

Exploring the Integration of Conventional and Innovative Approaches of Land Administration in Zambia

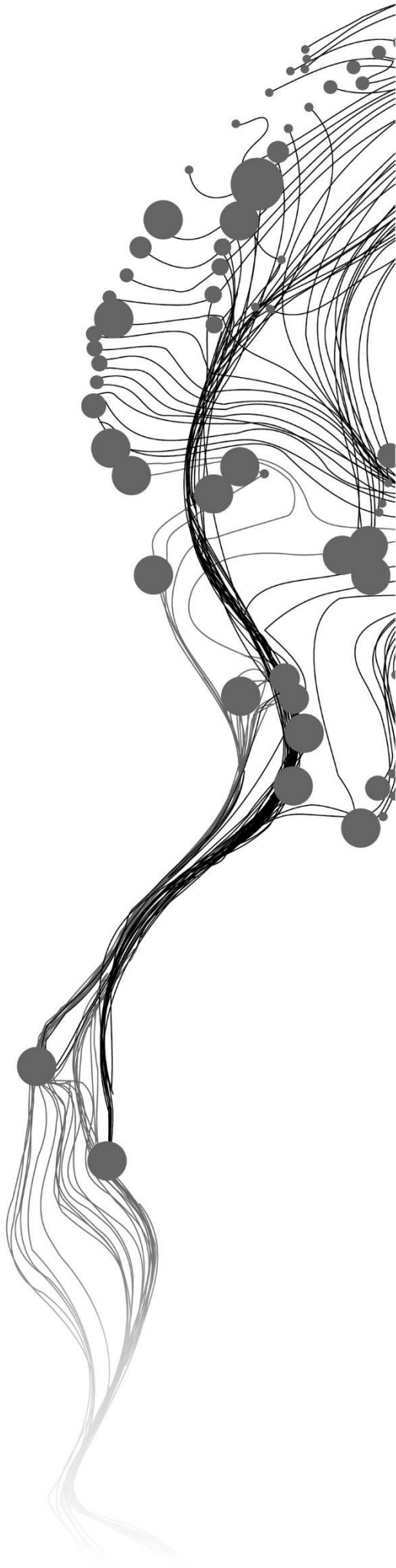
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June, 2020

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Enschede, The Netherlands, June, 2020

Thesis submitted to the Faculty of Geo-Information Science and Earth Observation of the University of Twente in partial fulfilment of the requirements for the degree of Master of Science in Geo-information Science and Earth Observation.

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DISCLAIMER

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ABSTRACT

The registration of land in land administration plays an important role as it is described as a formal process of recording land parcels information, including other details of their extents, tenure, use, and value. The land administration in Zambia has been experiencing challenges in land registration in the past decades. Some proprietors of the innovative tools have engaged in the documenting of customary lands and informal settlements. However, many of these innovative tools as well as the existing data collected by the innovative approaches have not been adopted into the formal registration system. This research, therefore, aimed at investigating the possibilities of integrating the conventional and innovative approaches of land administration to provide security of tenure for all such as the marginalised groups, women and the elite. The research adopted a qualitative approach which involved interviews with the key informants from government institutions and innovative organisations to obtain information on the conventional and innovative approaches for land administration in Zambia. The information gathered showed that there is a possibility of integrating the two approaches, either a full integration with the conventional system absorbing the innovative land approaches and taking full control of the system. The other option is to have the two approaches partly integrated with the conventional approach to collaborate with the innovative approaches in the provision and delivery of land management services. However, for effective integration to happen, there will be a need first to address the identified gaps in the spatial legal and institutional frameworks. From the status quo, it was ascertained that partial integration would be appropriate because the innovative will continue with their work and that the integration could be done in the already existing National Spatial Database Infrastructure (NSDI) platform. Information gathered will be integrated with what the conventional system currently has in place within the same platform. It is therefore recommended that the policymakers should work on the current laws such as the Land Survey Act 188,1960 by amending or making it flexible at the same time to finalise the draft land policy in order to accommodate the use of innovative approaches for land rights documentation that will allow the possible integration of the two approaches. For further studies investigating the impact of the integration of conventional and innovative land approaches from the perspective of the stakeholders may be considered and designing a framework for the integration.

Keywords: *Integration, conventional approach, innovative approaches, security of tenure*

ACKNOWLEDGEMENTS

I would like first and foremost to give praise and thanks to the Almighty God, for the wisdom, faith and confidence he provided to complete my research successfully.

My sincere appreciation to my supervisor's Dr Monica Lengoiboni and Dr Dimo Todorovski, for their supervision, valuable comments, guidance and time spent in reviewing my work as well as constant encouragement throughout this research.

Many thanks to the Dutch Government through Nuffic (NFP) for bestowing me the scholarship to advance my career. May I further take this opportunity to thank the Ministry of Lands and Natural Resources (MNLR) for granting me the study leave, the Survey Department and organisations involved in documenting land rights in the country for their support and cooperation in this research.

I cannot forget my colleagues' many thanks for the support and encouragement during this journey. Completion of my research could not have been possible without the support from you guys, especially classmates from the Land Administration domain for the restless times we were working together before the deadlines.

Lastly, special thanks go to my family; my kind and understanding wife Stella M. Mulenga and my children, Philip, Sendoi, Christine, Misapa; and my nephew Warren, words are totally insufficient to articulate how grateful I am to all of you for the countless prayers and moral support you gave throughout this journey.

May God Bless you all!

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LIST OF ACRONYMS

FFP	-	Fit for Purpose
GLTN	-	Global Land Tenure Network
ILRG	-	Integrated Land Resource Governance
LAS	-	Land Administration System
LCC	-	Lusaka City Council
MAST	-	Mobile Application to Secure Tenure
MLG	-	Medici Land Governance
MLGH	-	Ministry of Local Government & Housing
MLNR	-	Ministry of Lands and Natural Resources
NLTC	-	National Land Titling Centre
NLTP	-	National Land Titling Program
NLTS	-	National Land Titling System
NSDI	-	National Spatial Data Infrastructure
PPHPZ	-	Peoples Process on Housing & Poverty in Zambia
STDM	-	Social Tenure Domain Model
UN-Habitat	-	United Nations Human Settlement Programme
USAID	-	United States Agency International Development
ZILMIS	-	Zambia Integrated Lands Management Information System

1. INTRODUCTION

1.1. Background of the Research

Land is a significant factor of production and an essential resource upon which all human activities take place. According to Deininger (2003), access to land is an important aspect that aims at overcoming poverty to create economic growth. Considering land as an essential resource, it requires a well-functioning Land Administration System (LAS) with good land policies and management plans to support the sustainable development of any country (Lemmen, 2010). Lemmen stresses that a LAS should have an infrastructure that should consist of “*the institutional arrangements, legal framework, processes, standards, land information, management and dissemination systems, as well as some technologies that should support the allocation of land and control its use*” (Lemmen, 2010, pp5).

The registration of land in Land Administration plays an important role as it is described as a formal process of recording land parcels information, including other details of their extents, tenure, use, and value (Zevenbergen, 2002). Rabley (2009) describes the documenting of properties to be vital because of the benefits it gives to the property owners by providing them with the security of tenure and the opportunity to use the property as collateral. It provides the state with information about owners of the land and the sizes of the plots (Toulmin, 2009). Furthermore, it benefits the state with taxation and improvements in spatial land use planning to ensure sustainable development.

However, considering that land is an essential resource, most of it is outside the formal land register in many developing countries (Toulmin, 2009). The situation of not having land registered has been seen to be increasing due to lack of appropriate land tools to manage the processes (van Asperen, 2014). The conventional land administration system adopted from developed countries has been in use in many developing countries since colonial times (Lemmen, 2010). To date, a high percentage of land coverage in developing countries in the world has not been registered due to problems with the conventional methods used for land registration. These approaches have resulted in the low rate of land rights registration, which in turn jeopardises the security of tenure to the women and marginalised groups. The World Bank (2017) reports that approximately 30% of the land globally is legally registered (cadastral coverage), leaving the rest not formally recorded.

Because of the challenges of the conventional system, which is slow, costly, and many times favours the elite, efforts regarding documentation of land rights have been seen growing in many developing countries. Consequently, where possible innovative initiatives have been designed and implemented to reduce the gap of unregistered land rights. However, little has been written to describe how the

registration of land using innovative initiatives can be integrated into the existing formal system of land registration towards scaling up the low rate of land rights registration in most developing countries.

The majority of the countries have been documenting land rights using the methods of conventional and innovative initiatives of land administration to provide security of tenure. However, some countries have moved towards the integration of the conventional and innovative initiatives for land administration through the alignment of frameworks and operations of various land administration functions (Bennett, Wallace, & Williamson, 2005). However, the term *'integration' here is referred to as the 'combination of two operations under one management authority, replacing and transforming diverse processes, systems and organisational structures'* (Jacoby, 2011). Fetai (2015), also states that it is noteworthy that the concept of integrating the conventional and innovative approaches needs the three frameworks of the spatial, legal and institutional to be considered during the integration process. On the other hand, De Vries, Laarakker and Wouters (2016) finds the integration process to have some unanticipated and uncontrollable factors likely to be encountered during the process and can oppose the purpose of integration leading to non-integration. In addition, Yankey, Jacobus and Koney (2001), see the combining of organisations to have some benefits and risks considered in this situation to be as “pros” and “cons” to be encountered during and after the merging process.

1.2. Justification of the Research Problem

In many developing countries, registration of land is done using conventional methods. However, conventional land administration has not been able to meet the demands and provide security of tenure to all. According to Molen and Lemmen (2005) and van Asperen (2014), these conventional methods only recognise legal land rights and overlook other tenure types such as customary and informal. Hendriks et al. (2019) also note that, even with the existence of the conventional methods, many people still do not have legitimate rights, and if by chance that they have lawful rights, they do not have formal documents to show as proof of ownership. Therefore innovative approaches have been developed and implemented in various countries to provide a solution to the challenges created from the conventional methods. The initiated projects using the innovative approaches have been focusing around giving legitimate acknowledgement to existing property holders who have no legal documentation through a procedure of formalisation and allocating of land rights (Palmer, 1999).

Lengoiboni, Richter and Zevenbergen (2019), report that at least several different innovative initiatives have been implemented globally in many developing countries for land rights registration. An example is the use of Quantum Geoinformation System software for Social Tenure Domain Model (STDM) by Global Land Tenure Network (GLTN), supported by UN-Habitat and has its capabilities and developing alliance of 72 international partners (GLTN, 2016). Also, Mobile Application to Secure Tenure (MAST) (USAID, 2019) supported by USAID has shown to be working well in Tanzania with a milestone in the

registration of land rights, helping women in securing land rights and with the issuance of land tenure certificates in customary areas of Zambia. According to Lemmen (2010), the STDM serves as a pro-poor land information management system that can support land administration in urban and rural poor areas which possibly can be integrated into the formal cadastral system. The pro-poor approach is further considered as a solution to difficulties encountered in the conventional land registration system (Hendriks, 2019). Abubakari, Richter and Zevenbergen (2018) also stress that the inclusive recognition of land rights captured using these tools in practicality requires fine-tuning of the spatial, legal and institutional frameworks. Lengoiboni, Richter and Zevenbergen (2019) recognise that many developing countries have been encountering several challenges in using conventional land administration procedures and methods. This has brought about the marginalisation of many rural and urban poor concerning land access and tenure security which subsequently deepens their poverty. Van der Molen and Lemmen (2005) also argue that securing tenure does not necessarily need the formal issuance of legal land documentation, but the use of fast, easy and cheap procedures can be a substitute in the provision of land documentation.

Several studies have been conducted to evaluate some of these innovative tools in developing countries. These tools have been seen to help scale up the process for mapping land rights in a faster and more accessible way (Koeva, Crommelinck, Stöcker & Cromptvoets, 2018). There have been efforts to develop some ideas that may be eligible and be of good use for land registrars and land surveyors and could have an impact in the land administration, and the society as a whole once applied (van der Molen & Lemmen, 2005). Lengoiboni, Richter and Zevenbergen (2019) further add that the use of these approaches will help address technical problems in gathering and handling tenure information by providing methods and solutions that are simple, fast and affordable.

A country like Zambia has no exclusion of the challenges mentioned above. It has a dual land tenure system categorised as State and Customary land. 80% of the land in the country is customary land and managed by the traditional authorities, while 20% is state land managed by the state (Tembo, Minango & Sommerville 2018). The Ministry of Lands and Natural Resources (MLNR) is embarking on a National Land Titling Programme (NLTP) with the idea to have all parcels of land in Zambia registered at a reduced cost for its citizens (USAID, 2018). On the other hand, some innovative methods for land registration are currently being used in scaling up the process of documenting land information. This is done to strengthen the rights of rural households while embracing Zambia's customary culture.

Some developers of innovative land tools, for example, GLTN (STDM), USAID (MAST), Medeem and Medici Land Governance (MLG) have been undertaking pilot projects documenting land parcels in various parts of the country adopted on multiple pilot projects to upgrade informal settlements and customary land areas. The innovative tools are being used as pro-poor and participatory tools to support in achieving the NLTP at a hugely reduced cost. Although with this intention, the documents produced using these innovative approaches lack official recognition, and this has established a gap which needs to

be addressed. Most of the records captured are not in the official register of Zambia Integrated Lands Management Information System (ZILMIS) as various organisations are keeping most of this information. Sommerville et al. (2017) see these innovative tools, if adapted both in the spatial and institutional framework, could promote good governance for controlling land and accommodate various types of land rights for the legal framework. At the same time, enact new laws that will allow the systematic registration of land using the latest technologies. This will help to improve the system of land registration and offer answers to most of the land-related challenges faced in the country. Therefore, the use of innovative tools can be a better alternative.

1.3. Statement of the Problem

Despite having conventional methods guided by the spatial, legal and institutional frameworks for land administration in Zambia, the country has been experiencing challenges in land registration in the past decades due to lack of capacity to scale up land registration. The conventional method currently used in the country has contributed to the low rate of land registration due to the bureaucratic processes, time-consuming, expensive and technical standards that are required to be followed during the registration process (Lengoiboni et al., 2019; van Asperen, 2014; Zevenbergen, 2004). According to USAID (2018) and Tembo et al. (2018), MLNR has managed to register 600,000 properties at various stages. This rate is equivalent to less than 10% of the total land coverage of the country, which is approximately 752,614 square kilometres. Remarkably, the most significant portion of the unregistered land is administered by the traditional authorities, which holds about 60% of the population of the country. For the past years, the state law recognises the customary tenure system although no formal documentation is available that can officially be of recognition by the Government (Mulolwa, 2002) and has resulted in many land disputes among the landowners (villagers) and traditional leaders with regards to land parcels boundaries.

Some proprietors of the innovative tools have engaged in the documenting of customary lands and informal settlements in Zambia since 2014. Even though after the implementation, many of these tools have not been adopted into the formal registration. However, little is known about how the different data types collected by various proprietors of innovative land administration can be useful and accepted into the formal system and how the existing innovative approaches can be adopted and adapted.

Although ZILMIS exists as the only hub in the country anchored in the MLNR to record and store land information and other land-related information with the potential to integrate it into one repository, some challenges have hindered the integration process. ZILMIS is reported to be slow and struggles to contain different data (Tembo et al., 2018). The research, therefore, aims at investigating the integration of conventional and innovative approaches of land administration to provide security of tenure for all such as the marginalised groups, women and the elite.

1.4. Research Objectives

1.4.1. Main Research Objective

The main research objective is to explore possibilities of integrating the conventional and innovative approaches of land administration in Zambia to provide security of tenure for all.

1.4.1.1. Specific Objectives and Research Questions

Based on the main objective, the research will specifically address sub-objectives and research questions.

Table 1: Specific objectives and research questions

Specific objectives	Research questions
1. To explore the conventional and innovative land tools used in Zambia.	<ol style="list-style-type: none"> 1. What are the characteristics of conventional and innovative land tools for land registration in Zambia? 2. What are the similarities and differences in the spatial, legal and institutional requirements of the conventional and innovative approaches?
2. To assess the gaps of the spatial, legal and institutional requirements of the conventional and innovative approaches in Zambia.	<ol style="list-style-type: none"> 1. What are the emerged spatial, legal and institutional gaps as a result of comparing the conventional and innovative approaches?
3. To propose methods for the integration of spatial, legal and institutional frameworks of the conventional and innovative approaches.	<ol style="list-style-type: none"> 1. What are the spatial, legal and institutional reasons for not integrating the conventional and innovative approaches? 2. What are the spatial, legal and institutional effects that may result with integrating and non-integration of the conventional and innovative approaches? 3. What are the proposed methods for integrating the spatial, legal and institutional frameworks of the conventional and innovative approaches?

1.5. Conceptual framework

1.5.1. Introduction

Land registration plays a vital role in enhancing tenure security to landowners. With the innovations in mapping technology, the land administration coverage rate is gradually getting improved. However, the question remains on how land tenure information produced using innovative land tools can be integrated into the conventional land information system. This chapter explains the conceptual framework, a theoretical understanding and discussion about the research concepts which are conventional land registration systems, innovative land tools and integration.

1.5.2. Conceptual framework

The concept of Land Administration is broad and encompasses processes of registration, acquisition, management and dissemination of land information. The processes for registering land based on the two approaches of conventional and innovative will be the main focus of the research. In Zambia, registration of land is done using both approaches, the essence being to support the NLTP. Both approaches are managed by their spatial, legal and institutional frameworks. Nonetheless, the requirements of the frameworks vary between the two approaches. For the innovative land tools, the frameworks reflect the principles of Fit for purpose (FFP) land administration, while the conventional system has the frameworks which are defined in the existing legislation and policies. The conventional system is mainly focusing on registering the leaseholds, and information obtained is integrated and protected into the ZILMIS. However, the situation is different on the side of innovative initiatives. Documented land tenure information collected is not recognised by the ZILMIS, a research problem where this study intends to address. The main conceptual scope of this study will be ‘Integration Concept’ marked in blue colour in **Figure 1**. The question will be how land tenure information produced by the innovative land tools could be integrated into ZILMIS.

