. | Farms and lands unforgiving landscape and dirt roads. | Farms and lands have bad terrains for infrastructure. |
| Res 3:<br>The ***urban area will work perfectly*** because all ***plots are laid out into plans***. | Urban areas are perfect because of physical planning. | Urban areas plots physically planned. | Urban areas are physically planned. |
| In Botswana, ***this is great because it's a new thing*** and ***we are starting*** | | Will work in all 3 settings. | |

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| ***on a clean slate***, its ***fresh start and Batswana are people who do not always make noise***.<br><br>If ***something comes and its more beneficial*** and ***you present it perfectly or sell it to them***, ***they will take it with open arms at Villages and rural areas and farms and lands***.<br><br>Res 4:<br>Villages have ***a lot of gazetted roads which are not registered in google maps*** and ***other map software***. Its ***going to be hard for us because its not on the software/systems*** that we use here EA.<br><br>We have places that are ***semi-urban like Mahalapye and Palapye,*** we have our ***own agents on the ground*** that are from those places and ***they know the orientation*** and ***it's easy to locate someone through the use of the local knowledge***.<br><br>***For land and farms***, we rely on ***the nearest village on the map and agents that are on the ground and we believe the agents we will get there***, I believe ***it might work 50 percent***.<br><br>Res 5:<br>I will say, an urban area is much better because ***all roads are planned and surveyed*** and ***get your orientation right***.<br><br>The village is possible unless ***you are where they call it planning areas***. If its Tshane, it's a District council and I am not involved as I look at the Gaborone City Council only.<br><br>I think it can work Farms and Lands as ***Batsw*ana are people who are known with rearing cattles** hence there are households around ***those*** | It's a new thing and Batswana are very welcoming for change, it will be easy to find location in 3 settings for Batswana but depend on how you sell it to them.<br><br>Its going to hard at villages because of the roads network are not updates on gadgets.<br><br>Semi-urban place can work<br><br>50% probability to find a location at villages.<br><br>Urban areas are much better. | Depend on marketing strategy to the people.<br><br>Farms and lands unforgiving landscape and dirt roads.<br><br>Can work for semi-urban.<br><br>Might work at some villages.<br><br>Urban areas.<br><br>Possible for villages. | Applicable on all settlements patterns.<br><br>Creating awareness<br><br>Farms and lands have bad terrains for infrastructure.<br><br>Semi-urban areas are partially physically planned.<br>Some villages are planned physically.<br><br>Urban areas are physically planned.<br><br>Some villages are planned |

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| ***boreholes that are regarded as water point***, if we can get the ***coordinates of those waterpoint***, they we can always **approximate or assume** that there are household around them and then ***provide an address for people out*** there. If there is a farms, you can find ***a bird scarecrow on a farm boundary or get farm number*** of some sort because ***at the end of the day you need to locate households***.<br><br>Res 6:<br>This is going to work in the three setting according to the structures that we have designed, ***currently we are going to survey them***,<br><br>***Even farms lands have ERF/parcel number in our surveying diagrams that has been surveyed***, by default ***if there is any dwelling around there, it will be located by that parcel number***.<br><br>Res 7:<br>At farms and lands***, the farms and boreholes are supposed to be registered*** because we use ***them as a Point of Interest*** as they are ***households who use water for their daily living from there.***<br><br>You should ***have a coordinate of that borehole so that you can locate it*** and give ***it a unique number*** so that if there is any development that happens around there, somebody should be able to ***be aware that there is another person property*** in a form of a ***borehole*** or ***close to the borehole***.<br><br>You can be ***allocated a piece of land and you can drill a borehole***, the ***borehole is registered at Geological Division at Department of Water Affairs*** because ***they deal with Botswana water table and other underground water science***. | Villages is possible<br><br>Using boreholes as water points, it can work by approximation to their coordinates.<br>At Farms is also possible because they are associated with households.<br><br>You can find a location in the three setting according how they are structured as there are associated dwellings.<br><br>Farms and boreholes are point of interest hence associate households. Boreholes have coordinates as unique numbers. | Can work farms and lands because coordinates of boreholes. Boreholes associated with proximity settlements.<br><br>Can work in all 3 settings.<br><br>Can work at farms because boreholes are points of interest. | physically<br><br>Boreholes are used as coordinates reference system.<br><br>Applicable on all settlements.<br><br>Boreholes are used as coordinates reference system |

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| Res 8:<br>Location addressing will work because it's ***just a system of doing or placing a number on what is already there and introduce it to people***. They do have different ***types of numbers depending on the categories you have outlined***. ***Urban areas*** are ***easily to be done***.<br>Village and Rural area, there have ***Palapye as semi-village or hybrid place*** and they have done it, then they have Tshane, a very small and remote village in Kgalagadi District and it's the very first pilot in that category of piloting. In ***Tshane, there is no roads and streets***, so it ***works with wards***. So within wards, ***so the main boundaries or break-ups were sub-wards***, Tshane in its self has seven (7) wards and within a ward, once again the ***households are scattered or spatial distributed***, so ***there is a numbering system*** whether it follows some sort of a numbering system ***but they have put up a number outside every household***.<br>Res 9:<br>I don't know, ***I think the letter boxes would really look nice***, the residents are going to love their colors. The other problem is that when ***you are buying something being couriered with DHL***, ***American Express*** or ***UPS***, the ***delivery of a parcel is sometimes a problem.*** Just go around ***BHC in Urban areas, they just do their numbering in their own way***, they is ***no sequence and straight forward***. There is also ***no straights roads and the way they number their house*** is painful towards other industries.<br><br>Res 10:<br>I think it ***will work all the areas*** that have been mentioned though ***it will take time***. | Borehole data is with Geological Division, DWA because they deal with water table.<br><br>Urban areas are easy to find a location.<br><br>Semi-Villages or hybrid is also easy.<br><br>Villages and Rural areas is easy through wards or sub-wards as main boundaries.<br><br>I don't know. Numbering of houses in Urban areas not sequential and not straight forward. Its difficult to locate a household. | Boreholes associated with property.<br><br>Urban areas.<br><br>Semi-Villages.<br><br>Villages and rural areas are easy through wards and sub-wards as an identifier. | Boreholes are used as coordinates reference system<br><br>Urban areas are physically planned<br><br>Some villages are planned physically<br><br>Wards and sub-wards are used as geographic area identifier. |

| | | | |
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| | Can find location in all areas but it will take time to filter to the ground. | Urban area numbering not uniform with other stakeholders and the roads are bad<br><br>Can work in all 3 settings after stakeholder buy-in. | Urban areas numbering of properties not standardised. Urban poor roads infrastructure<br><br>Applicable on all settlements patterns. |

**Table 33: Digital representation context index**

| **Broad Codes** | Digital representation context | | |
|---|---|---|---|
| **Interview Question (IQ)** | IQ23: In your experience, how easy is to go around using a gadget with a navigation capability? | | |
| **Responses (Res) or Experiences** | **Fine Descriptive Codes** | **Researcher's Preliminary thoughts or Notes (what is this about?)** | **Initial Categories** |
| Res 1:<br>I know that the ***GPS gadgets have been loaded lately*** or ***the maps have been updated lately***. It ***used to be very difficult.***<br><br>***Its not really that easy to locate a residential place*** but ***when its commercial its much better and the GPS gadget can take you there***. When you are ***using the gadget to locate a household, its very difficult***. | With new updates of GPS data, it might work.<br><br>It should be easy for commercial but not residential households. | GPS Data currency is very important and make it easy.<br><br>Positional accuracy is a shortfall for residential households compared to business. | A good address data quality makes it easy.<br><br>Poor residential address data quality makes it difficult |

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| Res 2:<br>I ***think you can be successful***, I ***was in a car that has a GPS*** and to ***my observation, it's a thing that can be used.*** | I think you can be successful, having observed it before. | Through experience, logically it will work. | Through GPS digital representation |
| Res 3:<br>In ***Cities and Towns is easy to use gadgets*** with ***navigation capabilities*** like Gaborone. | | | |
| If you take ***Garmin and TomTom***, you will be ***able to arrive at a certain location because they have requested data from us as DSM***. | Its easy in Cities and Towns to use Gardgets (Garmin and TomTom) the current DSM data. | In Urban areas, gadgets are updated with the current mapping data. | An updated mapping address data quality makes it easy |
| We have an ***internal portal that is still being developed that you can search for an address*** and ***know where you are.*** | Developing internal portal for address location. | Development of IT web applications or portals. | Physical address interoperability enable apps to go around locating places. |
| Res 4:<br>It is ***very easy***, as you have seen that ***we have the tracking system*** and the gadget here in EA to see the big area of the suburbs.<br>"Pictures of the system taken" | Its would be very easy because we currently using it in our ambulances. | In-vehicle navigation system. | Ubiquitous use of Physical Address System navigation system. |
| ***If the google maps that we use can have Plot numbers***, that when ***we can work much better because we can reach precise location than what we are doing right now.*** | If google maps could have plot numbers, it be great. | Use of address related software | Physical address interoperability enable address related software. |
| Res 5:<br>I think for you to do that, ***you might need to take few trips first to orientate*** yourself ***else I don't think we are there as far I think navigation capabilities are needed***. | | | Innovation solutions can make it easy. |
| Res 6:<br>***I haven't had the experience a gadget experience but looking at the future, this will be easy after all the streets will be names and house*** | I think navigation capabilities are needed in Botswana. | Physical addressing resources are needed. | The digital divide makes it impossible. |

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| ***number provided.*** | | | |
| Res 7:<br>In ***Gaborone is not easy to around using a gadget with a navigation capability***, we ***don't have the updated information in our gadgets***.<br><br>Recently ***there is a penetration of smart phones*** and ***some of them have maps*** but the ***User Experience (UX) of these maps is not at that level as expected in Botswana***.<br><br>My phone ***can tell me the current position where I am standing***, but ***if I insert my plot number, it cannot tell me where it is***.<br><br>Res 8:<br>In ***Botswana I have never actually used it***, my use of a gadge was actually ***when I was outside the country***. Maybe ***I haven't seen the need to use it***, and ***I am not even show to what extent it will work or perhaps the ones that comes with the phones will work.*** The last I heard, ***people always said Botswana maps are not uploaded/updated or so many things to that effect***.<br>Res 9:<br>***I don't have one,*** I ***don't know so I can't tell you***. I ***have been here for so many years and I know where I am going***. ***Local knowledge*** of the area ***manifest amongst using gadgets for locations***.<br><br>Res 10:<br>***Is not easy in Gaborone to use a Gadget***, if you can ***ask me about some street in Gaborone, I get lost*** and if ***you use the GPS, it makes you to go around and around***.<br><br>Res 11:<br>I ***lived here in Gaborone since 1985***. | I haven't had the experience a gadget experience.<br><br>Gaborone is not easy to around using a gadget with a navigation capability.<br><br>User experienced of these maps is not mature in Botswana.<br><br>In Botswana, I have never actually used it except outside and never seen the need.<br><br>People always said Botswana maps are not uploaded or so many things to that effect.<br><br>I haven't had the experience of a gadget but personal experience. | No gadget experience.<br><br>Complexities of Urban areas technology use.<br><br>User Experience is still needed.<br><br>Comfortable with current Physical Address System<br><br>Map data currency is very issues.<br><br>No gadget experience but local knowledge is better. | Urban area orientation and context awareness.<br><br>IT Usability principles makes it easy for people to use cellphones.<br><br>Compatibility with the current addressing system.<br><br>Poor map data quality makes it difficult.<br><br>There is a Digital Divide but local knowledge better.<br><br>Local knowledge descriptions are better. |

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| I ***haven't been bothered*** because I ***know the streets are not numbered and named correctly and I will be lost***. | Local knowledge descriptions manifests and it's not easy in Gaborone to use a Gadget.<br><br>I know my orientation in Gaborone because of experience since 1985. | Local knowledge is better that technology.<br><br>Orientations and few of locality experience. | Local knowledge and Years of experience is enough. |

**Table 34: Physical World context index**

| **Broad Codes** | Physical world context | | |
|---|---|---|---|
| **Interview Question (IQ)** | IQ24: In your view, can I find your organization assets, land parcels, places of interest, on my own without assistance given the GPS coordinates? | | |
| **Responses (Res) or Experiences** | **Fine Descriptive Codes** | **Researcher's Preliminary thoughts or Notes (what is this about?)** | **Initial Categories** |
| Res 1:<br>Its ***not easy in Botswana***. Its not easy and ***it's a question of are we really tech*** savvy because not everyone at ***the entry level uses smartphone***. | It's not easy in Botswana and it also tests themap technology savviness. | GPS coordinates are difficult and need map technical skills. | Training and development of maps is needed. |
| Res 2:<br>It ***wont be easy***. | It won't be easy. | Not easy. | GPS coordinates not user friendly. |
| Res 3:<br>***Yes you can***, With the ***knowledge background of mapping***, you can be | Its possible with cartographic mapping skills. | It's possible for GIS professionals but not novice user. | Map skills development and training needed. |

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| ***successful on doing that***. | | | |
| Res 4:<br>We have ***GPS in our ambulances***, I think you can if are ***given the coordinates and our crew have to put them in the GPS gadget and it will take them to the exact location***. | Given the coordinates and our crew can take them to the exact location. | Ease of use of in-vehicle navigation. | Expect Knowledge is required to use GPS gadget. |
| Res 5<br>I think you can but ***you need expect knowledge on how to use them***. | Expected knowledge needed on the use | Requires extensive knowledge. | Skills transfer and training needed for maps. |
| Res 7:<br>***Nop, its very difficult to find a place given coordinates.*** | It's very difficult to find a place. | GPS coordinates are difficult on physical address. | GPS coordinates jargon not user friendly and not easy to understand. |
| Res 8:<br>No, ***do you mean given a tool or coordinates just like that***, then ***I wouldn't find a place***. | Even given the tool to use GPS coordinates, I wouldn't find a place. | Need technical skills to operate a tool. | Tool-in-Context and training required. |
| Res 9:<br>I ***don't have a smart phone***, my phone is in a way literally smart because ***It can just call and receives messages only and that's it***? | Lack of access to smartphone. | Smartphone accessibility issues compared to low entry mobile phones. | Inclusive smartphone access and the issue of the Digital Divide. |
| Res 10:<br>No, ***you can't, it is very difficult***. | It is very difficult. | GPS coordinates are difficult alone for physical address. | GPS coordinates not difficult to understand. |
| Res 11:<br>Given coordinates, ***As a Geomatics lecture***, I know I have to do ***some calculations or put them in the gargets*** but ***people who are not knowledgeable of using coordinates will have problems***. | Expect knowledge is required to be successful and I am a Geomatics lecturer. | As a professional, its easy to use GPS Coordinates. | GPS coordinates are usable by mostly Professionals. |