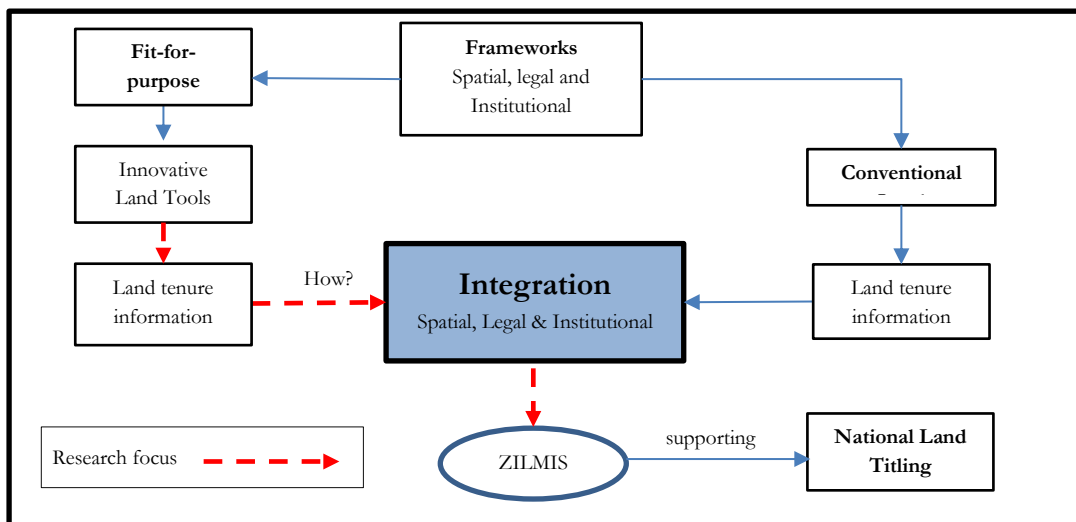


Figure 1: Conceptual framework

1.6. Thesis Structure

Chapter 1 – This chapter provides information about the introduction, background, justification, research problem, the main research objective, specific sub-objectives and questions followed by a brief description of the conceptual framework and thesis structure.

Chapter 2 – Provides the related literature about conventional land registration and innovative land tools under different frameworks. Integration of information is reviewed, representing the requirements for integration and challenges with an emphasis on the frameworks.

Chapter 3 – Research Methodology

Gives a short description of the research design, discussion on the data sources and collection processes adopted. The methods for analysing the data collected are also presented in this chapter.

Chapter 4 – Results

This chapter presents the results and the outcome of the data collected regarding the spatial, legal and institutional frameworks for the conventional and innovative land administration approaches.

Chapter 5 – Discussion of the Results. This chapter will be based on the comparison of the results with the existing scientific literature.

Chapter 6 - Conclusion and Recommendations. This chapter will present the conclusion of the research and some recommendations for future research.

2. LITERATURE REVIEW

2.1. Introduction

This chapter discusses the literature on the key concepts of the research. The chapter captures the theoretical background of the conventional and innovative approaches of land administration with the focus on the characteristics and requirements for land rights registration. The concept of integration focuses on the definitions, challenges, effects and strategies adapted for integration.

2.2. Conventional methods for land rights registration

The section is about the conventional land administration method. It considers the spatial, legal and institutional frameworks which are elaborated in the sub-sections from 2.2.1 to 2.2.3.

The conventional land administration method is also noted as the formal land administration system predominantly in developing countries (HABITAT U.N, 2012). For the past decades, many countries have been using the conventional approach in land administration as the main system for registering land rights associated with the spatial, legal and institutional frameworks which support the land policy of the country (Zevenbergen, 2002b). According to Salifu (2018), conventional methods are initiatives driven by the various governments for the registration of rights with intentions to ensure the security of tenure.

In many cases, the registration of land rights is done through the formal land administration system, which according to UN-HABITAT (2012) only about thirty per cent (30%) of the global land cover has been registered and formally recognised. The registration process in many developing countries according to the state laws and land policies which turn out to be slow, costly, requires the use of fixed boundaries, cadastral boundary surveys, technologically driven with high accuracy and institutional bureaucracies (van Asperen, 2014). Consequently, the process is slow which is unable to cover a wider area and this was affirmed by (Zevenbergen, 2002b) that as a result of the many processes involved with the conventional system, the registration of land tenure is complicated and works against the demands of the people in the community, especially the poor and marginalised. Dale and McLaughlin (1999), also criticize the conventional process for being expensive and cumbersome as they take too much time for the documents to be examined and approved for the issuing of legitimate titles. They further stress that the delay in the process could be the emphasis on the boundary delimitation, which requires high precision as well as the high cost involved. Thus, the following sub-sections elaborates on the spatial, legal and institutional frameworks under the conventional land administration system.

2.2.1. Spatial framework

The spatial framework considers the land information infrastructure, which consists of a digital (geo-information as well as Information and Communication Technology (ICT) and hard copy cadastral maps, and cadastral parcel information. The acquisition of data for land registration requires the use of high technology to obtain high accuracy (Salifu, 2018) through cadastral land surveys, aerial photogrammetry and terrestrial laser scanning (Inguane, 2018). Also, the spatial reference, geographical extent and accuracy help in defining the demarcated boundaries of land parcels. According to Hazel, Kaplinski, Parnell, Kohl, and Schmidt (2008); Stevens, Jennifer, and Raechel (2012) control points are required to be fixed when delineating the cadastral parcel boundary and accuracy to be attained should range between 3mm to 5mm using a dual-frequency GPS. The captured information is stored in the official register as a cadastral index database as well as the spatial data infrastructure (SDI). This is where the general public has access to the land information captured by the Government regarding land ownership, land value, land use and land development (Enemark, 2001).

2.2.2. Legal framework

The legal framework consists of land laws and regulations as well as a country's national land policy. The legal framework manages land rights, land tenure systems as well as administration and enforcement. Also, the legal framework of the conventional methods stipulates the various types of tenure and rights such as leasehold, occupancy or freehold which ensures a relationship between people and land by providing tenure security (Williamson, Enemark, Wallace, & Rajabifard, 2010). Practically the process of registration considers several factors such as costs, timeframe, registration procedures, procedures for the surveys, and proof of documents of land rights (GLTN, 2008). The final registration of the tenure could be either deed or title depending on the legal requirements for a particular area. Besides, the final recordation of land rights could be either deed or title as the first registration or as a provisional title which can later then be upgraded after all the legal requirements have been met (Zevenbergen, 2002a).

2.2.3. Institutional framework

The institutional framework consists of formal organisations, mainly government agencies responsible for land administration and management (Arko-adjei, 2011). These agencies, their roles and responsibilities are established by the laws of the country. Lengoiboni and Molendijk (2015) further add that the conventional method consists diverse actors involved during the land registration process among which include surveyors, conveyors, municipalities, registrars, lawyers, financial institutions, ministries, planners and other formal institutions. Additionally, the institutional framework outlines the legal procedures, the cost, activities to be done, and the actors to be involved during the process for the registration of land rights. According to Zevenbergen (2002b) the number of key actors involved and the required task during the process of land registration varies from country to country while the levels of education for the actors may also vary at different levels. Also, the method of land registration involves a series of activities. The

registration of land requires that the necessary documents are endorsed or approved by the relevant registering authorities to commence the land registration procedure, depending on the type of registration (Agyeman-Yeboah, 2018). Particularly, in developing countries, the roles and tasks are divided among the agencies, which sometimes leads to overlap and duplication of tasks (Williamson et al., 2010). As a result, there is less collaboration among institutions. Furthermore, some agencies also lack or have inadequate staff with the required education, training and professional skills. Previously, some of these organisations used the paper-based or manual system, which made the process of land administration as well as dissemination of information cumbersome and monotonous, thus less productivity (Larbi, 2006).

2.3. Innovative approaches for land tenure recordation

This section considers the innovative land approaches for land tenure recordation to secure land tenure for all. Also, some examples of the innovative approaches are explained in addition to the framework; spatial, legal and institutional. Notably, concepts such as pro-poor and fit for purpose land administration methods have been fostered into the innovative land administration approach for this study.

2.3.1. Innovative Land Administration

As already mentioned, according to Zevenbergen, Augustinus and Antonio (2012), only about thirty per cent (30%) of land is secured under the conventional system. This has been attributed to the challenges faced by the conventional system which includes the bureaucracies of the registrations, failure for delivery of tenure security for all, rapid urbanisation, high cost of transactions, technological capabilities and high accuracy of adjudication (Tuladhar, 2004). Remarkably, the innovative land administration approach is a result of the paradigm shift of the global land community from the conventional system to a continuum of land rights to secure land tenure for all especially the poor, marginalised and informal settlers in the urban areas as shown in figure 2 (HABITAT U.N, 2012). According to Lengoiboni, Richter and Zevenbergen (2018), the innovative land tenure approaches are mostly community-based pilot projects, yet they acknowledge the diverse land tenure interests within a particular country. These tools have been seen to be helpful in scaling up the process for mapping land rights in a faster and more accessible way (Koeva, Crommelinck, Stöcker & Cromptvoets, 2018).

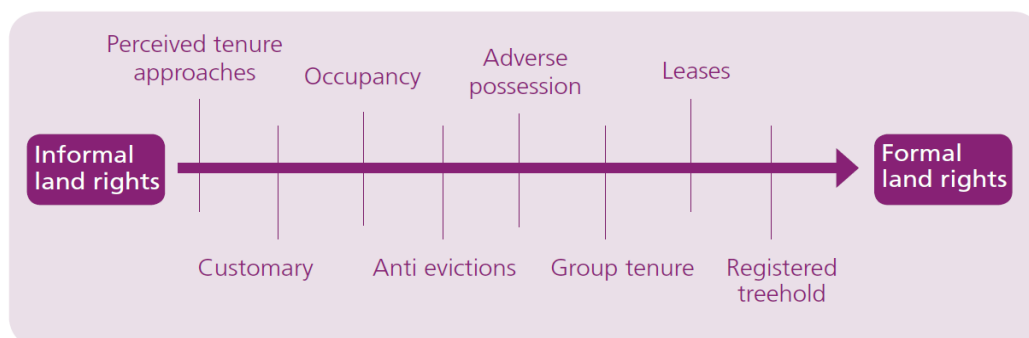


Figure 2: Continuum of land rights

Source:(HABITAT U.N, 2012)

Examples of Innovative Land Administration tools

The examples of innovative approaches are the Mobile Application for Secured Tenure (MAST), Social Tenure Domain Model (STDM), Open Data Kit (ODK), ParcelCert, Landum, Solutions for Open Land Administration (SOLA) among others. These may be organisations or tools that are adopted for documenting land rights but may differ regarding organisational characteristics and requirements as well as funding/financial mechanisms (Lengoiboni et al., 2018) which could either be government, donor or privately funded. The following gives an overview of the three examples mentioned above.

- **Mobile Application for Secure Tenure (MAST)**

MAST is a USAID innovative tool developed and implemented in various developing countries. Among the countries where projects have been undertaken are Tanzania, Ghana, Zambia, Mozambique and India working with an institution such as the Integrated Land Resource Governance (ILRG). The technology used is flexible, which involves community participation such as the use of mobile phones which happens to be used by a lot of people. The tool uses an open-source smartphone application linked to a cloud-based data management system where geospatial information is stored (USAID, 2015). Thus, less costly and transparent.

- **Social Tenure Domain Model (STDM)**

STDM is an innovative land tool developed by the Global Land Tenure Network (GLTN) partnered with the United Nations (UN-Habitat) and used for collecting land information embedded with open-source software, Quantum Geographic Information System (QGIS) (GLTN, 2016). The tool has been implemented in countries such as Kenya, Zambia, Uganda, Philippines, Nepal, Columbia, among others. They concentrate on informal settlements in the urban areas as well as customary land tenure in the rural areas (GLTN, 2016; Lengoiboni, Richter, & Zevenbergen, 2018).

- **Open Data Kit (ODK)**

The ODK is an innovative land tool that operates with an android mobile application as well as free and open-source mobile operating system supported by Google map by various organisations across the world. The system has an offline solution advantage over the other innovative tools. Thus, it is less expensive as compared to the other innovative tools (Lugo & Ortega, 2015).

2.3.2. Frameworks for Innovative Land Administration

The following sub-sections elaborates on the spatial, legal and institutional frameworks under the innovative land administration system. The frameworks serve as a fundamental principle in achieving the land policy objective in every country, as illustrated in table 2.

Table 2: Key principles of the Fit for purpose approach

Key principles		
Spatial Framework	Legal Framework	Institutional Framework
<ul style="list-style-type: none"> • General rather than fixed boundaries • The use of aerial images rather than field survey • Accuracy is based on the purpose rather than technological standards • Need for updating and chances for upgrading and ongoing improvements 	<ul style="list-style-type: none"> • A flexible framework designed along structural rather legal lines • Continuum of tenure • Secure land rights for all rather than one register • Ensures gender equality 	<ul style="list-style-type: none"> • Transparency and cost-effective • Unified institutional structure rather than sectorial silos • Sustainable IT approach rather than extreme technological solutions • Good land governance rather than a complicated one

Source: (taken from Enemark et al., (2016,pp.19))

Spatial framework

The spatial framework is designed to manage land-related issues in the local context, which does not require the bureaucratic and technical standards used in the conventional system (Lengoiboni et al., 2019). According to Enemark et al. (2016) and Enemark (2014), the acquisition of data is done through digitising of parcel information from the aerial or satellite images in a participatory way rather than the field surveys to capture land information such as boundary demarcation. As depicted in Table 2 above, the accuracy used on parcels boundaries relates to the purpose of securing land tenure for all to reflect a continuum of land rights. McLaren, Fairlie, Kelm and Souza (2018), further adds that the high accuracy when delineating parcel boundaries is of less importance unless, in areas of high-value land, contested boundaries and placing of boundary marks are necessary. The data collected in the field with position accuracy(ies) which is more than a meter can then later be processed for topology checks to eliminate the errors (McLaren et al., 2018). Thus, the use of general boundaries is recommended using visible features to record how land is occupied and utilised rather than depending on the boundaries that require placing marks or pillars for accurate measurements. Also, the cost of capturing land information is less costly due to the simple tool such as mobile phones and open source android application, thus affordable to meet the needs of the citizen (McLaren et al., 2018). In addition, the spatial framework for the innovative approach is outlined with other underlying principles such as opportunities for updating, upgrading and improvements of the parcels captured (Enemark et al., 2016 and Enemark, 2014).

Legal

In Table 2 above, the continuum of land rights permits the recording of the different land rights and interests existing in a particular country especially the customary land tenure which is sometimes not recognised by the conventional land administration. Therefore, the social tenures that exist are recorded

rather than merely focusing on land titling, ownership and leasehold (Enemark et al., 2016). Also, the frameworks are flexible rather than designed along structural judicial lines. Therefore, this provides the security of tenure for all in a participatory way rather than a sporadic manner under the conventional system.

Institutional

The institutional framework tackles the agencies and actors responsible for land administration. According to table 2.1 above, institutions need to be unified with the flexibility of sharing information rather than fragmented land information databases. Also, the information needs to be less costly, transparent, and accessible by all, including the general public. Furthermore, the technological approaches used should be accommodating to new systems and processes rather than the very precise technologies. Thus, for a sustainable land administration system, there is the need for good governance such as transparency, participatory, equitable and inclusive, among others (Enemark et al., 2016).

A comparison of the conventional and innovative land administration systems shows different characteristics regarding the spatial, legal and institutional frameworks. For instance, while the innovative system considers general boundaries, flexible judicial arrangements, transparent, participatory and less costly processes, the conventional is more rigid regarding the accuracy of boundaries, high cost of processes, structural judicial arrangements and fragmented land information databases. Therefore, to ensure sustainable land administration in a given country, there is a need to integrate conventional and innovative land administration systems. The following sub-sections of the literature review discusses the topic “integration.”

2.4. Integration

In this section, definitions of integration are first considered followed by the types of integration, challenges and effects for integration.

The notion of integration

In developing countries, especially in Africa, contemporary land reform discussions are concerned about the need to harmonise customary land tenure with the formal land tenure system (Malambo, 2014; Sommerville et al., 2017). This is because the formal land tenure system is most common or roman law from colonial governments and sometimes does not recognize all the customary land tenure existing before colonisation (Abubakari et al., 2018; Williamson et al., 2010; Zevenbergen, 2002a). Thus, the need to harmonize the information; statutory and customary land tenure of a country which will happen through the integration of different data or operations. Although the term integration has been widely used to integrate data, systems, organisational and legal processes in many organisations, Myerson (2001) mentions that there is no universal definition that describes it. Nonetheless, it is described as combining or merging of similar or varied processes or systems. Besides, the integration may consider the merging of

incompatible technologies, data and applications into a uniform architecture Kuhn (1990). Nichols (1993) further defines data integration as the process of combining multiple data from different sources into one repository point. According to Mulolwa (2002) and Stavridou (1999) integration of multiple systems as one should aim to support a unified goal such as a cohesive and united administrative system, procedure and services as much as achievable and satisfactory. Furthermore, Jacoby (2011), finds the integration as a process of combining, replacing, and transforming of diverse procedures, systems and structures of the organisation.

With the above descriptions of integration, this study will describe integration as *“the process of combining or merging land information and databases, technologies in the land adjudication and capturing of boundaries, dissemination of information, judicial and legal arrangements as well as the time and cost involved in land administration processes and systems”*.

2.4.1. Integration under land administration

According to (Yankey et al., 2001), the integration of organisations is normally complex irrespective of the sector or field as well as whether it is systematic or not. The consideration for integration in land administration may take cognisance of the institutional, legal and spatial aspects. Abrahamsson, Hasson and Isaksson (2009); Yankey et al. (2001) highlight that the institutional aspect regards the executive board, staff, professional expertise, clients as well as the aim and goal of the institutions. However, Fetai (2015) argues that integrating based on institution alone does not automatically merge issues of data quality, maintaining and storing data as well as transparency. Generally, there are two main types of integration of organisations; horizontal and vertical. The explanations are as follows:

- A. **Horizontal:** The horizontal integration is a strategy that occurs when one organisation combines with a similar one at the same level of the production process where the institution aims at providing one output (Termscompared, 2019). Yankey et al. (2001) emphasize that the organisations come together and form strategic alliances to accomplish a goal together. This is normally done by non-profit organizations which combine their resources yet maintain their own identities and sometimes core functions but perform specific tasks for the success of a project. Also, (Fetai, 2015) described this as partly merged where in certain countries like Norway, the cadastre and the land registration information are separate, yet the output to the consumers are the same. Similarly in Tanzania, McLaren et al. (2018) highlight that the Government is collaborating with an innovative land documentation organisation, Mobile Application Secure Tenure (MAST), in documenting rural/customary land tenure.
- B. **Vertical:** The vertical, on the other hand, is a strategy where the organization ensures that it has full control for the entire production process from the beginning to the end of the process (Termscompared, 2019). This is explained by Yankey et al. (2001) as company ‘A’ completely acquiring, engulfing or absorbing company ‘B’, where company ‘B’ collapses, and a new

organization is formed either as a new brand name or maintaining the name of company A but with adjustments. Fetai (2015) described this vertical integration as full merge where in Sweden, the government is the only agency responsible for land administration in the country with a central database where all the private sectors refer to it. Also, in Rwanda, the fit-for-purpose approach was adopted for a nationwide land tenure regularisation program where currently, there is only one database for land tenure in the country (McLaren et al., 2018).