**Table 35: People context index**

| **Broad Codes** | People context | | |
|---|---|---|---|
| **Interview Question (IQ)** | IQ25: What is your take on this, does being given directions for a particular location by someone or using local knowledge easier to find a residence, a land parcel or a place of interest. | | |
| **Responses (Res) or Experiences** | **Fine Descriptive Codes** | **Researcher's Preliminary thoughts or Notes (what is this about?)** | **Initial Categories** |
| Res 1:<br>Its ***definitely not***.<br><br>"QUOTE" | It's definitely not easy with directions. | Understood and interpreted differently. | Confusing as they can be interpreted with reference to context. |
| Res 2:<br>It ***makes it easy if you know Gaborone***, the ***directions are easy given to a person who knows the area*** rather a ***new person***. | Directions are easy given to a person who knows the area. | It depends from the orientation the person who describes then. | Descriptions are orientation and context dependent |
| Res 3:<br>***Some people are comfortable to description as way of addressing***.<br>For example,<br>I always use an example of Selibe Phikwe Town, they use descriptive information as way of giving locational address, the taxi drivers out there know the plot numbers and street names and they will take there. | Some people are comfortable to description as way of addressing. | Its what they are used as a form of physical addressing. | Easy to use and understand directions. |
| Res 4:<br>If it was me, ***I will look for a system that locates the cellphones like where a patient is calling from for easy identification of a location and the ambulance comes straight to the location***. That will be ***much easier than taking directions rather left turn and right turn***.<br><br>***We actually upgraded to using the system***, firstly before we have a system we ***were using a map book*** were ***paged to a particular location*** and **it *was tedious process to see if plot numbers match and all the*** | An innovative system would be better easier than taking directions as patients call in panic situations or very sick. | Directions are cumbersome compared to technology with regard to the patient situation.<br><br>Traditional way of describing | Uncertainty about direction because patients call in panic situations.<br><br>Traditional descriptive of |

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| ***like*.** Then we found that ***there is something better than a map book***. This is much better because we can even ***see where the ambulance is on the ground***. | Map book was the order of the day for doing business before the advent of technology. | physical addresses still works even though there are systems. | addressing is functional. |
| | | Digital representation is advancing. | Digital representation Context always win. |
| Res 5:<br>***That's the practice here in Botswana***, sometimes ***you need to ask twice until you get to the right place***. | Technology brings visual capability to view the ambulances on the ground or dispatched. | | It's the people preferences and experiences. |
| | People are orientated to giving directions in Botswana. | The people experience of people way of giving directions is a reality. | |
| ***People don't really know their locations***, the ***person might know how to get there but to direct someone is always a problem***. | | | |
| Using a ***local knowledge*** sometimes ***gives advantage*** because ***you know your location or bad enough you might be lost***. | | | Directions are complex. |
| | | Not easy, Some people can't provide directions. | |
| Res 6:<br>People ***interpret the descriptive directions according to their orientation or local knowledge***. | The person might know how to get there but can't provide direction. | | Descriptions are orientation and context dependent. |
| | | Interpretation of direction is | |
| On the other end, ***the other person doesn't understand the same orientation*** which results to them ***being lost. So, It depend on people orientations***. | Interpretation of description directions depends according to their orientation. | dependent on orientation. | Directions are complex. |
| | | Its difficult. | |
| Res7:<br>***It is very difficult because direction cannot take you there*** because ***directions are interpreted by someone with different orientation*** and ***some of the names we have are duplicates***. Like ***Chadibe at Tswapong and another Chadibe in Central District*** or ***Lethakane-Orapa and another Lethakane so far***. | It is very difficult because direction cannot take you there. | | Area names duplicates makes directions difficult. |
| | Duplicate descriptive name which is confusing. | Names are duplicates for certain locations. | |
| Res 8:<br>***Yes***, ***using a local knowledge*** or ***description is easy to find a place***. | | | |

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| Res 9:<br>We ***use simple descriptive directions*** and ***we use a plot number to be exact to the household*** that ***need to be monitored***.<br>Res 10:<br>***Its not easy because description can be anything because people describe things differently***.<br><br>Res 11:<br>Well, ***I just use my own memory because I stayed here long enough***, if there is any ***new development, I will know it or I knew about it***.<br><br>Having said that, if you ***have visitors or tourist, they will need everything in black and white*** so that when you say Broadhust Industrial, ***they will be able to go there***.<br><br>***Somebody coming outside Gaborone or Botswana,*** will have ***difficulty of finding places or of the orientation in Gaborone*** but for me, I ***have the advantage of the local knowledge and I have stayed here continuously for more than 30 years***. | Descriptions are easy to find a place.<br><br>Its easy to use simple descriptive directions.<br><br>Its not easy because descriptions are interpretive.<br><br>For visitors, it might difficult on finding places compared to me who stayed more than 30 years in Gaborone. | Its easy to find a location through directions.<br><br>Descriptive directions are easy to understand.<br><br>Its not easy.<br>Descriptions are interpreted differently.<br><br>Its might be difficult for visitors.<br><br>I have experience of my location, I know my way around. | Directions are easy to find a place.<br><br>Easy to use and understand.<br><br>Directions are complex.<br><br>Directions are complex.<br><br>Local knowledge and experience to direct properly makes it easy. |

## 9.8.3 Appendix 8.3: Data analysis and presentation of Research Objective 3

### Research Objective 3

*to identify and determine how the determinants of innovation may inhibit or enable the innovation adoption process of the Physical Address System, in context*

**Table 36: Prior Conditions index**

| **Sub-Theme/Broad Codes** | Prior Conditions (Previous practice and Norms of the social systems) | | |
|---|---|---|---|
| **Interview Question (IQ)** | IQ31: Please tell me your physical address or locational address where we are having this interview? | | |
| **Responses (Res #) or Experiences** | **Fine Descriptive Codes** | **Researcher's Preliminary thoughts or Notes (What is this about?)** | **Initial Categories** |
| Res 1: | | | |
| Example: | | | |
| BHC Headquaters | Building name | Building address. | A mix of multiple physical address types for a single unique location. |
| Cnr Mmaraka and Station Road | Roads network intersection | Intersection address. | |
| Plot 4773 | Plot number. | Plot number address. | |
| Gaborone | Administrative Area/Suburb. | Area boundary address. | |
| Res 2: | | | |
| Example: | | | |
| Deboirnairs Pizza, | | Landmark address. | A mix of multiple physical address types for a single unique location. |
| Main Mall | Landmark or Point of Interest. | Informal Address. | |
| Opposite Power Corporation | Descriptive addressing. | Area boundary address. | |
| Gaborone | Administrative Area/Suburb. | | |
| | | Post Office Address | Postal Office box address |
| Res 3: | | Area boundary address. | A mix of multiple physical address types for a single unique location. |
| Example: "*Digital Mapping Product*" pamphlet | Postal mail box delivery | Street and plot address. | |
| Private Bag 0037, | Area boundary. | Phone number address. | |
| Gaborone | Administrative Area/Suburb. | Fax number address. | |
| Station Road, Plot 1285 | Street and plot number. | Email address | |
| Phone: (+267) 3623-200 | Phone number. | Descriptive address. | Descriptive address to someone. |
| FAX: (+267) 3952-702 | Fax number. | | |
| EMAIL: dsm@lists.gov.bw | Email address. | | |
| Res 4: | | | |