In view of the above, Williamson, Enemark, Wallace and Rajabifard, (2010) and McLaren et al. (2018) argue that the contemporary sharing and integration of data and services regardless of horizontal or vertical integration, is the Spatial Data Infrastructure (SDI) platform which can be used at all levels; state, corporate, local as well as global. It is regarded as a better integration platform which is timely, transparent and accessible as well as avoidance of duplication. The main requirement for its sustenance and reliability is that the information should be accurate and updated regularly, which ultimately can be a tool for decision making to the stakeholders.

2.4.2. Challenges in Integration

Integration challenges are described by Cloverdx (2019) as something that prevents the process and output of the integration from being accomplished. These challenges are made up of multiple components that may include; i) not having data in one central place, ii) outdated data, iii) different data formats, iv) poor quality of the data, v) data duplication which are the result of silos mentality and vi) not having a common understanding of the data. In many cases, data from distinct sources may not be perfect but usually, are found with some problems with compatibility of legal, institutional and spatial frameworks. Such issues may include cadastral mapping scales, accuracy, completeness of the data, category of ownership and interests and parcel definition (Nichols, 1993), differences with the required documents, costs and procedures during the process.

2.4.3. Effects of Integration

With the rapid increase in technological change, new technology has mushroomed to develop products and services to society (Raišienė, 2011). The introduction of the innovations to any institution always makes organisations keen to find out what effects the initiative would have towards the production (Bakar, 2003). Many organisations opt to integrate the systems to increase efficiency, link quality information from various stakeholders and possibly develop a management system that will suit all the stakeholder's interests (Abrahamsson et al., 2010). However, the integration of the systems brings about different positive and negative effects in any organisation that are also classified as benefits or risks of integration. The effects of integration are summarised in Table 3 and partially adapted from (Yankey et al. 2001).

Table 3: Effects of integration

Pros	Cons
Change can be good	Change can be scary
Organisational Resources combined	Organisational liabilities are combined
Provide opportunities for increasing organisational efficiency and effectiveness	One or both partners (s) may lose its identity
Promote innovations through the integration of new perspectives	Process of integrating is time-consuming and can be costly
Provide opportunities to enhance organisational viability	Process of integrating organisations is complicated and costly
Provide potential for increased financial stability	The process is risky with organisations losing considerable autonomy
Provides opportunities to broaden or deepen organisational capacities	May require staffing changes or layoffs
May promote organisational growth	May require attention to duplication of programs and services

2.4.3.1. Positive effects of integration

The positive effects of integration as stipulated in Table 3 above include: generally, change is good because it provides avenues for growth and development. Also, integration provides opportunities for efficiency and effectiveness that leads to improvements in services delivery. There are a number of positive effects as a result of integration. Due to the ever-increasing data collection by various institutions from the society for various purposes, data has been seen to be kept in silos. Therefore, integration is identified to be a solution to such challenges. The following are some of the benefits identified by (Jasdec, n.d.; Latter, 2017).

- 1) There would be a reduction in the expenses and administrative workloads which are related to the issuance of certificates.
- 2) There would be increased efficiency in the delivery of services resulting in a decrease of days to deliver the products.
- 3) It will help in achieving the set objects of the project.
- 4) The data which is kept in silos will be stored in one central system with up to date information for making accurate and timely decisions, thereby eliminating also the risk of the loss, theft and fraud cases.

In addition, the integration will lead to improved data accessibility for the decision-making process, better communication between institutions and improved productivity (Wilson, 2016). Open access and sharing of the information among the users will reduce the barriers to expansion, reduction in corrupt activities and will improve the service delivery on land-related matters (Inguane, 2018). Bakar (2003) further adds that when the functions and information are combined, it will improve working procedures, good interaction among organisations, job satisfaction and the structure will be reviewed with staff taking up new roles. The integration of data leads to an opportunity of creating a spatial database infrastructure where data from multiple organisations can be linked and allowing all the institutions involved to have

access to the information. At the same time, it gives chances of building partnerships for interactions among institutions (United Nations, 2017).

2.4.3.2. Negative effects of integration

As much as there can be an upside towards integration, it also entails possibilities of having downsides. Today, in most organisations, the constraint has more to do with the hesitancy of the members of staff to change in the way they execute their daily duties, and this has an impact on most of the staff members to master the innovations (Akin, 2009). However, resistance to change as a challenge can be addressed by giving individuals opportunities to adopt and adapt to a more constructive approach (Jacoby, 2017). Goodhue, Wybo and Kirsch, (1992) also points out the effects such as delays in the delivery of services, low communication levels among the subunits, the costs of products and services will be high. (Goodhue et al., 1992) try to apply the impacts on the organisational perspective as over-time; the subunits may face various environmental challenges which eventually can be resolved by allowing the subunits to apply some flexibility towards their information system on a unilateral basis. Standards that may be set to be followed might not be best from the total organisation viewpoint. However, absence of integration results in data duplication, incompleteness, inaccuracy, time-consuming and high costs for the services (Abrahamsson et al., 2010; Fetai, 2015).

Conclusion

The reviewed literature review shows that there is a gap regarding the integration of conventional and innovative land approaches. It is noted that the conventional approach is a formal system that is legally recognised, but its slow, costly and only registers certain tenure. Also, due to the slow pace of registering land, a greater percentage of landholders are outside the formal land system. Given this, the innovative approaches have been globally accepted in documenting land rights as a continuum to secure the tenure for all, particularly those not recognised by the formal system. In Zambia, with the two approaches in place, both approaches have captured land information in various parts of the country. Therefore, there is a need to harmonise the land information for an effective land administration in the country. Hence, this research aims at exploring the possibilities of integrating the conventional and innovative approaches of land administration in Zambia.

3. RESEARCH METHODOLOGY

3.1. Introduction

The research methodology used for the research expounds on the systematic way in which the researcher collected the data and analysed it to address the research objectives as well as to answer the research questions and further provide an explanation of the collected data and observations (Mühl, 2014). This chapter illustrates the research methodology applied during fieldwork and analysis. The section begins with a description of the techniques used during the data collection. The processing of the collected data, analysis techniques and interpretation is further discussed in the following sections.

3.2. Research Design and Approach

The objective of the research is to explore possibilities of integrating the conventional and innovative approaches of land administration in Zambia to provide security of tenure for all. According to Zikmund, Babin, Carr and Griffin (2010), a research design is a master plan that indicates the techniques and strategies for collecting and analysing the required data.

The research adopted a qualitative approach for data capture, described by Hancock (2006), as a method that helps to explore and understand some aspects of the social world. The qualitative data approach is non-numerical and only generates words for data analysis (Mühl, 2014). The technique was used to obtain information on the conventional and innovative land tools for land registration in Zambia, to compare their spatial, institutional and legal requirements and propose approaches for the integration of the two methods. The qualitative research approach was appropriate for this study, as it provided comprehensive information concerning a specific phenomenon. Semi-structured interviews and questionnaires were used to collect primary data. Other data sources were secondary data. The research was conducted in three stages, which included pre-fieldwork, fieldwork and post fieldwork as presented in the flowchart in figure 3 with the steps followed.

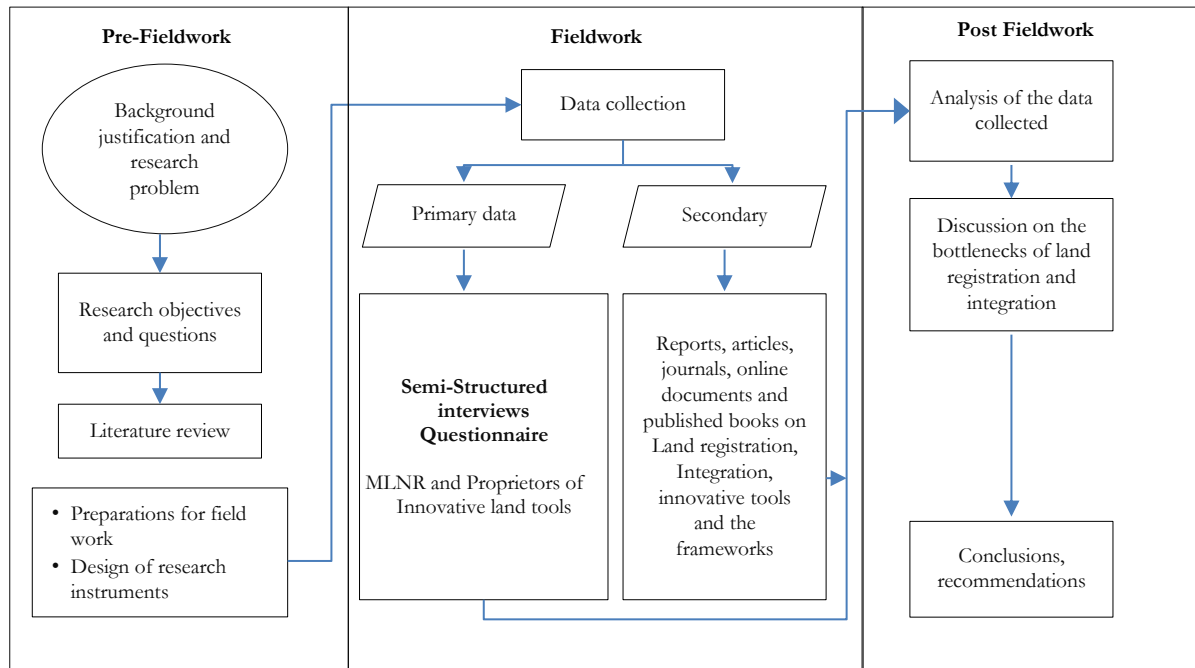


Figure 3: Thesis structure and workflow

3.2.1. Pre-fieldwork

The pre-field stage consisted of the identification of the problem and formulation of the research objectives and questions based on the literature and other relevant reports and articles. In addition, the literature was reviewed as well as preparation for fieldwork. The preparation for the fieldwork involved designing of the research questions and instruments (see appendix 3).

3.2.2. Fieldwork and data collection methods

Fieldwork was conducted in February and March 2019 in Lusaka, Zambia to address the research questions in sub-objective 1 to 3. During fieldwork, primary data and secondary data collection methods were adopted to generate the required data for the thesis. The information gathered was used in analysing some commonality of the frameworks of the different tools that are presently used for the recording of land rights in Zambia.

3.2.3. Primary data

As stated by Ainsworth (2020), the primary data collection method is the most reliable and authentic way of collecting data and allows the researcher to obtain data directly from the source. The technique of purposive sampling and semi-structured interviewing was used to get data on the characteristics of the conventional and innovative land tools, and the spatial, institutional and legal requirements of the two methods from the representatives of the organisations.

a. **Semi-structured Interviews**

A semi-structured interview is a method of data collection that allows the researcher and the interviewee to interact was adopted to address the set objectives 1 and 2 focusing on the innovative and conventional approaches, and the frameworks for the two methods. During the fieldwork, five officials from MLNR were interviewed with different ranks representing the conventional approach. Furthermore, to understand the functions or operations of the civil society and private organisation, six officials were interviewed with different positions and roles within each organisation representing the innovative approach. Interviews were conducted with an interview guide to the key informants. Information about the characteristics of the conventional and innovative land tools and the spatial, institutional and legal requirements of the two methods and suggestions for the integration was obtained through the structured interviews (*details refer to the tables in the results chapter*). All the conversations with the respondents were conducted in English.

3.2.4. Secondary Data

Aside from the primary data, secondary data was also collected which included reports from various institutions, brochures regarding the process of land registration/recordation, legal documents, published online reports and land-related documents such as the draft land policy of 2020. Also, other pieces of literature found to be relevant to the theme of the research was collected from various sources. The data collected was used for validating the primary data collected and to address sub-objective 1, 2 and 3.

The collection of the literature was carried out in two ways. During the interview, some respondents mentioned some legal documents such as laws and regulations and were availed to the researcher. Several documents were made available in either hard copies or digital, and only a few were suggested to be checked online. The online published legal documents such as Land Survey Act, Lands Act, Lands and Deeds Act, Urban and Regional Planning Act, Electronic Communication Transaction Act, Data Protection Act were downloaded from the internet to give an insight on the frameworks.

Datasets from various institutions involved in documenting land rights in Zambia were obtained. This included samples of title certificates and maps produced in raster format (pdf), and the geometry of the land parcels in vector format (.shp). The purpose of collecting cadastral datasets was to check the distribution of work done by various institutions in different parts of the country. ArcGIS software was used to check the datasets regarding the distribution of locations for land parcels collected. Other datasets such as certificates and maps were checked using Adobe Reader for further analysis.

3.1. Sampling Strategy

Purposive and snowball sampling were the techniques used to collect the primary data. Purposive sampling was used to identify the key informants who provided the required information (Tongco, 2007). Six (6) key informants of the initiatives for tenure documentation (Non-governmental) and five (5) key informants

from government institutions were purposely selected by virtue of knowledge and experience they have regarding the processes of land registration and recordation in Zambia. The government institutions included the departments from the Ministry of Lands and Natural Resources (MLNR) and the local authority from the Ministry of Local Government and Housing.

Table 4: List of respondents

Organisation	Position of the respondent
Lands Department - MLNR	Chief Lands Officer
Lands & Deeds Registry Department - MLNR	Chief Registrar
Survey Department - MLNR	Surveyor-General
Survey Department - MLNR	Principal Land Surveyor
National Land Titling Centre (NLTC) - MLNR	Project Manager -NLTP
Lusaka City Council (LCC) – (MLGH)	Project coordinator - GLTN-STDM project
Peoples Process on Housing & Poverty in Zambia (PPHPZ)	Project Manager - GLTN-STDM project
Medeem Zambia Limited	Chief Technology Officer
Medici Land Governance (MLG)	Project Manager
Integrated Land and Resource Governance (ILRG)	Country Coordinator
Zambia Land Alliance (ZLA)	Program Officer

During the first week of the fieldwork phase, communication was made to the interviewees selected to make appointments for the interview. Due to busy schedules or unavailability of some key informants, other individuals were identified to take up the task. Snowball sampling approach was considered, described by Ochoa (2017) as a sampling technique where the individual selected to be interviewed would recommend other potential subjects within their circles of acquaintances. Phone calling and emails were a mode of communication used to access the referred persons from institutions like PPHPZ and ZLA. For convenience purposes, the interview questions were sent via email in advance before the meeting to the respondents. This was done to enable respondents to read, understand and have a clear picture of the research before the meeting. For each particular session, a short description of the research topic and the aim of the research was explained.

3.2. Methods of Analysis

The management, analysis and interpretation of the data was conducted in two stages. The translation of the audio recorded interviews was transcribed using Microsoft word and analysed by adopting a thematic data analysis technique for organising data collected into themes (Bryman, 2012). Furthermore, all the responses from the interviews were transferred into the analysis guide table (excel sheet) using a

descriptive analysis method, where a summary for the answers was made. Analysis of the data was done using the gap analysis method by comparing the current situation of the land administration to the desired state and further determine the steps that could be undertaken to improve the state (Bhat, 2020) of the land administration in Zambia. This involved comparing the similarities and differences and further assess the areas of strengths and weaknesses of the conventional and innovative approaches. Comparison of the two approaches was made, taking into account the variations of the laws and regulations that influence the procedures of land registration. The analysis of the data in sub-objective three was done using the EPISTLE analytical framework described by (Rossini & Porter, 2019), as a tool used for identification and analysing of micro-economic variables that may influence the performance of the organisation. EPISTLE is categorised with six acronym initials of the micro-economical variable, namely **E**conomic, **P**olitical, **I**nstitutional, **S**ocial, **T**echnology, **L**egal and **E**nvironment, which is used as the analytical framework for this study. The results of the spatial, legal and institutional frameworks were categorised and presented in themes aligned to the EPISTLE model to help with the analysis of the data. Results obtained from the data collected are explained in chapter 4.

3.3. Ethical Consideration

The research involved experts from various identified government offices and proprietors of the innovative land tools in Zambia. Consent was sought to audio record and take notes whilst conducting the semi-structured interviews. The key informants were assured of the confidentiality of the information and the usage for academic purpose only. In addition, the sources of the secondary data will be acknowledged accordingly.

3.4. Limitation in data collection

Access to secondary data from private institutions such as the institutional guidelines were restricted. Also, since ownership of land is treated with privacy, there was a dearth of information with regards to cadastral datasets from the proprietors of the innovative land tools. Hence the available dataset that was made available was only for the locations of operational areas from each organisation.

3.5. Concluding Remarks

The methodology outlined in this chapter has given the essence of the strategies used in undertaking this research indicating how much data will be analysed. The methods used for data collection were picked corresponding to the research sub-objectives and questions. The next chapters plan to show an inside of the responses obtained from the key informants during the fieldwork.

4. RESULTS

This chapter represents the findings from the fieldwork through semi-structured interviews related to the sub-objectives 1 to 3. The qualitative data obtained from the primary and secondary data sources are presented in tables, maps and samples of the documents followed by subsequent analysis and interpretations of the findings. The findings are partitioned in sub-sections, and each part is related to the research questions of the sub-objective. Section 4.1 focuses on the characteristics and the similarities and differences in the spatial, legal and institutional requirements for the conventional and innovative land tools in Zambia. In section 4.2, the spatial, legal and institutional gaps that emerged as a result of comparing the conventional and innovative approaches are presented. Finally, section 4.3, focuses on the reasons for not integrating, the effects of integration and non-integration as well as the suggested methods for the integration of the spatial, legal and institutional frameworks of the conventional and innovative approaches.

4.1. Sub-objective 1: To explore the conventional and innovative land tools used in Zambia

General characteristics and requirements of the conventional and innovative land tools are presented in the next sub-sections regarding the spatial, legal and institutional frameworks.

4.1.1. General characteristics of the land tools

The following were used as characteristics to assess the conventional and innovative tools; *Name of the tool (initiative), name of the organisation, period of existence, funding, the aim of capturing data, clients, equipment used for capturing and the software used for processing data, data storage and formats* from the organisations dealing with documenting land rights. Table 5 is presented with the characteristics of the tools.

Table 5: Characteristics of conventional and innovative tools

	CONVENTIONAL	INNOVATIVE						
a) Name of the tool	1. ZILMIS	2. Landum		3. STDM		4. MAST	5. ParcelCert	6. Open Data Kit
b) Name of the organisation	MLNR	NLTC	MEDICI	PPHPZ	LCC	ILRG	MEDEEM	ZLA
c) Funding	Government	Government	Private - for-profit	Donor funded UN-Habitat – Non-profit	Donor supported UN-Habitat – Non-profit	Donor funded USAID Non-profit	Private supported by ESRI - for-profit	Donor funded USAID & OSISA Non-profit
d) Period of existence	1964	2017	2018	2017	2018	2014	2013	2000
e) Aim of capturing information	Land information and enhance the security of tenure	For registering land parcels and regularly produce certificates in a systematic way to the security of tenure for all.	To empower Zambians living in informal settlement areas with a certificate of titles to guarantee their security of tenure.	Land certification of customary land parcels and to improve access to land rights for women to enhance the security of tenure	For planning, taxation, zoning of the informal settlements, slum upgrading, city management and strengthen the security of tenure	Add value to the information beyond tenure security to extend services of financial assistance, collect data and produce certificates to enhance the security of tenure	To generate land tenure documentation and promote the security of land tenure by assisting the underprivileged	For the production of certificates to enhance the security of tenure, especially to people under customary land
f) Clients	Government ministries and the general public	The general public focusing on landowners	Ministry of Lands and the Local Authority (LCC)	Chiefdoms	Departments in the council, the ward development committee and landowners	Chiefdoms	General public focusing on customary areas and the operational council areas	General public mainly focusing on the underprivileged in customary areas
g) Equipment	DGPS and Handheld GPS and analogue application forms.	Tablets embedded with an add on GPS and DGPS, Handheld GPS, drones	Tablets embedded with a Unilab application and an electronic Questionnaire Handheld GPS and Differential GPS	Handheld GPS, Smart Phones, tablets embedded with STDM Tool	Handheld GPS, Tablets embedded with the STDM tool	Smart Phones embedded with an added Garmin feature which helps to improve the accuracy	Proprietary solution parcel I, Parcel surveyor and Tablets for automatic data collection	Smart Phones, Handheld GPS, DGPS
h) Mapping Software	ArcGIS, Model Maker, AutoCAD	NLTS app, ArcGIS and QGIS	NLTS app and QGIS	QGIS	QGIS	QGIS, Postgres and Amazon web server	QGIS, ArcGIS Pro and ArcMap, ArcGIS Online.	QGIS and Open Data Kit (ODK)
i) Data storage tools	National Data Centre (Server) and ZILMIS.	National Data Centre (Server) and ZILMIS.	Severs and on the cloud storage	Hardrives, computers and Google drive	Central Server and System backups	Server, and the backup drives	Geodatabase and ArcGIS online, PostGIS	A local server, computers and portable devices
j) Data formats	Raster, Vector and tables	Raster, Vector and tables	Text and Vector (shapefiles) formats	Raster, Vector and tables	Raster, Vector and tables	Raster, Vector and tables	Geodatabase – (Raster, Vector and Tables)	Raster, Vector and tables
k) Number of parcels recorded	700,000	60,000 in Lusaka city	47,000 in Lusaka	20,0000	18,400 city of Lusaka	20,000	20,000	40,000

Overview of the characteristics

Table 5 is interpreted in this section regarding conventional and innovative land tools characteristics. The conventional land tool was established in 1964 by the Government of Zambia as the formal system of land administration. The system goes directly with state laws which include: Land Act 184, 1995, Land and Deeds Act 185, 2004, Land Survey Act 188, 1960, Urban and Regional Planning Act 3, 2015 and Land Acquisition Act 296, 1970. The current tool being used under the conventional approach is the Zambia Integrated Land Management Information System (ZILMIS). An interpretation of the results in table 5 is described row by row using the characteristics of the tools. Characteristics for rows a, b and c are combined, while the rest of the characteristics (rows) are looked into individually.

The innovative land tools, on the other hand, are non-government initiatives that were established after 2010. The state laws do not back these systems as is the case of the conventional land tool. The tools captured under this study are five in number which include: Social Tenure Domain Model (STDM), Mobile Application and Secure Tenure (MAST), Landum, ParcelCert and Open Data Kit (ODK).

The following expatiates on the various characteristics of conventional and innovative land tools in Table 5. The name of tools, implementing organisations and source of funding are grouped into the conventional land tool and innovative land tools respectively. However, the other characteristics are tackled separately yet with a combination of both conventional and innovative approaches.

a) Name of the tool (a), implementing organisation (b) and source of funding (c)

Conventional land tool

1. **Zambia Integrated Land Management Information System (ZILMIS):** Prior to the establishment of the ZILMIS the Ministry of Land and Natural Resources (MLNR) was using separate Land Information Systems (LIS) for both cadastral and land registration. Due to a number of challenges the system had in the land administration such as delays in the processing of certificates of titles, the system was replaced by ZILMIS. The ZILMIS was established in 2013 by Sivan Design to have a centralised database of both cadastre and land registration. Notably, the ZILMIS serves as a one-stop-shop for land information in the country that controls the ICT and Geographic Information System (GIS). This provides secured transparent and traceable land transactions. Also, the Differential Global Positioning System (DGPS) surveying tool is used under the ZILMIS to capture land information on the ground. The ZILMIS project is implemented by the MNLR and is funded by the Government.

Innovative land tools

1. **Landum app:** This tool is an innovative tool established by Medici Land Governance (MLG), a Non-Government Organisation (NGO). However, the tool is currently being used for a government project; Systematic National Land Titling Project by the National Land Titling Centre (NLTC) and MLG on a government-funded program.
1. **STDM tool:** The tool was established by the Global Land Tool Network (GLTN) and funded by the UN_Habitat. The tool is currently being used by Lusaka City Council (LCC) and Peoples Process on Housing & Poverty in Zambia (PPHPZ) to capture land information for customary lands and informal settlements in the urban areas.
2. **MAST tool:** This tool was established and funded by USAID. The tool is currently being used by Integrated Land and Resource Governance (ILRG). The tool uses mobile devices in capturing land information for documenting land rights in an efficient, affordable and transparent manner.
3. **ParcelCert:** This is an innovative tool developed, implemented and funded by Medeem Zambia Limited. Medeem is currently using the tool for documenting land rights in both rural areas and informal settlements.
4. **Open Data Kit (ODK):** This is an innovative open-source mobile operating tool and is used in android mobile devices for collecting data. The tool is being used by Zambia Land Alliance (ZLA) for collecting data and documenting land rights across the country supported by donors (USAID and Open Society Initiative for Southern Africa (OSISA) in various projects.

The following characteristics consider both conventional and innovative land tools:

e) Aim of capturing data

The MLNR, as the government agency for land administration, provides geoinformation to the general public in addition to securing land tenure, mainly statutory land tenure. The innovative land tools, on the other hand, aim at securing the rights of the marginalised in the society, primarily the customary and informal settlements that are mostly not recognized by the conventional land administration system. Also, the Lusaka City Council (LCC) uses the innovative land information for planning, taxation, zoning of informal settlements and slum upgrading.

f) Clients

Information gathered from the field, as shown in Table 4 indicates that most of the organisations deal with the general public (beneficiaries/chiefdoms) and others with line ministries and departments. PPHPZ, ZLA, Medeem and IRLG have been focusing on the chiefdoms mainly on the underprivileged and communities, while MLNR, LCC and MLG has been dealing with government ministries and selected departments within and outside their organisations as indicated in table 5.

g) Equipment used for capturing data

Information in table 5 indicates that all the organisations use various equipment to capture data. The majority of the innovative tools use equipment like tablets, smartphones, handheld GPS that are simple and fast in capturing land information, whereas four of the innovative organisations use both simple and sophisticated tools. On the other hand, MLNR only uses the Differential Global Positioning System (DGPS).

h) Software for processing the data

The responses revealed that the majority of the organizations interviewed use open-source software, considering that they are non-profit making organizations. Medeem and MLG the profit-making use licensed software provided by the proprietors such ESRI for ArcGIS. The other profit-making organizations indicated that they use their proprietary software, as shown in table 5.

i) Data storage and formats

In response to the question on data storage, respondents indicated that the data collected is stored on servers while the reaction from 2 respondents was that data is mainly kept on the backup drives, computers and geodatabase or ArcGIS online, PostGIS. Most of the respondents stated that the data collected is stored in uniform formats of raster, vector and tables by most of the organisations.

j) Parcels recorded

Information gathered indicates that so far, the MLNR has recorded 700,000 records at various stages since independence in 1964, which represent about 10% of the entire land size in the country. On the other hand, total parcels captured so far by all the innovative land approaches is 456,000 representing about 5%. The respondent from MLG further indicated by saying that, *“considering the rate at which the data is being collected and the number of parcels captured so far by the innovative organisations, it is expected that the innovative tools will document more land rights and will out pass the number of parcels captured by the conventional approach”*. Also, Figure 5 shows a sample of the areas where MLG has captured land parcels within Lusaka through a systematic land titling program initiated by NLTC.

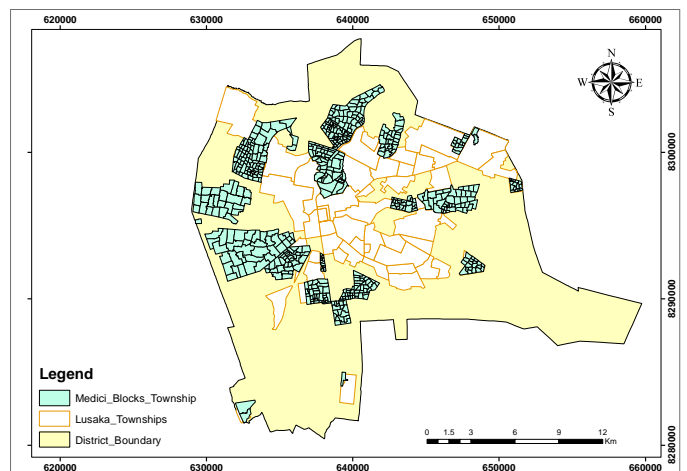


Figure 4: MLG operating areas within Lusaka (source, MLG)

In this section, characteristics of the conventional and innovative land tools were discussed, and the next section deals with the requirements for the conventional and innovative approaches with regards to the spatial, legal and institutional frameworks.

4.1.2. Similarities and difference in the Spatial, legal and institutional requirements of the two approaches

This section discusses the similarities and differences of the requirements for land registration with respect to the spatial, legal and institutional frameworks. The spatial requirements are shown in table 6 and the variables considered are as follows: *Techniques for fieldwork, spatial boundary, spatial accuracy, spatial reference, spatial coverage cost for data collection, time taken for data collection, data updating and maintenance, data access, data standards*. Also, the legal requirements are illustrated in table 7, and the variables include the following: *Land tenure types, time for the registration, the cost for the registration, registration procedures, documents for registration*. Lastly, table 8 tackles the institutional requirements with the variables being: *actors involved, institutional activities, institutional collaboration and institutional capacity building*.

Spatial Requirements

Table 6 presents a summary of the spatial requirements obtained from the respondents.

Table 6: Spatial requirements for conventional and innovative approaches

Variables	CONVENTIONAL	INNOVATIVE						
	MLNR	NLTC	PPHPZ	LCC	ILRG	MEDEEM	ZLA	MLG
a) Techniques for fieldwork	Field Surveys	<ul style="list-style-type: none"> • Aerial Images • Field Surveys 	<ul style="list-style-type: none"> • Aerial Images • Field Surveys 	Aerial Images	<ul style="list-style-type: none"> • Aerial Images • Field Surveys 	<ul style="list-style-type: none"> • Aerial Images • Field Surveys 	<ul style="list-style-type: none"> • Aerial Images • Field Surveys 	<ul style="list-style-type: none"> • Aerial Images • Field Surveys
b) Spatial Boundary	Fixed	General	General	General	General	Fixed and General	Fixed and General	Fixed and General
c) Spatial Accuracy	±3mm	10cm	1.5m to 3m	3m to 4m	1.5m to 2m	30cm	1.5m to 5m	10cm
d) Spatial Reference system	Arc1950	WGS84	WGS84	WGS84	WGS84	WGS84	WGS84	WGS84
e) Spatial coverage	Urban areas and to an extent rural area	Urban areas	Rural and urban areas	Urban areas	Rural areas	Urban and Rural areas	Rural areas	Urban areas
f) Cost for Data collection (per parcel)	US\$220	US\$43.5 - US\$133.7	<ul style="list-style-type: none"> • US\$40 to US\$60 (Urban) • US\$25 to US\$200 (Rural) 	US\$ 3.3	US\$10	US\$28.5 - US\$85.7	US\$28.5	Nil
g) Time taken for data collection of 20 parcels	1 day	1 day	1 day	1 day	1 day	1 days	1 day	1 day
h) Data updating & maintenance	Following laid down legal procedures	Processes to be followed as a subsequent transaction.	Application for changes through the LCC	Laid down procedure must be followed	Updated when a request & transaction is made	Updated when a request & transaction is made	Updated when a request & transaction is made	Procedures from the MLNR are to be followed
i) Data access	Yes	Yes	Yes/No	No	Yes	No	Yes	Yes/No
j) Data quality checks	Validation of attribute information and the survey data	Data Validation before approval	Data Validation before storing	Data Validation before storing	Data validation before storing	Data Validation before storing	Data Validation before storing	Data Validation before approval

k) Data standards	<ul style="list-style-type: none"> • Land Survey Act • Urban and Regional Planning Act 	<ul style="list-style-type: none"> • Land Survey ACT • Urban and Regional Planning ACT 	STDM Standards	<ul style="list-style-type: none"> • Urban and Regional Planning Act • STDM Standards 	Follow the set parameters by the organisation	Yes, but not availed	Follow the set parameters by the organisation	<ul style="list-style-type: none"> • Land Survey Act • Urban and Regional Planning Act
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Spatial Similarities and difference

Based on Table 6, similarities and differences in the requirements were derived using the variables.

a) Techniques for fieldwork

The techniques for capturing land information on the field/ground were found to be aerial images and field surveys. The similar technique was the use of field survey in both conventional and innovative approaches. The conventional used the field survey mainly for carrying out cadastral boundary surveys, whereas the innovative used the field survey for verification of data on the ground. In addition, the innovative approach predominantly used the aerial images for cadastral boundary mapping.

b) Spatial Boundary

There are some differences in the types of boundaries used in the two approaches. Four (4) out of the seven (7) innovative organisations use general boundaries, whereas three (3) use a combination of both general and fixed boundaries. Only the conventional approach uses fixed boundaries when demarcating land parcels.

c) Spatial Accuracy

The spatial accuracy of the two approaches indicates some variations. The accuracy for the conventional is ±3mm obtained using the DGPS (Leica, Topcon, Tremble). In contrast, the other organisations have relatively different accuracies ranging from 10cm to 4m obtained from using either orthorectified images, handheld GPS or embedded GPS Garmin tool in the smartphone appliances when collecting data or delineating boundaries. The accuracy to a larger extent depends on the authenticity of a good device and the spatial resolution for the orthorectified images.

d) Spatial Reference System

As indicated in Table 5, the conventional approach uses Arc1950 for cadastral boundary survey, whereas the innovative approach uses WGS84 for cadastral boundary mapping. The use of two different reference systems indicated some differences, which can lead to data inconsistencies.

e) Spatial Coverage

Spatial coverage of the two approaches includes both urban and rural areas. Three (3) of the innovative organisations operate in urban areas, two (2) in rural areas. The remainder of the innovative organisations and the MLNR (conventional) cover both urban areas (townships) and rural areas (chiefdoms) as indicated in figure 5.

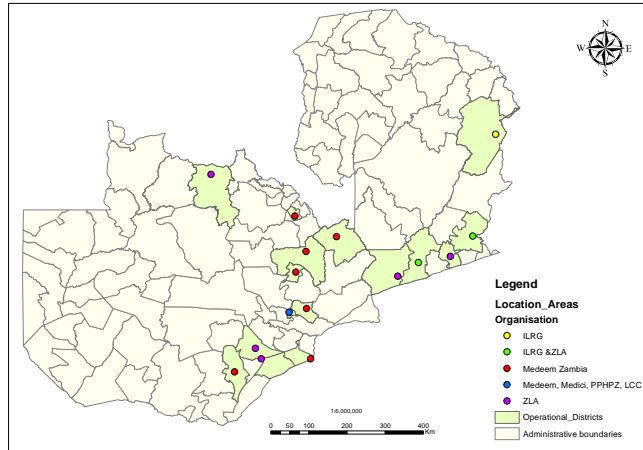


Figure 5: Distribution of projects by various organisations
(Source: Key informants)

f) Cost for data collection

As indicated in table 5, the costs for data collection (surveying) of parcels from all the organisations are not uniform. The results show the range with the minimum cost charge of US\$ 3.3 by LCC with the highest from the MLNR being US\$220 paid by the beneficiaries.

g) Time for data collection

Table 5 shows that the time for data collection of land parcels was based on the number of 20 parcels measuring 50mx50m for a plot which is equivalent to 5 hectares in a day in urban areas. On the other hand, PPHPZ and ILRG capture a minimum of 5 hectares in rural areas in a day. Thus, the majority of the organisations take at least one (1) day to collect data in both rural and urban areas.

h) Data updating and maintenance

The upgrading of information from both approaches is done following the laid down procedures once the beneficiaries make a request. The upgrading is usually done by the Information and Communication Technology (ICT) experts in respective organisations in case of any changes to the property or information (subdivision or ownership).

i) Data access

The majority of the organisations share data with the general public, mainly the beneficiaries with some set protocols and conditions such as from the MLNR under the conventional approach. A fee is required to be paid for the information and information given ought to be treated with confidentiality. Similarly, with the innovative approach, data is accessible and only if consent is granted by the chiefs and to be treated with confidentiality. However, the research gathered that there is no data sharing between conventional and innovative systems. Additionally, there was no data sharing among the organisations undertaking the innovative land administration systems, and this has led to data duplication, especially when collecting data.

j) Data quality checks

All the respondents mentioned that, before the information is stored on the server, the data quality is done to guarantee that the topology is clean, the property information is correctly entered and ensure that standards are followed. The validation, on the other hand, is done through the public meeting or public review at village level (chiefs and indunas) for objections and corrections with common changes that may include correcting of spellings, additions and subtraction of landholders.

k) Data Standards

With regards to the data standards, two (2) out of the seven innovative organisations and the MLNR use the standards or parameters as stipulated in the Land Survey Act 188 of 1960 and the Urban and Regional Planning (URP) Act 3, 2015. At the same time, one (1) organisation uses only STDN standards and the other both STDN and URP Act. The three (3) organisations follow the parameters that have been set by the respective organisations.