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| Example:<br>Let me give you descriptive directions coming from Airport Junction Robots. "You head straight facing Barclays cycle, there is you turn in you left, the tun left again and curve with the road, after Botswana craft heading to MetSef, you take the second turn on the right and then first right you be at Emergency Assist building or Look-up for the board outside". | Descriptive address. | | |
| Res 5:<br>Example:<br>4 Choye Street<br>Library, Main Mall,<br>Gaborone | | Street and plot address.<br>Landmark address.<br>Area boundary. address | A mix of multiple physical address types for a single unique location. |
| Res 6:<br>Shared the pamphlets about the definition of the LAPCAS project)<br>Example:<br>Plot Number (I don't know it)<br>AKD House<br>Gaborone | Street number and name.<br>Landmark or Point of interest.<br>Administrative Area/Suburb. | Plot number address.<br>Building address.<br>Area boundary address.<br>Lot number address<br>Intersection address.<br>Area boundary address | A mix of multiple physical address types for a single unique location.<br>A mix of multiple physical address types for a single unique location. |
| Res 7:<br>Example:<br>Lot 2419, Extention 9<br>Cnr North Ring Road and Baffulo Close<br>Gaborone | Plot number.<br>Building name.<br>Administrative Area/Suburb.<br>"Lot" number. | | |
| Res 8:<br>Example: (Participant Observation)<br>Where we are now, (Asking someone across the table, do you remember the plot number, i always ask this address because it confuses me. The colleague told the Interview Participant the plot number).<br>Plot 20577<br>Block 3 Industrial, | Roads network intersection<br>Administrative Area/Suburb. | Plot number address<br>Site address.<br>Area boundary address. | A mix of multiple physical address types for a single unique location. |

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| Gaborone. | | | |
| | | Site address. | A mix of multiple physical address types for a single unique location. |
| Res 10: | | Street address. | |
| Example: | Plot number. | Complex address. | |
| Block 3 Industrial, | Site description. | Plot number address. | |
| Magotshanyana Way | Administrative Area/Suburb. | Area boundary address. | |
| West industrial Estate | | | |
| Plot 6983 | | | |
| Gaborone | | Room and floor address | |
| | | Building address | A mix of multiple physical address types for a single unique location. |
| Res 11: | Site description. | Intersection address. | |
| Example: | Street name | | |
| Room 142 | Estate description. | Landmark address | |
| Block 428 | Plot number. | | |
| Corner Mabuthu and Notwane | Administrative Area/Suburb. | Area boundary address. | |
| University of Botswana | | Country address (Botswana = BW) | |
| Faculty of Engineering and Technology | | | |
| Department of Civil Engineering | | | |
| Gaborone | Room and Floor numbers | | |
| Botswana | Building name. | | |
| | Roads network intersection | | |
| | Landmark or Point of Interest | | |
| | Administrative Area/Suburb. | | |
| | Country name called Botswana | | |

**Table 37: Compatibility Index**

| **Sub-Theme/Broad Codes** | Compatibility |
|---|---|

| **Interview Question (IQ)** | IQ32: Is the current way of physically locating residences, land parcels or places of interest working, how is working well or not working well for your organisation? | | |
|---|---|---|---|
| **Responses (Res #) or Experiences** | **Fine Descriptive Codes** | **Researcher's Preliminary thoughts or Notes (what is this about?)** | **Initial Categories** |
| Res 1:<br>I ***don't think is working*** because of the mindset, ***I don't think people have been trained on how it works*** or ***oriented to know if this is how you should locate a physical address***.<br><br>I think in Botswana, to a ***larger extent we don't know or we are not used to location addresses***. We just ***locate by using prominent buildings*** to that ***area not necessarily through location address***. | I don't think is working.<br>People have not been trained on how it works and we are not used to location addresses. | The need for skills and training for effective use of physical addressing. | Training and development to increase knowledge and its usage. |
| Res 2:<br>Sometimes you find that ***some of the locations(plot numbers) to deliver at is not included in the map***<br><br>Some of the ***plot numbers are repeating itself*** and it's a challenge for us. | Plot numbers are not included in the map and are repeating itself. | Missing and duplicate plot numbers. | Not working as plot numbers has poor address data quality. |
| Res 3:<br>***Nop, it's not working.*** | The current way it's not working. | | |
| Res 4:<br>***Not really efficient and effective***, so ***we have to run with what we have for now***.<br><br>***Its working*** but it ***takes a lot of time to locate a place where we would like to go and the life of a patient*** is always at risk, like I said that ***we don't have house numbers for now***.<br><br>We can simple say that ***we have adapted to using to using the clients*** | There is no choice but to use the available current way of addressing.<br><br>It's working but it takes a lot of time to locate a place because of lack of house numbers.<br><br>We have adapted to using to using the directions. | The descriptive and traditional way of addressing is not working.<br>The only way of addressing which is not effective and efficient.<br><br>The lack of house numbers requires time. | It's difficult to move from norms of the social systems.<br><br>The current is ineffective and inefficient.<br><br>Nonexistence of house number.<br><br>Compatibility issues as |

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| ***directions***, so if ***we can be given a better solution to work with, we can cut our response time in half***, that ***will be great initiative.*** | Any innovative solutions are welcomed | Accustomed and adapted to directions as a way of addressing. The need Innovative solutions | people are accustomed or used to the current way of addressing. |
| Res 5: This ***current way of addressing is not working,*** I ***know that for me to get somewhere, I will need a plot number and a street name***. | Plots are numbered and street named but it's still difficult to use the current way of addressing. | Not working but streets names and plot are seldomly used even though they exist. | Creating awareness of physical addressing components is welcomed. |
| Res 6: Currently, what is happening in ***Cities and Towns is that all plots are numbered but the numbering is not sequential***. For instance, "you are plot number 2, you are between plot 1 or 3, when you sub-divide this plots, this portion is going to have a different numbers depending which last plot was numbered somewhere else in the entire City of Gaborone, say the City is already at 5000 compare to the previous partition of 2 of the single digits. How do you look for plot 2 with the range of plot number of 5000 range. ***We saw this as a challenge, what is the best way, we realised that the best way is come up with Location Addressing***." | Cities and Towns numbering not consistent. | Urban area numbering not uniform. | Urban areas numbering of plots not standardised. |
| | The challenge resulted to need to conceptualise the locational addressing pilot project. | | |
| Res 7: The current system is **not working very well**, 1) some of the streets names like **I mentioned Northern Ring Road are not known by residents in Gaborone**. Some people live in these areas but when **you ask him/her what streets name does they live at, they have no clue**. | Street names are unknown by residents, if known they are not used. | Conceptualization of locational addressing pilot project. | New standardised Physical Address System is a way forward. |
| | | Seldom usage of street names by residents. | Seldom usage of street names. |
| Currently in Botswana, there ***is no standard way of addressing***, if you go to your neighbor and ask him/her to write their address, ***they might write differently*** or ***don't use the street name but they know their plot numbers but in Botswana,*** even though the **numbers are not sequential**. | There is no standard way of addressing. | | |
| | Doesn't use the street name but they know their plot numbers. | Addressing is not standardized. | Address standardization is a priority. |
| Res 8: ***So, for my personal experience, the current way of locating addresses it's not working and can pose challenges for purpose of identification*** | | People remember and know their plot numbers compared to the | Physical address is connected to status; bring |

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| ***only of the location.***<br>***"QUOTE"***<br>Res 9:<br>***Its working for us because we use plot as they are the ones available for us to direct our crews***, we ***work with what is available and we have mastered it***.<br><br>This is because we ***are localized in one area and its manageable in that aspect***.<br><br>Res 10:<br>• This ***traditional approach of addressing or current approach is not working for us***, looking at our ***Culture in Botswana, people don't like reading or reading the streets names to be exact***.<br>• Batswana likes ***descriptive address and they always locate places with old names or places of interest***.<br>• The ***traditional address that I gave you is also cumbersome to a normal Motswana***.<br>Res 11:<br>***Its not working.***<br>***"QUOTE"*** | The current way of locating addresses it's not working.<br><br>Work with what is available and we have mastered it.<br><br>Batswana likes descriptive address and they always locate places with old names or places of interest because they don't like to read and it's cumbersome.<br><br>The traditional way of addressing is part of norms and standards for Batswana people.<br><br>The current way it's not working. | streets.<br><br>Identification of locations is difficult to achieve.<br><br>Mastered the art of what is available to us and it works.<br><br>Descriptive address aligned to culture and illiteracy.<br><br>If previous practice works, why change it.<br><br>The descriptive and traditional way of addressing is not functional and working. | dignity and identity of being.<br><br>Complex way of addressing.<br><br>Logical, contextual and practical way is how we work with the current system.<br><br>Culture and illiteracy levels make it difficult.<br><br>It's difficult to move from norms of the social systems which is cumbersome.<br>Physical addressing change is imminent from the current one. |

**Table 38: Perceived easiness index**

| **Sub-Theme/Broad Codes** | Perceived Easiness | | |
|---|---|---|---|
| **Interview Question (IQ)** | IQ33: How easy is your organisation currently finding their assets, land parcels, places of interest within the country? | | |
| **Responses (Res #) or Experiences** | **Fine Descriptive Codes** | **Researcher's Preliminary** | **Initial Categories** |

| | | thoughts or Notes<br>(what is this about?) | |
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| Res 1:<br>Every BHC has a number. At the moment, the ***number is still confined to BHC internally***, we ***are the only one who knows what that number means*** and they ***general population or public do not know***.<br>For example,<br>" You will the number written like GW 243234, we know that in our system, its Gaborone West Suburb for the GW and house number 243234. In this instance, the public would not know but internally we know or In some number, if its start by TA, BHC knows that it's a Town House."<br><br>Its surprising that the names of ***areas or suburbs*** in Gaborone are ***not called by the names that we know***, For example- you find that ***Bontleng*** that we are used to is called Extension 34 and its not used. That's what ***people do not know***. ***Stakeholders have to come together and promote these names***.<br><br>Res 2:<br>We use an ***A0 paper size map in the store to look-up for the plot numbers***.<br><br>You ***have to be familiar with Points of Interests in Gaborone*** as customers use them *to describe the location to deliver pizza*.<br><br>***Local knowledge is critical*** in Pizza business and have observed that ***being aware of Gaborone and its surrounding areas is very important***<br><br>We have ***observed that mostly new hires get lost***.<br><br>Res 3: | Using internal unique number known to BHC only.<br><br>The general population or public do not know.<br><br>The names of areas or suburbs in Gaborone are not called by the names that we know.<br><br>Stakeholders need to promote these names.<br><br>Use maps to look-up for the plot numbers.<br><br>Customers use points of interest to describe the location to deliver pizza.<br><br>Observed that mostly new hires get lost.<br><br>We use Satellite Images or Aerial | Various unique numbering systems used.<br><br>Public don't BHC number represent.<br><br>Names not used by public.<br><br>Names need to be promoted but exist.<br><br>Use of paper maps.<br><br>Use point of interest. | BHC have their own house numbering standard.<br><br>Need communication strategy to create awareness for the public.<br><br>Names not used by public.<br><br>Seldom usage of street names but it's not easy.<br><br>Use of manual map interpretation.<br><br>Use landmark address<br><br>Accuracy and reliability of maps makes people get lost.<br><br>The use of physical Address |

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| Firstly, Its either you find it from ***Satellite Images*** or ***Aerial Photographs*** and secondly ***you go strictly to the ground to do cadastral survey***. | Photographs or perform cadastral survey. | New hires get lost. | coordinates referencing. |
| Res 4:<br>As you know that ***we have places like Maun, places that are further from Gaborone***. If the Ministry of Health is ***asking for assistance for us to get a patient from Maun to any place where the patient can be assisted better***, that's when ***they contact us, and we call the Okavango Air Rescue***. We have a **nurse**, a **doctor** and the ***pilots as the nurses assists***. | If the place is far, we call the Okavango Air Rescue. | Use satellite images.<br>Use aerial photographs<br>Do cadastral surveying. | Address accessibility for services through air.<br>Use of the address-related software |
| How do you find someone on the ground, ***there is a process we do*** and ***we use a software to assist us***. Process for ***EA 991 is as follow***: "QUOTE" | There is a process we do and we use software to assist us to get to a particular address as EA 911. | With physical address, we reach everyone around the country. | Using physical address types for different stakeholders. |
| Res 5:<br>Currently ***we are still using the plot numbers and title deeds numbers from GCC***. | Using the plot numbers and title deeds numbers from GCC. | Use locational software in emergency services. | |
| Res 6:<br>As ***surveying professionals at MLH***, we are ***using the plot number and the coordinates*** because we know ***how to interpret them because we use them in our tool everyday in our process***. | We are using the plot number and the coordinates as surveying professionals. | Use plot numbers and title deeds as address from different stakeholders. | Use of manual map interpretation. |
| Res 7:<br>We ***have to look at the map*** and ***locate the place before we leave to site*** of that assert else ***we are going to get lost***. | Have to look at the map and locate the place before we leave to site. | Surveying professionals use multiple physical address types. | Use of internet access. |
| Res 8:<br>Through our ***website***, there is a contact number and a plot number, you call them and they will describe the location.<br>On the ***telephone book***, we sponsor a page and you will find it and you can get the address and | Through our website. | Use of paper maps. | Use of telephone address.<br>Use the Contingency plans to get there. |