Legal Requirements

Table 6 presents the section with legal requirements information collected from all the organisations under study.

Table 7: Legal requirements for conventional and innovative approaches

Variables	CONVENTIONAL	INNOVATIVE						
	MLNR	NLTC	PPHPZ	LCC	ILRG	MEDEEM	ZLA	MLG
a) Land tenure types	Leasehold 99 years	Leasehold 99 years	Customary	Occupancy Licenses 30 years	Customary	Customary	Customary	Leasehold 99 years
b) Time for the Registration	2 months	1 month	2 to 3 months	4 to 8 months	6 months	3 months or more	6 months	1 month
c) Cost for the Registration	US\$285	US\$215 to 285	US\$200	US\$ 36.1	US\$ 7.1to 35.7	US\$26.7	US\$18 to 25 US\$571 to 714	US\$215 to 285
d) Registration procedures	<ol style="list-style-type: none"> 1. Application and recommendation by the council 2. Approval and offer from Commissioner 3. Payment of the prescribed fees 4. Cadastral Surveys 5. Preparation of leases and signing 6. Preparation of Certificate of Title 	<ol style="list-style-type: none"> 1. Sensitisation 2. Social Surveys 3. Preparation of layout plans 4. Mapping of parcels from aerial images 5. Adjudication, Verification and correction 6. Approvals from all the key stakeholders 7. Registration of parcels in the NLTS 8. Certificate Generation 	<ol style="list-style-type: none"> 1. Sensitisation 2. Social Surveys 3. Preparation of layout plans 3. Communication with the chiefs for endorsement, and, 4. Certificate Generation 	<ol style="list-style-type: none"> 1. Sensitisation 2. Lodgement of the application form with supporting documents 3. Payment of the ground rent and the cost for the occupancy license 4. Production and Issuance of licenses 	<ol style="list-style-type: none"> 1. Sensitisation and Preparation of layout plans 2. Consent from the chief 3. Mapping and processing of parcels data 4. Field verification 5. Automatic processing of data & validating 6. Production of maps for objections and corrections 7. Process data 8. Certificate Generation 	<ol style="list-style-type: none"> 1. Sensitisation 2. Preparation of layout plans 3. Consent from the chief 4. Data collection 5. Data processing and validation 6. Certificate Generation 	<ol style="list-style-type: none"> 1. Sensitisation 2. Preparation of maps for the project areas 3. Payments of the processes 4. Demarcation of land parcels and register claims 5. Certificate Generation 	<ol style="list-style-type: none"> 1. Sensitisation 2. Preparation of layout plans 3. Approval of the layout plan by the City council 4. Numbering approved plans 5. Verification of layout plans and other relevant documents 6. Preparation of leases and signing 7. Certificate Generation and printing
e) Documents for Registration	<ul style="list-style-type: none"> • NRC • Filled in application forms 	<ul style="list-style-type: none"> • NRC, • Utility bills • Photos 	<ul style="list-style-type: none"> • NRC • Other relevant documents 	<ul style="list-style-type: none"> • NRC, • Photos • Land records • Any interest in land 	<ul style="list-style-type: none"> • NRC • Consent letter from the chiefs 	<ul style="list-style-type: none"> • NRC • Names of interest in the village register 	<ul style="list-style-type: none"> • NRC • Land records • Consent letter from the chiefs • Village land register 	<ul style="list-style-type: none"> • NRC • Utility • Other documents from the council

Legal Similarities and difference

Based on Table 7, similarities and differences in the legal requirements were derived using the variables.

a) Land Tenure types

It was observed that there are three land tenure types used for land rights registration which are in the law Lands Act 184, 1995 and Lands and Deeds Registry Act 185, 2004. The land tenure types include leasehold, occupancy license and customary land tenure. The conventional system recognizes and issues 99 years leasehold tenure (certificate of title). Also, the occupancy license is issued by the LCC in liaison with MLG and Medem in urban areas. The other innovative approaches mainly issue customary land tenure documents. Notably, the research observed that the conventional approach recognizes the customary land tenure but does not issue customary land tenure certificates in that regard. Furthermore, although the innovative approaches record the customary land rights which are recognized in the law, the tools used are not authorised by the law to record land rights and therefore, operate outside the law as they produce different templates of documents as shown in the samples in appendix 4. Again, the samples of certificates obtained were used to compare the degree of commonality of the products.

b) Time for the Registration

The time taken to process land registration documents varies per organisation. Under the conventional approach, the time taken is approximately two months which was nonetheless reported by the other respondents to take more than two months. Additionally, the NLTC and MLG take one (1) month to complete the registration process for the Systematic Land Titling program. While other organisations such as PPHPZ and Medem the range is between 2 to 3 months. The rest of the organisations such as ZLA, ILRG and LCC take as long as 4 to 8 months to finish the recordation process. The research gathered that latter organisations take longer time than the conventional approach due to the bureaucracies involved with some stakeholders such as the chiefs.

c) Cost for the Registration

The costs from each organisation differ, as indicated in table 7. The conventional system requires the registration fees of about US\$285 to be paid by the beneficiaries for the registration process for the certificate of title. Among the innovative approaches, ILRG charges the lowest fees of about US\$ 7.1 while the majority charge more, which are not uniform. The fees charged are based on the areas (customary or urban) and the size of parcels. The respondents attributed the variations in the registration fees to the services provided during the process, for instance for LCC, *the cost required include; publication cost, dissemination of the data cost, awareness cost, the cost of security of tenure and occupancy license fees.*

d) Registration procedures

Similarly, the registration or recordation procedures are peculiar to the organisation involved in the process. Although in some cases, procedures appear to be similar due to the stages they undertake during the process, especially with organisations working in customary areas. As shown in Table 6, the conventional

system has about six (6) stages while the longest process is from the innovative (ILRG and NLTC), with eight (8) steps while the shortest process is from the other innovative organisation (LCC and PPHPZ) with four (4) steps for recordation. The research observed that organisations with the most prolonged process take longer due to the number of stages involved.

e) Documents for Registration

Each respondent indicated that personal identification documents are required to be submitted by the beneficiaries during the registration process. The conventional system requires two (2) types of identification documents such as National Registration Card (NRC) and application forms. The majority of the innovative organisation have four (4) similar materials needed for the process to commence such as NRC, utility bills, land records and other materials to show as proof ownership for land recordation either in digital or paper.

Institutional Requirements

The responses obtained from the key informants of both conventional and innovative approaches are indicated in table 8 below.

Table 8: Institutional Requirements for Conventional and Innovative approaches

Variable		CONVENTIONAL	INNOVATIVE						
		MLNR	NLTC	PPHPZ	LCC	ILRG	MEDEEM	ZLA	MLG
Actors involved	Field team	Land surveyors	Land surveyors	Para surveyor	Site officer	Land Surveyors	Land Surveyors	Land Surveyors	Land Surveyor
		Planners	Planners	Planners	Planners				Planners
			Enumerators	Enumerators	Enumerators	Enumerator	Enumerators	Enumerators	Enumerators
			Village land committees			Village land committees	Village land commit	Village land committees	
	Office team	Cartographers	Cartographers	GIS Expert	GIS Expert	GIS Expert	GIS Expert	GIS Expert	GIS Expert
		Lands officers	Lands officer						
		Registrars	Registrars/Lawyers		Legal Officers/Lawyers			Lawyers/Paralegals	
		Government Surveyors			Chief Coordinator				Project Manager
		ICT Staff	ICT Staff			ICT staff			ICT Staff
				Project staffs	Project Coordinator		GIS Manager		GIS Manager
	Basic actors	Ground rent collectors	Ground rent collectors		Ground rent officer			Financial manager	
		Landowners	Landowners	Landowners	Landowners	Landowners	Landowners	Landowners	Landowners
		Chiefs		Chiefs		Chiefs	Chiefs	Chiefs	
		Village head persons		Village head persons	Village head persons	Village head persons	Village head persons		
Institutional Activities	1. Identification and Allocation of Land 2. Land surveys & provide geoinformation 3. Land registration 4. Land disputes resolution 5. Collect land-related fees 6. Certificate of Title issuance	1. Sensitisation meetings 2. Demarcating of parcels 3. Systematic Adjudication 4. Certificate of Title issuance	1. Sensitisation meetings 2. Regular communication with the chief 3. Data collection Field Surveys 4. Data quality checks 5. Issuance of customary tenure certificates	1. Sensitisation meetings 2. Recording of all land parcels 3. Collect property rates 4. Informal settlement regularisation 5. Issuance of Occupancy Licenses	1. Sensitization meetings 2. Mapping General Boundaries on a map, points of interest 3. Field Mapping with witness and claims 4. Data quality checks 5. Issuance of customary tenure certificates	1. Sensitisation meetings 2. Data collection Field Surveys 3. Field Data entry 4. Data quality checks 5. Issuance of customary tenure certificates	1. Sensitisation meetings 2. Preparation of maps for the project areas 3. Demarcation of household 4. Field and Register claims 5. Data quality checks 6. Issuance of customary tenure certificates	1. Sensitisation meetings 2. Demarcating of parcels 3. Field data entry 4. Systematic Adjudication 5. Certificate of Title issuance	
	Institutional collaboration	Very often - Medici & ILRG, Often with Medeem, Others seldom	Very often - Medici & ILRG, Often with Medeem & seldom with others	Seldom with the MLNR	Often with the MLNR	Very often with the MLNR	Often with the MLNR	Often with the MLNR	Very often with the MLNR
Institutional Capacity	Departmental Directors	NLTP Manager	Country Coordinator	Chief Coordinator	Chief of Party	Chief Tech.Officer	Administrative Officer		
	Assistant Directors		Vice coordinator	Project Coordinator	National Coordinator		Human Resource officer	Project management	
			Project Manager					GIS Manager	
	Cartographers	Cartographers	GIS Expert	GIS Experts	GIS Experts	GIS Experts	GIS Experts	GIS Experts	
	Land Surveyors	Land surveyor	Para Surveyors	Site officer		Land Surveyor	Land Surveyors	Land Surveyor	
	Planners	Planners		Planners				Planners	
	Lands officers	Lands officers							
	Land valuers								
	Ground rent collectors	Ground rent collectors		Ground rent officers			Financial manager		
	Registrars/ Lawyers	Lawyers		Legal officer			Lawyers/ Paralegals		
	Interns/temporary staff	Enumerators	Enumerators/ Para surveyors	Enumerators/temporary staff	Enumerators/temporary staff	Enumerators/interns	Enumerators/Interns		
ICT Staff	ICT Staff			ICT Staff			ICT Staff		

Institutional Similarities and difference

On the basis of the responses from the organisations interviewed similarities and differences were observed using the variables, as indicated in Table 8.

a) Actors involved

The actors involved in land registration are not uniform. Actors can be categorised in three classes comprising different expertise with specific roles. The three categories include the field staff team, office team, and basic actors. All the seven (7) of the organisations from the innovative initiative involve enumerators/interns during field data collection as opposed to the conventional approach with only land surveyors. Five (5) organisations have a combination of both enumerators/interns and land surveyors to collect the data. The office team also has different actors ranging from two (2) to five (5) staff who are employees of various organisations and play different roles that require the processing of the data collected and others who do the administrative works such as approval of documents. Within the innovative approach, the basic actor's group include the landowners whose tenure is documented, and they provide the necessary information to the enumerator's and the chiefs who play the role of endorsing the certificate produced. Under the conventional approach, the MLNR also engages the landowners to provide custodial information regarding state land and the chiefs who give consent and as the first point of contact in the allocation of customary land being converted to leasehold tenure.

b) Institutional activities

With regards to the institutional activities, both approaches have different stages performed during the process. As indicated in Table 8, the conventional approach has six (6) steps and begins with the identification of land to be registered with the involvement of the local authority in the planning stage. However, on the innovative approaches, different organisations have a range of activities from four (4) to six (6) in carrying out similar activities which kick-start with conducting sensitisation activities with community members on the importance of security of tenure and land ownership before the actual mapping. After following all the outlined activities, the ultimate goal of both approaches is to generate the land rights documents for the beneficiaries.

c) Institutional Collaboration

The collaboration among the organisations involved in the documenting land rights exists but vary between actors. The MLNR has been interacting with all the organisations at different levels, formal and informal. It has partnered with MLG in the proof of concept systematic land titling project to enable beneficiaries or landowners to obtain a 99-year certificate of titles. Similarly, other organisations from the innovative approaches have also been working with the MLNR through the launch or officiating of customary certificates in customary areas, which shows some levels of interaction. In addition, the MLNR

and the organisations have been interacting through institutional meetings where they deliberate on issues among which include, low-cost registration approaches, possibilities of working with other service providers, on the survey standards and consideration of types of equipment to mention but a few. On the other hand, some innovative organisations have also been collaborating among themselves. For instance, the LCC and Medeem have also partnered in an on-going slum upgrading program which aims to regularise the informal settlements within the city of Lusaka.

d) Institutional Capacity

It is evident from the information in table 7 that the composition of the organisations involved in land rights documentation is of diverse expertise. The responses of the key informants from the innovative initiatives indicated that they have both permanent staff and temporary staff, while the MLNR has more than 400 staff who are permanently employed and operate in all provincial offices across the country. Generally, organisations from innovative approaches have an establishment of staff ranging from 7 to 200, including other temporary staff consisting of enumerators or interns. Most of the organisations have members of staff with different titles, and they play similar roles during the land registration process. For example, the LCC has legal officers, while ZLA has Paralegals or lawyers with the same responsibilities. Similarly, other organisations have a position of a GIS Expert, also referred to as Cartographer in the MLNR establishment.

Summary for sub-objective 1

For the characteristics of the conventional and innovative land tools, the research gathered that the current tool being used under the conventional is the ZILMIS which is government-funded and backed by the state laws. The innovative land tools are mostly either donor-funded or privately funded, and they use simple tools like smartphones. Their activities are mostly not backed by state laws. While the conventional land tool mainly captures statutory lands, the innovative primarily considers the customary and informal settlements.

Furthermore, for the similarities and differences regarding the spatial, legal and institutional frameworks, there were various variables used. For the spatial framework, the major similarities were the time for surveying for data collection, updating and maintenance. The major differences were the accuracy, spatial references, spatial boundaries and the techniques for fieldwork. However, under the legal framework, the only similarity is that both conventional and innovative approaches issue documents of which the tenure is stipulated in the law. The major differences were that the land tenure recorded by the conventional approach is supported by the state laws but does not issue customary tenure certificates. Whereas some of the innovative approaches record tenures that are not backed by the state laws, for example, the informal (occupancy) and customary tenure certificates. Also, the time involved, and cost of registration/recordation differ. Lastly, under the institutional framework, the major similarity was the local

stakeholders who are the landowners in the actors involved. Also, the other similarity was a collaboration among the institutions that exist though at different levels. For the differences, while most of the innovative approaches use enumerators yet under the conventional, qualified professionals are employed. The other difference was in the institutional activities where the innovative approaches undertake sensitisation programs with the local communities, whereas the conventional begins with the identification of land for allocation.

In this section, similarities and differences in the requirements of the conventional and innovative land tools were discussed, and the next section deals with the gaps identified in the spatial, legal and institutional requirements for the conventional and innovative approaches.

4.2. Sub-objective 2: To assess the gaps of the Spatial, legal and institutional requirements

This section presents the emerging gaps to ascertain the major issues and challenges between the conventional and innovative land approaches that need to be addressed for the integration of the two systems.

4.2.1. Emerged spatial, legal and institutional gaps from the comparison of approaches

Table 9 presents the emerged gaps observed in the spatial, legal and institutional requirements for land registration between the conventional and innovative approaches. The identified emerged gaps were as a result of the comparison of the similarities and differences between the two approaches, and results were assessed as follows.

Table 9: Emerged gaps for the conventional and innovative approaches

	Variable	Gaps/issues	Emerged gaps	Category of Gaps
SPATIAL	Techniques for fieldwork	Different methods for data collection	Two methods: Aerial and Field surveys	B
	Type of Boundaries	Different types of boundaries used for defining land parcels	Two types: Fixed and General	B
	Spatial Accuracy	High and low accuracies	Range of $\pm 3\text{mm}$ to 4m	B
	Spatial Reference	Use of different reference system	Arc1950 and WGS84	B
	Spatial coverage	Different focus areas of data collection	Rural or urban areas	S
	Cost for data collection	Different charges for the services	Range of US\$ 3.3 to US\$ 220	B
	Data upgrading	The procedures when upgrading	Procedures are there to be followed	N
	Data sharing and accessibility	Non-sharing of data among organisations	Lack of data sharing	B
	Data standards	Standards to be followed for capturing data and procedures	Standards are in place but not adhere to	B
LEGAL	Land tenure types	Issuance of certificates/documents	Documents differ	B
	Time for the process	The period taken between the two approaches in processing the documents	Ranging from 1 to 8 months	S

	Variable	Gaps/issues	Emerg ed gaps	Category of Gaps
	Cost for the registration process per parcel	The required fees to be paid by beneficiaries for the process are incredibly different	Range from US\$ 7.1 to US\$ 285	B
	Registration Procedures	There are different processes and steps to be followed.	Ranging from 4 to 8 steps	S
	Documents for registration	Different required documents to be submitted by the beneficiaries	Some organisations require a range from 2 to 4 documents	N
INSTITUTIONAL	Key actors involved and their roles	The actors involved are almost similar in numbers and positions	Some organisations require 8 or 9 actors	S
	Institutional activities	The activities involved during land registration are different	Ranging from 4 to 6 activities	S
	Institutional collaboration	There is a gap in institutional cooperation between the organisations and the MLNR	Ranging from rare to very often	S
	Institutional capacity	Different Staffing and capacity levels	Staff Range from 7 to 400 and qualified and non-qualified staff	S

N – No gaps, **S** – Small gaps, **B** – Big gaps

The emerged gaps shown in Table 9 were assessed and categorised in three classes using the variables from each framework. The categories were No-gaps (N), Small gaps (S) and Big gaps (B). The assessment of the emerged gaps was done based on the subjective opinion of the researcher.

No gaps -The differences indicated with no gaps were assessed and classified to have implications of ease integration where both the conventional and innovative approaches have some similarities. The variables identified were data upgrading and documents for registration. For the data upgrading, for instance, in both the conventional and innovative approaches, field survey techniques are required when a request for a subdivision is needed. Thus, the field survey technique used for upgrading as well as verification under the conventional system. Also, for the documents in both approaches, materials such as National Registration Card and utility bills are required for registration as proof of identity.

Small gaps - The small gaps category was classified as minor gaps of the various variables between the innovative and conventional approaches that are manageable and could easily be integrated. The variables identified were spatial coverage, institutional activities, institutional capacity, key actors involved and their roles and institutional collaboration. With regards to the spatial coverage, the innovative approaches usually operate in customary areas (chiefdom), and informal settlements in the urban settings whereas the conventional operates mainly in urban areas and rural areas only when customary land is converted into state land. Again, the institutional activities differ regarding the involvement of stakeholders. The innovative approaches usually sensitize and involve the local people during the process of land registration, whereas the conventional approach does not. However, the personnel and positions (institutional capacity/key actors involved and their roles) of both approaches include key staffs at the managerial and technical (surveyors

and cartographers) levels despite the inclusion/non-inclusion of other staff. Also, there is some level of collaboration between the MLNR and some of the innovative organisations. Some degree of collaboration includes the deliberation on issues relating to the finalisation of the draft land policy document, NSDI, the legitimacy of customary land certification, survey standards and equipment considerations and FFP approaches. The MLNR has partnered with some of these organisations in the Systematic Land Titling Program, and the MLNR is present during the officiating of documents produced by some innovative organisations.

Big gaps - The category for big gaps had implications of complexity towards the integration of both conventional and innovative approaches. The variables identified were techniques for fieldwork, spatial boundaries, spatial accuracy, spatial reference, the cost for data collection and registration, data sharing and accessibility, data standards, land tenure types, registration procedure and time for the process. The methods used for data collection differ, the innovative approaches use field surveys for verification of boundaries on the ground that are not visible on the image when digitising. In contrast, the conventional approach uses the field survey method for the cadastral boundary survey using high precision equipment. The conventional approach uses beacons during the boundary survey (fixed boundary) while the innovative uses physical features that may be trees in rural areas and fences in informal settlements (general boundary). Although accuracy depends on the purpose under the innovative approaches, the conventional approach requires high accuracy for demarcating land parcels. The use of different spatial references (Arc1950 and WGS84) could be an issue when transforming data. There is no uniform charge for data collection and registration. There is usually a breakdown of charged fees under the conventional approach. The research found that under the innovative, there are variations in the fees to be paid for the services. The law (Land Survey Act 188, 1960) provides the breakdown of the charges under the conventional approach, whereas such breakdown is missing under the innovative approaches. There is no sharing of geospatial information among the organisations. MLNR provides the data to the general public at a fee, whereas the innovative approaches provide similar data for free with the consent of the chiefs. Each organisation uses its standards in data capture and processing. The conventional approach issues leaseholds while innovative approaches issue customary tenure certificates. The registration procedures differ in stages in all the organisations with some having more steps and some less, which could be cumbersome during the registration process

Summary for sub-objective 2

From the description of no-gaps, small gaps and big gaps above, the process of integration will require the adoption of simpler to sophisticated measures in handling the varying levels of gaps. No-gaps and small gaps have no or few differences implying that they can easily lead to the integration of conventional and innovative approaches, while the big gaps have differences which can hinder the integration. It was observed that the big gaps were identified under the spatial and legal frameworks, whereas the institutional had slight gaps. This implies that more efforts will be required to address the gaps under big gaps compared to the small and no gaps.

4.3. Sub-objective 3: Propose methods for the integration of conventional and innovative approaches

In this section, data collected with regards to the integration of conventional and innovative approaches are presented. The reasons and effects for integration and non-integration as well as proposed methods for integration are considered in sections 4.3.1 & 4.3.2, respectively. The EPISTLE model was adopted as the framework for the analysis in this section. As already mentioned, the EPISTLE model stands for **E**conomic, **P**olitical, **I**nstitutional, **S**ocial, **T**echnology, **L**egal and **E**nvironment.

4.3.1. Reasons for not Integrating the two approaches

The respondents were asked the research question; what are the spatial, legal and institutional reasons for not integrating the conventional and innovative approaches? This will help to ascertain the causes of the non-integration of the two approaches. The views of the respondents are summarized in table 10 and grouped into themes (EPISTLE).

Table 10: Responses from key-informants on Reasons for not integrating

Indicator	REASONS	Theme
Spatial	The use of different technologies, high and low grades for conventional and innovative approaches, respectively	T
	Stipulated standards in the state law are not adhered to by the innovative approaches	L
	Survey charges differ, low and high	E
	Different boundaries for demarcation of parcels	T
	The quality and accuracy of information as well as digitized data	T
	Inadequate sharing of data	T
Legal	Non- recognition of the Certificates produced by the innovative approaches organisation	L
	Not following the requirements stipulated in the Acts	L
Institutional	Different actors and roles performed during the process	I
	Institutional mandates to the conventional system only	I
	Customary land actors are against the integration since their interest/tenure may not be recognised	I

KEY - Economic Political Institution Social Technological Legal Environmental (EPISTLE)

Table 10 is organised in three columns: indicators, reasons and themes. The themes are aligned to the EPISTLE analytical framework.

- i **Spatial** - Six reasons for not integrating the spatial framework were identified. According to EPISTLE framework, four reasons relate to technology in terms of methods, boundaries, data quality and accuracy. The other reason was related to the economy in terms of cost and time, lastly with one relating to legal standards regarding the capturing of spatial data.
- ii **Legal** – Two reasons for not integrating the legal were identified and are legally oriented. The majority of the innovative organisations do not adhere to the requirements stipulated in the land laws and secondly, the government does not legally recognise the certificates of land rights produced by the organisations.

- iii **Institutional** – Four reasons were identified for not integrating the institutional framework and three relating to institutional focusing on actors and the roles, mandates of the stakeholder. Also, it was found that customary land actors are against the integration fear of not to have the power to control their land.

4.3.2. Effects of Integration

This section considers the effects of integration; positive effects of integration and negative effects for non-integration of the two approaches; conventional and innovative. Also, the EPISTLE analytical framework is used in analysing the views of the respondents, as shown in table 11.

Table 11: Responses from key-informants on effects of integrating the two approaches

	Positive effects for integration	Theme	Negative effects for non-integration	Theme
Spatial	1. Stipulated standards in the set laws will be followed resulting in a reduction of data inconsistency regarding the collection of data	L	1. Stipulated standards won't be followed, hence no control over the data produced to check the quality leading to data inconsistency	L
	2. Reduced cost on land registration	E	2. High cost on land registration delays in the delivery of products to the clients	E
	3. Seamless cadastre index and no information gaps	T	3. Continuous gaps in the cadastral index and NSDI	T
	4. Less data duplication and improvement in data quality	T	4. Continuous duplication of data leading to overlaps and an effect on data quality	T
	5. It will enhance data access and reliability	T	5. Less accessibility to the vital information which can be used for decision making	T
	6. Data transparency for land transactions	S	6. No data transparency in land transactions	S
	7. Data will be highly managed and protected	T	7. Mishandling of important information due to lack of protection mechanisms	T
	8. Improvement in the land information system to manage the data	T	8. No improvements in the Land Information Management System to manage the bulk data	T
	9. Wider coverage of land information	T	9. Spatial distribution of parcels in the country	T
	10. It will allow the formal recognition of the data collected by various organisation	L	10. Collected data will continuously not be recognised	L
Legal	1. Use of Certificates for various purpose such as collateral	E	1. No improvements in accessing formal credit/bank loans or not widely accepted by money lending institutions as collateral for loans	E
	2. Increased Security of tenure to landowners	S	2. Less support towards the security of tenure	S
	3. Authentication of the documents/certificates	L	3. No authentication and challenging to detect fraudulently produced documents	L

	Positive effects for integration	Theme	Negative effects for non-integration	Theme
Institutional	1. Reduction in processes and timeframe leading to speedy data collection and approval of the documents	E	1. Continuous increase in time for land registration and processing of documentation	E
	2. Improve/Increase in revenue collection	E	2. Low levels in revenue collection	E
	3. Improvement in service delivery	I	3. Overlaps in Institutional mandates and no collaboration among the key players from various institutions	I
	4. Reduction in the duplication of roles and responsibilities among organisations	I	4. Non-completion of the Land audit and National Land Titling Program due to not having up to date records	I
	5. Bulk messaging to the landowners reminding them of the bills	T	5. Communication on developmental programs between the government and the chiefs	I
	6. Increase in capacity building	S	6. Continuous low levels in skills and Human resource and resistance to change	S

KEY - Economic Political Institution Social Technological Legal Environmental (EPISTLE)

Table 11 presents the effects of integrating conventional and innovative approaches with regards to the spatial, legal and institutional frameworks. The table is organised in four columns, positive effects with its theme and adverse effects with its themes. EPISTLE was used as an analytical framework for the themes emerging in both positive and negative effects of integrating and non-integration of the two approaches.

Positive effects

- i **Spatial** - Ten effects were identified. Most (6) of the effects identified are relating to technology in terms of cadastre index information, less data duplication, data access and reliability, management and protection of the data, improvements in the land information system and wider coverage of the information. Two effects relate to legal in terms of standards to be followed and formal recognition of the data. The other effect relates to the economy in terms of the cost and lastly, one on social focusing on data transparency on land transactions.
- ii **Legal** – Three effects were identified. One effect related to legal mostly on authentication of the documents. One effect refers to the economy category focusing on the use of certificates as collateral, and one effect relates to social focusing on tenure security.
- iii **Institutional** – Six effects were identified. Two of the effects identified relates to the institutional category that focuses on roles and responsibilities and service delivery of the organisations. One effect is related to the social category focusing on capacity building. One effect is related to technology which involves bulk messaging to landowners. Lastly, two effects on the economy theme in terms of time for the process and revenue collection.

Negative effects

- i **Spatial** - Ten effects were identified. Mostly six (6) of the effects are relating to technology in terms of cadastre index information, data duplication, access, mishandling of information, no improvements in land information, quality and spatial distribution of parcels. Two effects relating to legal focusing formal recognition of the data and standards. One on social focusing on transparency on land transactions and lastly one on the economy in terms of cost for the registration.
- ii **Legal** – Three effects were identified where one identified effect related to legal, mostly on authentication. One effect regarding the social theme focuses on the insecurity of tenure while the economy focuses on the use of documents as collateral.
- iii **Institutional** – Six effects were identified. Three effects relate to institutional that focus on mandates, activities and communication. Two effects associated with the economy focusing on time for registration and low levels in revenue collection. Lastly, one social relating to low-levels in human resource.

4.3.3. What are the proposed methods for integrating the spatial, legal and institutional frameworks?

In the previous section, the effects of integration were discussed, and in this section, proposed methods are presented for each indicator to provide solutions on how to address the emerging gaps regarding the integration of conventional and innovative approaches. Organisations interviewed responded positively concerning the integration of conventional and innovative approaches. Some suggestions were indicated with regards to the spatial, legal and institutional frameworks from each organisation that could support and lead to the integration of the two approaches.

Spatial

Techniques for fieldwork – Six (6) out of seven (7) innovative organisations suggested the use of both aerial images and field survey methods with only one (1) suggesting the use of aerial images only. The MLNR suggested the use of a field survey. For this method, the innovative approaches indicated that the field survey would be used for verification of data on the ground while with the conventional for carrying out cadastral boundary surveys. Furthermore, it was suggested that there is a need to have a committee in place that should be monitoring, check, verify, calibrate and further certify all the survey equipment used by organisations for collection of data.

Spatial Boundary – The majority of the innovative organisations suggested the adoption of general boundaries as a possible solution for determining the land parcels, which can later be changed to fixed boundaries. Therefore it was observed that using general boundaries will give a fit for purpose compared to the fixed boundaries. Hence the suggestion will be that the land administration system should adopt the use of general boundaries.

Spatial Accuracy – The majority of the organisations suggested consideration of the use of various levels of accuracies for different locations. For instance, low levels can be considered in informal settlements and customary areas, while a high level of accuracy will be required for urban areas.

Spatial Reference System – The use of WGS84 as a common datum was suggested by the majority of the innovative organisations when surveying land parcels to allow easy integration of information from the two approaches. However, this may require some transformation process to be done when assigning the new reference system to the existing data, which is in ARC 1950.

Spatial Coverage – Having a wider coverage land in the country, the majority of the organisations suggested the use of systematic adjudication which allows the systematic titling rather than only using the sporadic titling which is in the legal framework. The systematic system will help in documenting land parcels effectively and efficiently to secure tenure for all.

Cost for data collection – Considering some variations in the charges for surveying or data collection, the majority of the organisations suggested to have standard and flexible survey fees for specific locations and sizes that will accommodate and provide security of tenure for all.

Data sharing and access - The majority of the organisations indicated that there was a need to make data available and suggested that data should be made available or open to the general public through flexible ICT platforms such as National Spatial Database Infrastructure (NSDI).

Data quality checks - With regard to this variable all the organisations suggested that constant checks of the data quality be done to allow improvements in the data collected by various organisations that will enable smooth integration of the information.

Data Standards – As suggested by the majority of the organisations, there is a need to have data interoperability standards that organisations adhere to when collecting data and processing the data and should be made publicly available to all the organisations involved in the documenting land rights.

Legal

Land Tenure types – Three (3) out of seven (7) innovative organisations suggested having a legal framework that will include and allow the issuance of titles on customary land using a fit for purpose approach. The current draft National Land Policy recognises innovative approaches. Hence, for the integration of the two approaches, it was suggested that the draft policy should be passed. Two (2) suggested if innovative approaches organisation could have a standard format of the certificates issued to support the integration. Also, the other two (2) suggested the need to maintain the dual land tenure system in the country than to convert all the land into state land to allow chiefs also to play a role in the land administration.

Time for the Registration – Processing of certificates was found to be taking long to be completed under the conventional. Five (5) out of seven (7) innovative organisations, including the conventional, suggested that there should be a system in place which will be less time consuming when processing the documents. For instance, the provision of use digital signatures in the Electronic Communication and Transaction Act of 2009 that will replace manual signing and allow the efficient way of approving certificates.

Cost for the Registration - Based on the interviews, land registration charges were indicated with some variations. The majority of the organisations suggested having a seamless titling program that will require landowners to bear less expensive fees and enable the majority to have their parcels registered that will eventually be incorporated in the formal land register

Registration procedures – From the interviews conducted the majority of the organisations suggested that in order for the registration to be effective there is a need to define the processes that have to be followed by every organisation in documenting land rights.

Institutional

Actors involved and roles – Four (4) out of seven (7) innovative organisations suggested that there is a need to bring together organisations involved in the collection of data for documenting land rights and define the tasks for each actor and have common steps that should be followed.

Institutional activities – The gap which was identified under this variable was with regard to the number of activities undertaken during the process. However, the suggestion made was to align all the processes required; every organisation can follow to integrate the conventional and innovative approaches.

Institutional collaboration – Regarding this variable four (4) innovative organisations and the conventional suggested a need to enhance institutional collaboration between MLNR and all the organisations involved in documenting land rights and continuity should go on which can help in developing the standards or guidelines across all the implementing partners.

Institutional Capacity - Five (5) out of seven (7) innovative organisations suggested that capacity building should be built at the local levels through training of all the players involved so that the standards are adhered to by everyone. Two (2) of the innovative organisations, including the conventional, suggested a need for effective capacity building to transform the rigidity of the staff in the use of the latest technology.

Sub-objective 3 Summary

In summary, the main reasons for non-integration of the conventional and the innovative approaches were ascertained to assist in proposing methods for the integration. Under the spatial framework, the

study found that the methods of data capturing, the standards, the fees charged, the boundaries and spatial accuracy as well as non-sharing of information were the reasons for non-integration. Also, under the legal framework, the non-recognition of certificates produced by the innovative approaches as well as not following the stipulated requirements in the state laws. Furthermore, under the institutional framework, it was found that the actors involved and the roles they perform during the process of the registration were different. In view of this, the effects of integration were determined. The positive effects were that there would be less access to data, improvement in the land information systems, and there will be formal recognition of the data. The negative effects of integrating the two approaches revealed that the customary land actors, specifically the traditional authorities are uncertain regarding the integration of both approaches because of the loss of power over their customary land as well as the possibility of the conversion of their customary interests to statutory leaseholds. Finally, the proposed methods for integrating the two approaches were suggested. Under the spatial framework, it was revealed that there is a need to consider varying levels of accuracies in different areas. Also, the aerial survey, which is mainly used by the innovative approaches, should be considered for preliminary surveys which could cover wider areas. Subsequently, the field surveys could be used for cadastral survey boundaries for precise measurements. Additionally, it was suggested that there should be one common datum to be used by both approaches. Furthermore, data sharing and accessibility was suggested that there is a need to make data available to the public through platforms that do not require users to use privileges when accessing them. Under the legal framework, it was proposed that there is a need to have a legal framework that will include and allow the issuance of titles on customary land using a fit for purpose approach. Again, it was suggested that there is a need for the National Land Policy to be passed in order to recognize the innovative land. Lastly, under the institutional framework, it was suggested that there is a need to enhance the institutional collaboration between the Ministry of Lands and Natural Resources with innovative organisations.

In this section, reason, effects and suggestions for the integration of the conventional and innovative approaches were discussed, and the next chapter discusses the finding from sub-objective 4.1 - 4.3.

5. DISCUSSION

This chapter discusses the results presented in chapter four based on the sub-objectives presented concerning the integration of conventional and innovative approaches for land administration in Zambia. Also, the discussion juxtaposes the results obtained with the scientific literature reviewed.

5.1. Conventional and innovative land tools used in Zambia

The research explored and found that conventional land tools are officially recognised and backed by state laws. This affirms that statement made by Zevenbergen et al. (2012) that the conventional land administration is the formal land administration system of a country. Again, it was noted that the conventional system has been in place for many years, where the Land Administration system in Zambia is about fifty-six (56) years from 1964. According to van Asperen (2014a), the registration process of the formalized system follows categorized top-down procedures regarding the state laws which this study found to be Lands Act 184, 1995, Land and Deeds Act 185, 2004, Land Survey Act 188, 1960, Urban and Regional Planning Act 3, 2015 and Land Acquisition Act 296, 1970 (MLNR, 2019). The innovative land tools, on the other hand, were established in 2010 by non-government organisations, either donor-funded or privately owned. This agrees with the statement made by Lengoiboni et al. (2018) that innovative land tools are donor or privately funded. In addition, the innovative tools mainly capture customary and informal settlements which recognize various land tenure interests and arrangements as stated by Lengoiboni et al. (2018) and Sommerville et al. (2017).