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| ***Look at other ways to locate at your own means***, E.g just drive there in person and ask people or any other means suitable .<br>Res 9:<br>We ***use simple descriptive directions*** and ***we use a plot number to be exact to the household*** that ***need to be monitored***. When the ***response crew arrives at the house***, they ***need to radio in the office to confirm the plot number*** they are at.<br><br>We got ***waypoint dotted around Phakalane area***. Remember that we do only Phakalane Suburb for now.<br><br>People that get lost often are mostly the ***new employees*** in our crew.<br>We ***have procedures and process*** that make sure that when someone is lost or arrives at the wrong house, we have something to follow to make it right next time.<br><br>Res 10:<br>We have a ***location map*** (***big map on the wall but in the villages we use point of interest***) that we ***use at the operation office to orientate our delivery drivers***.<br><br>Res 11:<br>We have ***one main campus*** here. ***Somebody coming outside Gaborone or Botswana,*** will have ***difficulty of finding places or of the orientation in Gaborone*** but for me, I ***have the advantage of the local knowledge and I have stayed here continuously for more than 30 years***. | On the telephone book.<br><br>Look at other ways to locate at your own means.<br><br>We use simple descriptive directions and plot numbers to be exact.<br><br>We got waypoint dotted around Phakalane area.<br><br>New employees in our crew get. lost.<br><br>We have a big paper map that we use to orientate our delivery drivers.<br><br>We have one main campus here. Somebody coming outside Gaborone or Botswana, will have difficulty of finding. | Use website.<br><br>Use telephone book.<br><br>Contingency means to locate addressing.<br><br>Describe address<br><br>Landmarks in the areas.<br><br>New hires get lost.<br><br>Use of paper maps.<br><br>The use of point of interest. | Use of descriptive address.<br><br>Use of landmarks address<br><br>Accuracy and reliability of maps makes people get lost.<br><br>Use of manual map interpretation.<br><br>Use of landmark address |

**Table 39: Perceived Advantage and PAS Adoption outcome index**

| **Broad Codes** | Perceived Advantage and PAS Adoption outcome | | |
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| **Interview Question (IQ)** | IQ34: Finally, If the physical addressing or location addressing is introduced, would your organisation adopt it to be in place in Botswana (Yes or No), please give a reason(s)? | | |
| **Responses (Res #) or Experiences** | **Fine Descriptive Codes** | **Researcher's Preliminary thoughts or Notes (what is this about?)** | **Initial Categories** |
| Res 1:<br>***Yes, it's a welcome development and it will help us in a big way***. We have ***to catch up with what other countries has been doing***. What is been worrying is that we are not trying to do what other people are doing especially in the ***developed world***, I think the ***locational addressing can help the country in a big way.as we speak if its introduced***, its ***difficult to locate a place in Botswana and time is money*** nowadays because people generally do not know how to locate place and ***if it comes it will assist us in a big way***. | Yes, new development in line with best practice of other countries are welcome it will help us. | The future is on innovation to change the status quo to be on par with the rest of the world. | Yes, Innovative concept is a game changer. |
| Res 2:<br>We are going to ***look at it to see how easy is it to use it to use in our business*** and then ***we will embrance it*** or ***adopt it per say*** | Will analyses its impact first and them adopt it. | The innovation will be reviewed and implement its fit to out context. | Yes, after the innovation has been reviewed and before its implementation. |
| Res 3:<br>We will adopt, most of ***people have realized that plot numbers are cumbersome*** as they ***can be partitioned hence they won't be sequential***. | Yes, Will adopt it because plot numbers are cumbersome. | Solve locating places issues with plot number. | Yes, the process of house numbering and naming streets is welcomed. |
| Res 4:<br>***We will definitely adopt the new system of Physical Address System in Botswana*** and it ***will be integrated as our top priority is to provide top quality medical assistance***.<br><br>If you can come-up with something better than we are using***, we can definitely go for it***. I think if ***we get a system that can work better*** that | Yes, Will adopt it and make it priority to provide top quality. | Physical address is a core datasets for integrating with others system to deliver services.<br><br>Physical address optimizes process and time in providing | Yes, Address data recognised as a core datasets. |

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| ***have plot number or best practice house number***, I think ***we can cut our response time in half*** because ***we will be knowing where precisely where you are on the maps that we use***.<br><br>Res 5<br>***Yes, we will adopt*** as ***we do not have anything like other countries***.<br><br>Res 6:<br>***Yes, we will adopt it*** because ***we understand the importance of it through the LAPCAS pilots that are already on the ground*** and ***theoretically how it can improve the life of citizens*** through its ***benefits***.<br><br>Res 7:<br>***I think its overdue***, we will ***definitely adopt the Physical Address System*** because we have ***seen it working in other countries and we believe it can work for us as well***.<br><br>***Currently we don't have anything***, we will ***embrace it definitely***.<br><br>Res 8:<br>***Yes, we will adopt it from the Post***. In fact, we have an o***bligation by virtue of being the Botswana Post and as custodians of postcodes*** and our relationship with ***ongoing national initiative of locational addresses in the LAPCAS project*** that we are involved in and our ***physical delivery of mail role relies there on the underlying infrastructure*** or ***addressable elements of location address*** as you can see (showing me the proposed locational address package). Ditimamodimo is the other name of Block 7.<br><br>Res 9:<br>Obviously, if ***the new physical address system is being introduced*** and it***s part of the city plans***, ***we don't have a choice but to embrace it*** and | Response time can be improved with innovative solutions.<br><br>Yes, will adopt it as a best practice with other countries.<br><br>Yes, will adopt it because we understand the importance of physical address.<br><br>We will adopt it as we have seen working in other countries as best practice.<br><br>Yes, will embrace it. Currently we don't have anything.<br><br>Have an obligation to as custodians of postcodes on the ongoing national initiative of locational address. | services.<br><br>Physical address facilitates trading of mail, parcels and goods globally.<br><br>Physical address contribute to social-economic and financial inclusion;<br><br>The benefits of the physical address are well documented.<br><br>Botswana is starting in a clean slate and it's a first innovation of its kind<br><br>The importance of an efficient and efficient physical address as a core infrastructure datasets not only for a quality postal service, but also for improving the living conditions of people around in Botswana.<br><br>Add value to smart cities initiatives because it improves the city living standard for all residents. | Yes, the innovation will be important on optimisation and time saving for reaching a certain location.<br><br>Yes, physical address facilitate easy trading.<br><br>Yes, it promote social-economic and financial inclusion.<br><br>There are known physical addressing benefits.<br><br>Yes, its first for the country and it will be welcomed.<br><br>Physical address is core infrastructure datasets and we have an obligation to see its success. |

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| configure our system.<br><br>Having said that, ***we will adopt it***.<br><br>Res 10:<br>***We will perfectly adopt it looking at that we will have a swift delivery***, this will help also of ***cutting costs of hiring courier's services in one area*** and it ***will results to hiring 1 or 2 to do you work where there is a shortfall***.<br><br>Res 11:<br>• ***Of course***, we ***are tired of this long descriptive way of describing things*** even if you have a sketch. They ***still call to make sure and confirm the location addresses***.<br>• When I ***am being asked about Postcode***, County or State when ***renewing a software license online or buying something online***, I use the ***one I used to have in England when I was still studying oversees, atleast the application goes through and life goes ON***. It will be great to have our own physical address and postcodes. | It will be part of the City plans to add to the smart cities initiatives.<br><br>Yes, will adopt it as it offers for swift delivery and cutting costs.<br><br>Yes, will adopt it because describing things is confusing even though it works<br>.<br>Will be proud to have something for Botswana rather than use England postcode on online shopping. | Convenient and cost cutting measures.<br><br>Descriptive addresses are interpreted differently.<br><br>Proud for Botswana.<br>Pride for Botswana. | Yes, it add value to the Smart Cities initiatives.<br><br>Yes, for cost cutting measures.<br><br>Descriptive addresses are interpreted differently.<br><br>Yes, The country sense of identity and dignity will be restored as Botswana will have PAS. |