The research assessed the similarities and differences of the framework requirements for both land administration approaches (conventional and innovative).

Spatial framework

The research found that the main similarity regarding the spatial framework for the two approaches was the use of field surveys. For the conventional approach, the field survey was used as the primary technique for data collection, whereas some of the innovative approaches used the field survey for verification of captured data. The field survey is usually done for fixed and accurate boundaries using high technologies like DGPS under the conventional approach. Yet, innovative approaches use mainly aerial images and simple tools like mobile devices. The research gathered that the conventional approach has been able to capture about 10% of land information in the country since 1964 using conventional land tools whereas the innovative with the simple tools have been able to capture about 5% of land information since 2010. This, therefore, aligns with the statements made by Lengoiboni et al. (2018); Salifu (2018) and Salifu, Abubakari and Richter (2019) that conventional approach uses sophisticated tools whereas the innovative approaches use simple tools. Also, the results confirm the argument made by (Koeva et al., 2018) that the

innovative land tools are faster regarding spatial coverage as compared to the formal conventional land tools.

Based on the comparative of the results, it was realised that the identified differences were in the methods of data capturing, accuracy, the spatial references. However, this has some implications that could result in having challenges in harmonising the data collected by innovative organisations with the data from the conventional system resulting in data inconsistencies and could have an impact on the quality of data.

Legal framework

Under the legal framework, the similarity found between the conventional and innovative approach is the issuance of documents or certificates to landowners. The major difference found was that while the conventional approach is supported by the state law such as Land Act 184, 1995, Land and Deeds Act 185, 2004., and Land Survey Act 188, almost all the innovative approaches do not have legal backing. This confirms the statement made by Salifu (2018) that innovative tenure documentation is usually not recognized by state law. Furthermore, the researcher ascertained that these innovative approaches, although not supported by law, register customary land rights and informal settlements and issue customary and occupancy certificates, respectively. This agrees with the statement made by (Enemark et al., 2016) that social tenures are the main focus of the innovative approaches which are flexible and not according to structural judicial lines, thus ensuring a continuum of land rights. However, the lack of provisions in the current draft land policy to support the integration of the framework for the conventional and innovative approaches has impacted negatively on land management in the country. The documents produced by the innovative organisations are out of the formal register, and therefore, they lack legitimacy.

Institutional framework

Under institutional, the research found that there are similarities regarding the conventional and innovative approaches which are mainly the actors involved; staff and stakeholders. Nevertheless, while the conventional approach primarily uses qualified professionals, the innovative approaches use enumerators who are not qualified professionals. Again, in the conventional approach, the process begins with the identification of land with the involvement of the local authority in the planning stage, while in the innovative approaches the process starts with community sensitisation programs on the importance of land tenure documentation and security of tenure. This aligns with the argument made by (Lengoiboni & Molendijk, 2015) that under the conventional approach, various qualified professionals such as surveyors, conveyors, registrars, lawyers, among others are involved during the process. Again, the argument made by Williamson et al. (2010) was ascertained that roles and tasks are divided under the conventional approach, which sometimes leads to duplication of tasks due to less collaboration.

5.2. Gaps in the conventional and innovative approaches

The emerged gaps, which are the more issues and challenges between the conventional and innovative land approaches identified are compared with the literature. The details are as follows:

Spatial framework

The major challenges that were identified regarding the possible integration of the conventional and innovative approaches were the techniques for field data collections, spatial boundaries, spatial references, data sharing and accessibility, data standards, accuracy, the cost involved in the collection and processing of data. The other identified areas with minor challenges were spatial coverage and data upgrading. While the conventional approach uses standards and requirements from the state laws such as Lands Act 184,1995 and the Land Survey Act 188, 1960, the innovative approach uses their own standards and requirements which differ from one organisation to another. This is likely to have implications on the quality of the data collected, inconsistencies including metadata and will be challenging to integrate data from different sources with different settings. However, to achieve the effective integration of the two approaches establishing standards and policies will be required that will be adopted by all the organisations to ease the integration process. In addition, the research found that the spatial accuracy for the conventional approach is $\pm 3\text{mm}$ using DGPS, whereas the accuracy for innovative approaches ranges from 10cm to 4m using simple tools and aerial images. This agrees with the statement made by Hazel et al. (2008) and Stevens et al. (2012) that the conventional approach uses control points in fixing and delineating the cadastral parcel boundaries where the accuracy ranges between 3mm to 5mm using a dual-frequency GPS. This will have some implications on the consistency and quality of the data collected by both approaches and can negatively impact the integration process. Furthermore, the researcher ascertained that data sharing was a challenge between the conventional and innovative approaches as well as among the innovative organisations as a result of the diversity in standards, operations and requirements, thus causing duplication of land documentation.

Legal framework

The emerging gaps identified concerning the possible integration of the conventional and innovative approaches under the legal framework were the time and costs for registration/documentation, the varied land tenure certificates/documents produced as well as the legal recognition and backing and the procedures undertaken during the process of registration. Only the required documents were considered with minor challenges. Under the conventional approach, the time indicated to be shorter, and costs for documentation were ascertained to be high and uniform. However, in comparison to the innovative approaches, the time was longer with the variations in the costs than expected, considering the tools being as innovative and supposed to provide services in a cheaper and faster manner as also mentioned by Enemark et al. (2016) and Koeva et al. (2017). Nevertheless, the documents issued are certificates of titles

that are fully recognized by the state yet under the innovative approach, the documents issued differ which are not recognized by the state. Furthermore, it was found out that the conventional approach converts customary land tenure to statutory by issuing 99 years leasehold certificates to landowners. This confirms the argument made by Abubakari et al. (2018) and Sommerville et al. (2017) that registered customary lands are transferred from customary interests to statutory leaseholds. The research found that both approaches had different stages for registration with some organisations having more and less, and seemed to be quiet involving and could impact the integration of the two approaches negatively. Again, the research agrees with Zevenbergen (2002) and Larbi (2006) that the process of land registration under the conventional system is cumbersome regarding several factors.

Institutional framework

The major issue ascertained regarding the institutional framework for integrating the conventional and innovative approaches was the level of engagement of the local stakeholders, especially the Chiefdoms, the vulnerable and marginalized in the society. While the innovative approach engages the community through sensitization programs, the local people participate in the collection of the data. Thus, they (local stakeholders) deem it to be part of the land documentation process, which can be sustainable. This agrees with the statement made by Salifu et al. (2019) and FAO (2002) that innovative approaches usually involve the communities.

5.3. Integration of the conventional and innovative approaches

Reasons for not integrating

The reasons for not integrating conventional and innovative approaches are compared with the literature. The research found that the reasons for not integrating the conventional and innovative approaches were mostly on the spatial framework focusing on methods of capturing data, time for processing the data, boundaries for demarcation of parcels and accuracies to be used when collecting data from both approaches. Under the institutional framework, the reason for not integrating was found to be that customary land actors, particularly the Chiefs, were against it. This is mainly due to the fact that the Chiefs will not have the power to control their customary land since it will be converted to statutory leasehold under the stipulated state laws. This confirms the argument made by Sommerville et al. (2017) that the traditional authorities usually have powers on their customary land and subjects.

Positive effects

The positive effects for the integration of the conventional and innovative approaches are compared with the pros of integration in the literature. The research found out that when these two approaches are integrated, there will be secured tenure for all, including the poor, vulnerable and the marginalized such as women. This aligns with the statement made by Zevenbergen et al. (2012) where there is the need for a

continuum of land rights in order to secure all land rights holders as well as informal settlers (GLTN, 2008). Thus, the integration will lead to the issuance of legitimate certificates for all property owners. Again, the researcher ascertained that the integration of the two approaches would result in non-duplication of roles and responsibilities where the systems will be efficient and effective as was stated by Bakar (2003); Inguane (2018) and Wilson (2016). Also, there will be centralised land information system which will make transactions to be transparent, information to be accessible by various institutions and agencies and easy sharing of information thus improving the growth and development of the country. This is aligned with the pros mentioned by Yankey et al. (2001).

Negative effects

The negative effects of integration were found to be the conversion of customary land tenure to statutory land tenure system, which changes interest such as customary freehold to leasehold. In addition, there will be a likelihood of some innovative organisations that are profit-oriented to lose their autonomy and business. This aligns with the statement made by Yankey et al. (2001) that integration can lead to the acquired/absorbed organisation folding up completely. Also, regarding non-integration, the research found that there will be duplication of data collection which will be costly, time-consuming should the conventional land documentation disregard the data collected by the innovative initiatives.

Proposed methods

The research found that there were differences regarding the spatial and legal frameworks of the conventional and innovative approaches than the institutional framework. The following are the suggested methods to address the identified gaps for each variable.

Techniques for fieldwork - With regards to the spatial, the suggested feasible method for data collection was the use of aerial images and field survey for verification of data. Considering that the majority are using the aerial images and field survey methods, this will make the integration of the two approaches easy. However, the use of the aerial images was found to have some implications such as; highly participatory, saves time, cost and knowledge transfer or sharing. This agrees with the statement by Enemark et al., (2016) that capturing of information through digitising is participatory than the actual cadastral field survey method. On the other hand, it has other implications that include loss of data once it is mishandled. Although suggested as a feasible solution, aerial images cannot work independently but may require some added methods to uncover hidden features as well as provide the actual survey when required. This is because not all the people will require the actual survey, and they may only need to know their boundaries. However, this combination does not mean that it has equal weight, but the field survey is only for verification of the features that are not visible in the image and only in case of measurement when required. In the Zambian context, it was mentioned that the proposed method would require a committee

established that will be able to monitor, check, verify, calibrate and further certify all the survey equipment used by organisations for collection of data.

Spatial boundary - As indicated in chapter 4.3 results, the majority of the organisations proposed general boundaries as a method for determining the land parcel using visible features from the satellite image, in order to provide security of tenure for all. This aligns with the statement by McLaren et al. (2018) they recommend the use of general boundaries for recording how land is occupied and is utilised. Also, the findings have shown that in a situation where the landowner needs the actual survey, the survey can be considered done at a later time for upgrading the already captured land information. However, the proposed method was found to have implications such that it will only offer the Fit for purpose solution because it will solve the immediate problem of the unregistered land and will also consider the identification of boundaries, especially in the customary setup. On the other hand, it will help with the recognition and legitimacy of the documents and the data collected. The other implication could be that during the dry season when most of the features used are weathered the marks used as reference points may result in boundary conflict as they may not be visible during the season. However, it was discovered that location must be considered because the use of general boundaries mostly can be applied in the customary areas and urban areas, it can work best in areas that are clustered (informal).

Spatial accuracy was identified as a gap in the integration of conventional and innovative approaches. The suggested method was to have graduated levels of accuracies that could be supported with external gadgets to boost accuracy. However, considering the locations such as customary areas the use of high or increasing the accuracy may not be necessary unless in high-value land of an urban setup and areas where features of boundaries are not visible. This aligns with the statement by McLaren, Fairlie, Kelm and Souza (2018), that high accuracy when delineating parcel boundaries is less important unless, in areas of high-value land, contested boundaries and placing of boundary marks are necessary. Therefore graduated accuracies for different locations and purposes may be considered as it will reduce inconsistencies in data since accuracy will be specified for different areas.

Data sharing and accessibility - Access to data and sharing was identified as a gap for the integration of the two approaches. Considering different data being collected by various organisations, the sharing of data has been an issue in Zambia. Therefore, it was suggested that data should be made available to the public through flexible platforms. The proposed method has implications such that no privileges to access data will be required, and different data captured by various organisations will be uploaded on this platform for sharing. This aligns with the statement by McLaren et al. (2018); Williamson et al. (2010) that such platforms provide access to information timely and transparently. Eventually, this will need all stakeholders to come together and support the integration and harmonise the data, preferably have all the data in the existing NSDI platform for easy access.

Data standards - Currently, in Zambia collection and processing of data is conducted without following what is stipulated in the laws such as the Land survey Act and Urban and Regional Planning Act. Each organisation does things in its own way. Therefore, it was suggested that there is a need to have data interoperability standards in place that organisations adhere to when collecting data and processing the data and should be made available to all the organisations involved in the documenting land rights. Once not adhered to the set laws it will have implications such that data collected by various organisations will not be recognised and will result in a waste of time because it will be difficult to harmonise the data with different parameters. This will require to convert the data types, systems into a common one which will be as good as starting all over again rather than incorporating the already existing and can negatively impact the integration.

Land tenure types - Despite having all tenure types recognised in the law, the documents issued by the innovative approaches lack formal recognition. Therefore it was suggested that there is a need to have a legal framework in place that will allow and back the certificates issued using the innovative approaches. However, this has implications that landowners will have the security of tenure to their land and documents produced will have some form of recognition even with the financial lending institutions leading to many accessing the funds to improve on their pieces of land. Also having a standard format for the certificates as suggested, this will imply that documents will have the same quality of details, and this will help reduce any fraudulent activities which are currently happening in the country since the documents will have some authentication. This will help to have the information and documents from the innovative approaches easily be integrated with the conventional approach.

Time for registration - As suggested by both the conventional and innovative approaches to have a system in place that will be less time-consuming when processing the documents as well as the use of digital signatures. Indeed this will have implications that there will be efficiency in the delivery of services to the general public hence improving the land administration system. This will also help the government to achieve the goal of producing five (5) million certificates by 2021 following the 7th National Development Plan. This will also require that the Electronic Communication and Transaction Act of 2009 be revised and make a provision for the use of electronic signatures.

Cost for registration - Variations were observed in the fees required to be paid by the beneficiaries during the registration process from both approaches and considered to be high. Therefore a proposal was made if there could be a seamless titling program to allow landowners not to pay exorbitant fees that they have been paying for the services. This implies that more parcels will be registered and will improve the land registration in the country and also to provide security of tenure for all and will further provide a solution of having unregistered land in the country. On the other hand, organisations will need to adhere to the standards that will require to be followed to avoid overlaps with the data.

Registration procedures - Regarding the registration process, a suggestion was to define the processes of registration. This has implications that there will be a reduction in procedures to be undertaken, straight-through processing and speedy approval of the documents reducing the current bureaucratic processes that mostly hinder the efficient delivery of services and eventually all the processes will be integrated.

Actor involved and roles - Three of the innovative organisations suggested bringing together organisations involved in the collection of data for documenting land rights and define the tasks for each actor and have a common step. This implies that there will be a reduction with overlaps in the tasks and will lead to every actor knowing who is in charge of some operational areas and roles will be clarified. There will also be an increase in collaboration among the key players from different institutions leading to the integration of the innovative organisations and the MLNR.

Institutional activities - Based on the interview, the number of activities undertaken during the processes were found to be a concern with some organisations having more stages and some less. It was suggested that the processes should be aligned and be uniform for every organisation to follow in order to integrate conventional and innovative approaches. The research found this to have some implication such that the processes that are undertaken by the innovative approaches are more of community involvement and therefore, the local people tend to understand their land administration processes.

Institutional capacity - To have a well-structured land administration, there must be a presence of well-balanced staffing levels. Based on the information gathered, five (5) innovative organisations proposed a need to build capacity levels through training of all the players involved so that the set standards are adhered to by everyone. This implies that skills will be improved, there will be an increase in human resources and production levels since knowledge will be extended at the local level, and there will be the presence of dedicated staff at the institutional level. There will be a change of mindset through knowledge transfer.

6. CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

The research aimed to investigate the possibilities of integrating the conventional and innovative approaches for land administration in Zambia. The conclusion is based on the summaries from sub-objectives 1 – 3. Recommendations and further research are also provided.

6.1.1. To explore the conventional and innovative land tools used in Zambia.

The research explored the possibilities of integrating the conventional and innovative approaches of land administration in Zambia to secure tenure for all. This was done through conducting interviews with key informants from institutions such as the government (MLNR) innovative organisations (MLG, Medeem, ILRG, ZLA, LCC, PPHPZ and NLTC). The research gathered information on the similarities and differences in the requirements between the two approaches. The similarities that were identified was time for data collection, tenure types recorded, collaboration among the institutions and actors involved. The differences identified were accuracy, spatial references, spatial boundaries and the techniques for fieldwork, land tenure recorded by the innovative approaches, time and cost of registration/recordation as well as institutional activities.

6.1.2. To assess the gaps in the spatial, legal and institutional requirements of the conventional and innovative approaches in Zambia.

The research observed more gaps in the spatial and legal frameworks which were observed to have implications of complexity towards the integration that might require extra work and resources. The gaps identified with greatest challenges were techniques for fieldwork, spatial boundaries, spatial accuracy, spatial reference, the cost for data collection and registration, data sharing and accessibility, data standards, land tenure types, registration procedure and time for the process. Small gaps and no gaps were also observed to be less complicated and could easily lead to the integration of the conventional and innovative approaches once addressed. However, more efforts will be required to address the issues under more gaps compared to the small and no gaps.

6.1.3. To propose methods for the integration of spatial, legal and institutional frameworks of the conventional and innovative approaches.

The critical reasons for not integrating the conventional and innovative approaches are because of the diversity in the spatial and legal frameworks. Additionally, the integration of the institutional frameworks would be very flexible once the spatial and legal frameworks are integrated. The reasons for the non-integration were diverse variables such as the non-recognition of the land tenure documents by the state, non-adherence to the state land laws, methods and standards of data capturing, the fees charged, the boundaries and spatial accuracy as well as non-sharing of information. In addition, the positive effects of

integration would be the security of tenure for all-inclusive of the poor and the marginalised. On the other hand, the negative effect is the possibility of the customary land tenure to be converted to statutory leaseholds as well as the loss of power by the chiefs in managing their customary lands. Thus, the proposed methods for the integration is either the conventional approach absorbs all the innovative approaches which may be interpreted as vertical integration (fully merged) or the merge of only the spatial and legal frameworks regarded as horizontal integration (partly merged). Also, regarding the partly merged, the existence of the National Spatial Database Infrastructure (NSDI) would be the appropriate platform for the integration of all the land information which will benefit both the conventional and innovative organisations.