## 9.9 Appendix 9: Chatting themes of the Framework Analysis method Stage

**Table 40: Chatting of the themes from the empirical evidence**

| Charting of themes | | | |
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| Participants | Stakeholders | Context | Determinants of Innovation |
| Res 1 | "Through the ***Housing forum***, we ***share the ideas***, ***share skills***, we ***share experiences***, and information where we seat together and there are presentations, [Res 1_Vertical_1, Pg 2: 57-58]<br><br>"we are ***able to know what is happening and being informed***." [Res 1_Vertical_1,Pg 2:60-61]<br><br>***"Stakeholders have to come together and promote these names***." [Res 1_Vertical_1, Pg 4: 129-130]. | "I think in Botswana, to a larger extent we don't know or we are ***not used to location addresses***. We just locate by using ***prominent buildings to that area*** not necessarily through location address." [Res 1_Vertical_1, Pg 4: 115-116]<br><br>"It's surprising that the names of areas or suburbs in Gaborone are ***not called by the names that we know or normal hear***, For example- you find that Bontleng that we are used to or know is called Extension 34 in Deeds Title and it's not used by the public. ***That's what people do not know***." [Res 1_Vertical_1, Pg 4: 127-129]. | "I don't think is working because of the people mindset, I don't think people have been ***trained how it works or oriented to know if this is how you should locate a physical address***." [Res 1_Vertical_1, Pg 4: 113-114] |
| Res 2 | "We make and deliver pizza at our ***customers at a certain plot number;*** we make sure that ***the pizza arrives in time*** after being ordered from the Store either by the phone and walk-in." [Res | "We are using a ***simple printed map to look up for our locations*** where we need to deliver" [Res 2_Vertical_1,Pg 2:37]<br><br>"Sometimes you find that some of the ***locations*** | "I think ***you can be successful***, I was in a ***car that has a GPS*** and to my observation, it's a thing that can be used." [Res 2_Vertical_1, Pg 2:62-63]. |

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| | 2_Vertical_1,Pg 1:3-4] | ***(plot numbers) to deliver pizza at is not included in the map***." [Res 2_Vertical_1, Pg 2:46]<br><br>"Some of the ***plot numbers are repeating itself*** and it's a challenge for us." [Res 2_Vertical_1, Pg 2:47]. | |
| Res 3 | "We are ***the custodian and we have the mandate to produce the accurate*** and ***legal information about land in Botswana***." [Res_3_Vertical_ 1, Pg 1:19-20]<br><br>"LAPCAS Project Team at ***MLH is the facilitating body*** and ***DSM is the implementing body of most of these components,*** because LAPCAS Project Team does not have the capacity." [Res_3_Vertical_ 1, Pg 3:85-86]<br><br>"Yes, ***we have our own standards***, when we transitioned and moved from analogue to digital from mapping and surveying and ***adopted other standards from ISO, BS and others***." [Res_3_Vertical_ 1, Pg 1:33-34]. "More ***communication and*** | "We have ***the linear approach that we are doing in towns or urban areas*** and we do not have to apply the linear approach methodology in the villages. In villages we have two components, in villages we apply ***linear to a proper survey*** but in ***old villages we apply Arial survey where you can slot point in households*** but not necessarily into a line. We have tested that in Palapye were we did a pilot, we realized from a test that ***we cannot follow 3 digits and now they will be more which means we need to sub-divide the ward into another divisions***." [Res_3_Vertical_ 1, Pg 3:74-79]. | "Yes, LAPCAS Project Team is ***the facilitating body*** and DSM is ***the implementing body*** of most of these components, because ***LAPCAS Project Team does not have the capacity***." [Res_3_Vertical_ 1, Pg 3:86-87]. |

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| | ***awareness need to be made.*** [Res_3_Vertical_ 1, Pg 3:101]. | | |
| Res 4 | "Ministry of Health is very important to be part of all process we do because is the ***regulator*** of what we do in the Health emergency industry and the Ministry offer us jobs to assist them which keep us in Business." [Res_4_Vertical_ 1, Pg 3:98-100]. | "***Villages*** have a lot of ***gazetted roads which are not registered*** in google maps and other map software. Its going to be hard for us because its not on the software/systems that were use here EA. But we have places that are ***semi-urban*** like Mahalapye and Palapye, we have our own agents on the ground that are from those places and they know the ***orientation*** and it's easy to locate someone through the use of the ***local knowledge***. For land and farms, we rely on the **nearest village on the map** and agents that are on the ground and we believe the agents we will get there, I believe it might work 50 percent." [Res_4_Vertical_ 1, Pg 4:125-130]. | "We can simple say that we have adapted to using the clients directions, so if we can be given a ***better solution*** to work with, we can cut our response time in half, which will be a ***great initiative***." [Res_4_Vertical_ 1, Pg 4:115-116]. |
| Res 5 | "Most of the time, all this ***infrastructure development*** starts from the Ministry of Land and Housing or other Ministries and then its handed to us for ***maintenance purposes***." [Res_5_Vertical_ 1, Pg 1:5-6]<br><br>We follow the ***standards from ISO and BOBS*** for ***compliance***. It also goes to the materials that are being used to put us the road and suburb boundary signage; they | "Currently we are still ***using the plot numbers and title deeds numbers*** from GCC, For me to go to a place like Phakalane, I will need ***a map to get there and it's not that easy*** because the numbering is not sequential." [Res_5_Vertical_ 1, Pg 3:103-105]<br><br>"I think it ***can work Farms and Land***s as Batswana are people who are known with rearing cattle's hence ***there are households around*** | "I think you can but you need ***expect knowledge on how to use them***." [Res_5_Vertical_ 1, Pg 4:122]. |

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| | are ***prescribed in the standards***. [Res_5_Vertical_ 1, Pg 1:28-29].<br><br>"Apparently the ***Permanent Secretary at MLH has the last say in the way forward of the LAPCAS pilot project*** even though we have given our inputs." [Res_5_Vertical_ 1, Pg 3:89-91]. | ***those boreholes that are regarded as water point,*** if we can ***get the coordinates of those water point, they we can always approximate*** households or assume that there are household around them and then ***provide an address for people out there***. If there is a farms, you can find a bird scarecrow on a ***farm boundary or get farm number of some sort because at the end of the day you need to locate households***." [Res_5_Vertical_ 1, Pg 4:111-116]. | |
| Res 6 | "The Ministry of Lands and Housing ***manages a project that seeks to improve Land Administration, Procedures, Capacity and Systems (LAPCAS) in Botswana*** which started around 2009. It has 7 components, one of them is the ***Location Addressing and still ongoing***." [Res_6_Vertical_ 1, Pg 1:4-7].<br><br>"We have structures, ***we have villages, we have wards they are associated with Village leadership*** that rule the community like Chiefs or Sub-Chiefs. Our people are associated ***more with wards that gives them the identity in a*** | "We looked at our situation, ***planned areas (urban setting)*** has been perfectly laid out on the roads and its easy to do the process and that's not a problem as it fit in the best practice around the World. Focusing on the ***non-planned areas (villages and remote setting),*** we have structures, we have villages, we have ***wards they are associated with Village leadership that rule the community*** like Chiefs or Sub-Chiefs. Our people are associated more with ***wards that gives them the identity in a society***." [Res_6_Vertical_ 1, Pg 1:27-32]. | "We will work together to come up with the structures, to see that they benefit both of us and moving forward by doing the ***pilots implementation***, so during implementation of the pilot, we could see that we are different Stakeholders, so ***each institution has to play their role***." [Res_6_Vertical_ 1, Pg 3:79-82]. |

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| | ***society***." [Res_6_Vertical_ 1, Pg 1:29-32]. | | |
| Res 7 | "In Botswana, we have an Act called ***Land Survey Act, that the act that guides or direct what a surveyor*** should do and how conduct land surveys." [Res_7_Vertical_ 1, Pg 1:9-10]. | "We tend to guide people with the ***physical features that you see around***." [Res_7_Vertical_ 1, Pg 3:93].<br><br>"We have to look at the ***map and locate the place before we leave to site*** of that assert else we are going to get lost." [Res_7_Vertical_ 1, Pg 4:100-101]. | "Recently there is a penetration of ***smart phones*** and some of them have maps but the ***User Experience of these maps is not at that level as expected in Botswana***." [Res_7_Vertical_ 1, Pg 4:121-122]. |
| Res 8 | ""Then within the Botswana Post, for the purpose of the project, ***I also have my own governance structures that I have to report to***, I do have meetings that I involve them at 1) LAPCAS Pilot Project, 2) then I have the meetings, as part of Steering Committee and 3) meet my principles as the Department of Postal Services, within the MTC who are my project sponsors." [Res_8_Vertical_ 1, Pg 5:141-144].<br><br>"There is a ***project steering committee***, I will admit that probably you might know, but those are just project issues and ***we don't meet as frequent or as much as we should I suppose***, so for that reason, | "So, in ***Urban areas it works very well*** and even from economical perspective it ***makes sense for us to deliver to the door steps***. So in the ***villages and rural areas*** like a place like Tshane, it doesn't work and it would not be viable to try ***and extend that service all the way to each individual households because of the spatial distribution of the households*** and even the mail volumes don't even warrant that." [Res_8_Vertical_ 1, Pg 8:279-282]. | "I could say the ***transport network metrics*** of Botswana Post has been outsourced to the Botswana Couriers but we ***own the metrics as we are the ones responsible for analytics of data, route optimization and strategies***." [Res_8_Vertical_ 1, Pg 2:50-52].<br><br>"The ***cluster boxes are at the sub-ward in every area***, the reason for that was ***simple viability of the service***. By the way, we don't say we deliver to the door step, its not a commitment that we can be held bye that says we promised ***to deliver by the door steps but ideal we are bringing your mail parcels close to you***." [Res_8_Vertical_ 1, Pg 8:270-273]. |

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| | a lot now, our forums are reactive depending on whatever the case will be at the time. ” [Res_8_Vertical_ 1, Pg 4:131-133].<br><br>“The ***public consultation*** is a big issue on the ***participatory process***, there has been a big challenge with that regard.” [Res_8_Vertical_ 1, Pg 7:212-213]. | | |
| Res 9 | “For anyone to have a ***security company that has guards you have to be the Citizen of Botswana for high security clearance and vetting by the DISS*** and that is reserved for Citizens.” [Res_9_Vertical_ 1, Pg 2:35-36]. | “We got ***waypoint dotted around Phakalane***. Remember that ***we do only Phakalane Suburb*** for now. ***People that get lost often are mostly the new employees in our crew***.” [Res_9_Vertical_ 1, Pg 2:19-20].<br><br>“We will ***benchmark to the strategy*** that we used in Phakalane Suburb to Block 10.” [Res_9_Vertical_ 1, Pg 2:63].<br><br>“***Local knowledge*** of the area manifest amongst ***any other ways of offering directions***.” [Res_9_Vertical_ 1, Pg 2:76]. | “The Police have a satellite office here at Phakalane Suburbs, quite often they don’t have vehicles, in that event we will take them to one of our client who has a problem to do the processing of the scene so that our client can be helped quickly. Because of that ***strategy of making sure we help with our cars, this helped us to expand in the market by signing other clients from this reputation*** through word of mouth but created more enemies from the likes of G4S, Security Systems because they were not taking care of their ***customers*** when they had problems.” [Res_9_Vertical_ 1, Pg 1:24-29]. |

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| | | | "As a Director of Security Alert, I am not a citizen, so I don't employ security guards but ***provide a security as a service in terms of innovative technology, monitoring and maintenance***." [Res_9_Vertical_ 1, Pg 2:37-38]. |
| Res 10 | "As private courier, we regulated by ***BOCRA***, like other Postal Operators." [Res_10_Vertical_ 1, Pg 1:7]<br><br>"We have ***agreement and partnership with FedEX*** and we communicate with technology and handle transaction that way." [Res_10_Vertical_ 1, Pg 1:24-25]. | "I think we are behind, ***the traditional approach of addressing is time consuming*** looking that we were not aligned with the best practice and it becomes difficult to do business with other countries." [Res_10_Vertical_ 1, Pg 2:38-39]. | "Our ***strategic positioning of our branches***. We can easily network, like our services now becomes easily accessible like for example, like when our ***parcel need to be delivery for long distance***, we have ***a relay type of methodology where our drives exchanges parcels until in the morning*** without a single driver transport the parcel where there are a lot of risks involved. Our turnaround time is ***overnight or a day***." [Res_10_Vertical_ 1, Pg 1:11-16].<br><br>"We offer ***training***, we have a close user group by the ***use of cellphones for communication***, we offer all our employees cellphones." [Res_10_Vertical_ 1, Pg 3:74-75]. |
| Res 11 | "The way LAPCAS was arranged was that there was ***10-15 Steering Committee*** and the ***50 Stakeholders in order to get*** | "I lived here ***in Gaborone since 1985***. I haven't been bothered ***because I know the streets are not number and names correctly and I will be*** | "I have ***trained quite a number of people***, say close 650 personnel from the Ministry of Land and Housing with regard to the |

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| | ***project buy-in***, this Stakeholders were divided in ***National Project Team (NPT)*** which has representative on different ***7 LAPCAS Components like Location Addressing***." [Res_11_Vertical_ 1, Pg 1:55-57].<br><br>"***We didn't have the Botswana Post***, but we brought them later." [Res_11_Vertical_ 1, Pg 3:70].<br><br>"The Programme Manager (Mr Malatsi) who reported to the President (HE) is passionate about the project because one of the ***challenges in terms of the project was that this location addressing is supposed to be the Councils (Cities and Town) mandate*** as ***the laws of Botswana***. It's not supposed to be Department of Surveys and Mapping and any other." [Res_11_Vertica_ 1, Pg 3:86-89]. | ***lost***." [Res_11_Vertical_ 1, Pg 4:118-119].<br><br>"I have the advantage of the ***local knowledge and I have stayed here continuously for more than 30 years***." [Res_11_Vertical_ 1, Pg 4:125-126].<br><br>"Of course, ***we are tired of this long descriptive way of describing things even if you have a sketch***. They still call to make sure and confirm the ***location addresses***." [Res_11_Vertical_ 1, Pg 5:133-134]. | LAPCAS project." [Res_11_Vertical_ 1, Pg 2:34-35].<br><br>"During the recession in 2008, when ***the President was prioritising project, he didn't stop the LAPCAS project because of the potential to stop Voter trafficking that is common***, he understood and was of a view that if this LAPCAS thing is finalized, ***the strategy we will be able to know where the voters are and do necessary political campaigns***." [Res_11_Vertical_ 1, Pg 3:80-83].<br><br>"One of the driving factors of the ***implementation*** of LAPCAS project was the ***Election Act***, well I don't know whether is written." [Res_11_Vertical_ 1, Pg 3:77-79]. |