6.2. Recommendation

- The Land Survey Act 188, 1960 should be amended or made flexible to accommodate the innovative approaches' technical standards of data collection and the flexible legal framework that allows documenting land rights from both customary and informal settlement areas. Also, to create an institutional framework that will involve all the key stakeholders (CSO, NGO, Traditional authorities, the government institutions and the local communities) to work together as a way of integrating the institutions. With the above in place, the state agency (MLNR) could use this study as a guide in establishing the integration of the conventional and innovative approaches of land administration Zambia.
- Currently, the country has been working on the land policy, which is still in the draft form and has taken time to be finalised. In the process of integrating the conventional and innovative approaches, it will be appropriate that the law recognises the innovative approaches through finalisation of the draft land policy to enable the integration. Therefore, the finalisation of the draft land policy document should be taken into serious consideration in order to support the integration at the same time to recognise and incorporate the certificates produced by the innovative approaches into the formal register.
- As observed in the results from the emerging gaps, there are no standards to follow during capturing of data; there are differences in accuracy ranging from high to low, different charges, different times to process the documents and steps. Therefore there is a need to have a common framework in place for both conventional and innovative approaches to follow. There is a need to have a standard guide to enable the organisations involved in documenting land rights and produce data that are as close to each other as possible in case of integration and will allow the process to be easy.

Further Research

- A framework could be designed for the integration of the conventional and innovative approaches in Zambia.
- Future research may consider investigating the impact of the integration of conventional and innovative land approaches from the perspective of the stakeholders. This will bring out the role of the traditional authorities as well as whether the land administration system to be recognized and adopt all the customary interests subsisting in the country and not converting all into leasehold as is the current case in the conventional system.

LIST OF REFERENCES

- Abrahamsson, S., Hasson, J., & Isaksson, R. (2010). Integrated Management Systems: advantages, problems and possibilities. In *13th Toulon-Verona Conference: Excellence in Services* (pp. 1–12). Coimbra, Portugal 28-29 August 2010: University of Coimbra. Retrieved from <http://urn.kb.se/resolve?urn=urn:nbn:se:hgo:diva-756>
- Abubakari, Z., Richter, C., & Zevenbergen, J. (2018). Exploring the “implementation gap” in land registration: How it happens that Ghana’s official registry contains mainly leaseholds. *Land Use Policy*, 78(July), 539–554. <https://doi.org/10.1016/j.landusepol.2018.07.011>
- Agyeman-Yeboah, S. (2018). Land Rights Documentation in Ghana : Experiences From Low -Income Key Workers. *European Journal of Research in Social Sciences*, 6 (1), 13–26. Retrieved from <https://www.researchgate.net/publication/322500038%0ALAND>
- Ainsworth, Q. (2020). Data Collection Methods. Retrieved March 17, 2020, from <https://www.jotform.com/data-collection-methods/>
- Akin, O. (2009). *CAD and GIS Integration*. (B. A. Hassan A. Karimi, Ed.), *CAD and GIS Integration* (1st Ed.). Boca Raton, USA: CRC Press. <https://doi.org/10.1201/9781420068061>
- Arko-adjei, A. (2011). *Adapting land administration to the institutional framework of customary tenure: The Case of peri-urban Ghana*. (PhD Thesis) Delft University of Technology, Delft, The Netherlands: IOS Press. Retrieved from <https://research.utwente.nl/en/publications/adapting-land-administration-to-the-institutional-framework-of-cu%0A>
- Bakar, Z. A. (2003). Benefits of systems integration: Qualitative or quantitative? *Malaysian Journal of Computer Science*, 16(2), 38–46. Retrieved from https://www.researchgate.net/publication/228404656_Benefits_of_Systems_Integration_Qualitative_or_Quantitative
- Bennett, R., Wallace, J., & Williamson, I. (2005). Integrated Land Administration in Australia - the Need to align ICT Strategies and Operations. *Spatial Sciences Institute*, 1–11. Retrieved from https://minerva-access.unimelb.edu.au/bitstream/handle/11343/34494/67048_00002707_01_SSC2005-Ro.pdf?sequence=1&isAllowed=y
- Bhat, A. (2020). What is Gap Analysis: Definition, Method and Template with Example. Retrieved March 21, 2020, from <https://www.questionpro.com/blog/gap-analysis/>
- Bryman, A. (2012). *Social Research Methods* (4th Ed.). New York: Oxford University Press.
- Cloverdx. (2019). The 6 Biggest Data Integration Challenges. Retrieved May 15, 2020, from <https://www.cloverdx.com/blog/biggest-data-integration-challenges>
- De Vries, W., Laarakker, P., & Wouters, R. (2016). Land Registration and Cadastre , one or two agencies? In *2016 World Bank Conference: Land and Poverty* (pp. 1–20). Washington DC, USA 14-18 March 2016: World Bank. Retrieved from <https://www.researchgate.net/publication/299086777%0ALand>
- Deininger, K. (2003). *Land Policies for Growth and Poverty Reduction*. World Bank and Oxford University Press. Washington DC, USA: World Bank and Oxford University Press. <https://doi.org/10.4324/9781351317726-5>
- Enemark, S. (2001). Land Administration Infrastructures for Sustainable Development. *Property Management*, 19(5), 366–383. <https://doi.org/10.1108/02637470110410194>
- Enemark, S. (2007). Integrated Land-Use Management for Sustainable Development. In *JointFIG Commission: Informal Settlements* (pp. 1–13). Athens, Greece, 28-31 March 2007: University of Aalborg. Retrieved from <https://www.researchgate.net/publication/254508777>
- Enemark, S., McLaren, R., & Lemmen, C. (2016). *Fit-For-Purpose Land Administration: Guiding Principles for Country Implementation*. Nairobi, Kenya: UNON, Publishing Services Section. Retrieved from www.unhabitat.org
- Enemark, S., Bell, C. K., Lemmen, C., & McLaren, R. (2014). *Fit-For-Purpose Land Administration*. (S. Enemark, Ed.). Copenhagen, Denmark: International Federation of Surveyors. Retrieved from www.fig.net
- FAO. (2002). Gender and access to land (pp. 1–44). Rome, Italy: Publishing Management Service, Information Division, FAO. <https://doi.org/10.1057/9780230226203.0005>

- Fetai, B. (2015). *Analysing the Effects of Merging Land Registration and Cadastre*. (MSc Thesis) The University of Twente, Enschede, The Netherlands. Retrieved from https://www.itc.nl/library/papers_2015/msc/la/fetai.pdf
- GLTN. (2008). *Secure Land Rights for All*. Nairobi, Kenya: Global Land Tool Network. Retrieved from <http://www.unhabitat.org/>
- GLTN. (2016). GLTN and Land Tools. In *Securing Land and Property Rights for All*. Christchurch, Newzealand, 2-6 May 2016. Retrieved from www.gltm.net
- Goodhue, D. L., Wybo, M. D., & Kirsch, L. J. (1992). The impact of data integration on the costs and benefits of information systems. *MIS Quarterly: Management Information Systems*, 16(3), 293–310. <https://doi.org/10.2307/249530>
- HABITAT U.N. (2012). *Designing a Land Records System for the Poor, Report 2, 2012*. Retrieved from <http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Designing+a+Land+Records+System+for+the+Poor#2>
- Hancock, B., Ockleford, E., & Winderidge, K. (2009). *An Introduction to Qualitative Research. Qualitative Research*. University of Birmingham. <https://doi.org/10.1109/TVCG.2007.70541>
- Hazel, J. E. J., Kaplinski, M., Parnell, R. A., Kohl, K., & Schmidt, J. C. (2008). *Monitoring Fine-Grained Sediment in the Colorado River Ecosystem, Arizona — Control Network and Conventional Survey Techniques. U.S. Geological Survey Open-File Report 2008-1276*. Reston, Virginia: Northern Arizona University and Utah State University. Retrieved from <http://www.usgs.gov/pubprod>
- Hendriks, B. (2019). *Designing and Implementing a Pro-Poor Land Recordation System*. Nairobi, Kenya: UN-Habitat. Retrieved from www.unhabitat.org
- Inguane, A. (2018). Mapping Community Land in Mozambique Opportunity and Challenges for Combining Technology with Good Land Governance. In *2018 World Bank Conference: Land and Poverty*. Washington DC, USA 19-23 March 2018. Retrieved from <https://www.researchgate.net/publication/324522011>
- Jacoby, J. (2011). Challenges to Merging Organizations – Emergent Journal. Retrieved April 20, 2020, from <http://blog.emergentconsultants.com/2011/10/31/challenges-to-merging-organizations/>
- Jacoby, J. (2017). How Leaders Can Manage Team Member Change Resistance. Retrieved April 30, 2020, from <http://blog.emergentconsultants.com/2017/09/01/how-leaders-can-manage-resistance-to-change/>
- Jasdec. (n.d.). Benefits of the System. Retrieved April 30, 2020, from <https://www.jasdec.com/en/system/fund/benefits/index.html>
- Koeva, M., Bennett, R., Gerke, M., Crommelinck, S., Stöcker, C., Crompvoets, J., ... Kundert, K. (2017). Towards Innovative Geospatial Tools for Fit-For-Purpose Land Rights Mapping. In *International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences* (Vol. XLII-2/W7, pp. 37–43). Wuhan, China, 18-22 September 2017: ISPRS. <https://doi.org/10.5194/isprs-archives-XLII-2-W7-37-2017>
- Koeva, M., Crommelinck, S., Stöcker, C., & Crompvoets, J. (2018). Its4land - Challenges and Opportunities in Developing Innovative Geospatial Tools for Fit-For-Purpose Land Rights Mapping. In *Embracing our smart world where the continents connect: enhancing the geospatial maturity of societies* (pp. 1–17). Istanbul, Turkey, 6-11 May 2018: International Federation of Surveyors (FIG). Retrieved from <http://www.fig.net/fig2018/>
- Kuhn, D. R. (1990). On the Effective Use of Software Standards in Systems Integration. In *Proceedings of the First International Conference: Systems Integration*. Morristown, NJ, USA, 23-26 April 1990: IEEE. <https://doi.org/10.1109/icsi.1990.138711>
- Larbi, W. O. (2006). Land Administration Reform in a Plural Environment – The Case of Ghana. In *5th FIG Regional Conference* (pp. 1–11). Accra, Ghana, 8-11 March 2006. Retrieved from http://w.fig.net/resources/proceedings/fig_proceedings/accra/ppt/ps01/ps01_02_larbi_ppt.pdf
- Latter, T. (2017). The Benefits of System Integration. Retrieved April 30, 2020, from <https://thehappinessindex.com/tech/integrated-system-benefits/>
- Lemmen, C. (2010). *The Social Tenure Domain Model A Pro-Poor Land Tool*. Copenhagen, Denmark: International Federation of Surveyors (FIG). Retrieved from [https://research.utwente.nl/en/publications/the-social-tenure-domain-model--a-propoor-land-tool-ebook\(e1c64a71-181e-450e-b6c0-0027aeb9d74b\).html](https://research.utwente.nl/en/publications/the-social-tenure-domain-model--a-propoor-land-tool-ebook(e1c64a71-181e-450e-b6c0-0027aeb9d74b).html)
- Lemmens, M. (2011). Land Administration. In *Geo-information* (pp. 297–338). Dordrecht: Springer Science+Business Media. https://doi.org/10.1007/978-94-007-1667-4_15
- Lengoiboni, M., & Molendijk, M. (2015). Land Administration and Tenure Registration : Precondition for

- successful implementation. In *Proceedings of GeoTech Rwanda 2015* (pp. 1–14). Kigali, Rwanda, 18-20 November 2015: Department of Urban and Regional Planning and Geo-Information Management, UT-I-ITC-PLUS, Faculty of Geo-Information Science and Earth Observation. Retrieved from <https://research.utwente.nl/en/publications/land-administration-and-tenure-registration-preconditions-for-suc>
- Lengoiboni, M., Richter, C., & Zevenbergen, J. (2019). Cross-cutting challenges to innovation in land tenure documentation. *Land Use Policy*, *85*, 21–32. <https://doi.org/10.1016/j.landusepol.2019.03.023>
- Lengoiboni, M., Richter, C., & Zevenbergen, J. A. (2018). An overview of initiatives to innovate land tenure recordation: 2011 to present. In *2018 WORLD BANK CONFERENCE: LAND AND POVERTY* (pp. 1–31). Washington DC, USA, 19-23 March 2018: Land Governance in an Interconnected World. Retrieved from <https://research.utwente.nl/en/publications/an-overview-of-initiatives-to-innovate-land-tenure-recordation-20>
- Lugo, D., & Ortega, J. (2015). Open Data Kit (ODK), an Open Source option for field mobile data collection. *Proceedings of the International Conference on Offshore Mechanics and Arctic Engineering - OMAE*, *10*(March). <https://doi.org/10.1115/OMAE201542230>
- Malambo, A. H. (2014). Land Administration in Zambia After 1991: History, Opportunities and Challenges From the 1995 Lands Act. *Journal of Geography and Geology*, *6*(1), 139–154. <https://doi.org/10.5539/jgg.v6n1p139>
- McLaren, R., Fairlie, K., Kelm, K., & Souza, G. D. (2018). New Technology and Emerging Trends : The State of Play for Land Administration. *World Bank*, (February), 1–180.
- MLNR. Draft National Land Policy, 5 Ministry of Lands and Natural Resources § (2019). Lusaka, Zambia. Retrieved from <https://www.mlnr.gov.zm/>
- Mühl, J. K. (2014). Research methodology. *Contributions to Management Science*, 75–100. https://doi.org/10.1007/978-3-319-04069-1_4
- Mulolwa, A. (2002). *Integrated Land Delivery: Towards Improving Land Administration in Zambia*. (PhD Thesis) The Delft University of Technology, The Netherlands: Delft University Press. Retrieved from <http://resolver.tudelft.nl/uuid:39998679-36f2-4fe6-ab1e-d0d98360d7f1>
- Myerson, J. M. (2001). Enterprise Systems Integration. In J. M. Myerson (Ed.) (2nd Ed., pp. 1–46). New York, USA: CRC Press.
- Nichols, S. (1993). *Land Registration: Managing Information for Land Administration*. (PhD Thesis) The University of New Brunswick, Fredericton, New Brunswick, Canada.
- Ochoa, C. (2017). Non-random sampling: snowball sampling. Retrieved March 16, 2020, from <https://www.netquest.com/blog/en/snowball-sampling>
- Palmer, D. (1999). Making land registration more effective. Retrieved December 16, 2019, from <http://www.fao.org/3/x3720t/x3720t04.htm>
- Rabley, P. (2009). Land Registration Systems Around the World. In *PRLA Winter Conference*, (pp. 1–59). Washington DC, USA, 5 March 2009: International Land Systems.
- Raišienė, A. G. (2011). Advantages and Limitations of Integrated Management System: The Theoretical Viewpoint. *Social Technologies*, *1*(1), 25–36. Retrieved from <https://www.researchgate.net/publication/281595782%0AAdvantages>
- Rossini, F. A., & Porter, A. L. (2019). *Integrated Impact Assessment*. (F. A. R. and A. L. Porter, Ed.), *Taylor & Francis* (Vol. 53). New York, USA: Routledge. <https://doi.org/10.1017/CBO9781107415324.004>
- Salifu, F. W. (2018). *Innovative Approaches To Land Tenure Documentation in Ghana : An Institutional Perspective*. (MSc Thesis) The University of Twente, Enschede, The Netherlands Faculty of Geo-Information Science and Earth Observation: ITC Printing Department.
- Salifu, F. W., Abubakari, Z., & Richter, C. (2019). Innovating along the continuum of land rights recognition: Meridia’s “Documentation packages” for Ghana. *Land*, *8*(12), 1–18. <https://doi.org/10.3390/LAND8120189>
- Sommerville, M., Bouvier, I., Minango, J., & Chuba, B. (2017). Land Documentation in Zambia: A comparison of approaches and relevance for the National Land Titling Program. In *Proceedings of the Responsible Land Governance :Towards Evidence Based Approach* (pp. 1–31). Washington DC, USA, 20-24 March 2017; World Bank: Washington, DC, USA, 2017.
- Stavridou, V. (1999). Integration in software-intensive systems. *Journal of Systems and Software*, *48*(2), 91–104. [https://doi.org/10.1016/S0164-1212\(99\)00049-7](https://doi.org/10.1016/S0164-1212(99)00049-7)
- Stevens, J., Jennifer, S., & Raechel, B. (2012). Land Surveying and Conventional Techniques for Measuring Positions on the Earth’s Surface. Retrieved May 14, 2020, from <https://www.e-education.psu.edu/geog160/print/book/export/html/1926>

- Tembo, E., Minango, J., & Sommerville, M. (2018). *Zambia's National Land Titling Programme-challenges and opportunities*. Retrieved from https://www.land-links.org/wp-content/uploads/2018/03/Session-06-05-Tembo-153_paper.pdf
- Termscompared. (2019). Horizontal integration vs vertical integration. Retrieved May 1, 2020, from <https://www.termscompared.com/horizontal-integration-vs-vertical-integration/>
- Tongco, M. D. C. (2007). Purposive Sampling as a Tool for Informant Selection. *Ethnobotany Research and Applications*, 5, 147–158. <https://doi.org/10.17348/era.5.0.147-158>
- Toulmin, C. (2009). Securing land and property rights in sub-Saharan Africa: The role of local institutions. *Land Use Policy*, 26(1), 10–19. <https://doi.org/10.1016/j.landusepol.2008.07.006>
- Tuladhar, A. M. (2004). *Parcel-based Geo-Information System: Concepts and Guidelines Arbind Man Tuladhar*. (PhD Thesis) International Institute for Aerospace Surveys and Earth Sciences (ITC), Enschede, The Netherlands: ITC Printing Department. Retrieved from <https://research.utwente.nl/en/publications/parcel--based>
- United Nations. (2017). In-depth review of data integration. In *Conference of European Statisticians* (Vol. 2, pp. 1–20). Geneva, Switzerland, 14-15 February 2017. Retrieved from https://www.unece.org/fileadmin/DAM/stats/documents/ece/ces/bur/2017/February/02_in-depth_review_data_integration_final.pdf
- USAID. (2015). Mobile Application To Secure Tenure: Using Technology to Strengthen Land Rights. *US International Development*, 1–4. Retrieved from https://www.land-links.org/wp-content/uploads/2016/09/USAID_Land_Tenure_MAST_Brochure.pdf
- USAID. (2018). Zambia's National Land Titling Programme - Challenges and Opportunities LandLinks. Retrieved from <https://www.land-links.org/research-publication/zambias-national-land-titling-programme-challenges-and-opportunities/>
- USAID. (2019). Mobile Applications to Secure Tenure (MAST): Lessons from Burkina Faso, Liberia and Tanzania | LandLinks. <https://doi.org/https://www.land-links.org/event/mobile-applications-to-secure-tenure-mast-lessons-from-burkina-faso-liberia-and-tanzania/>
- van Asperen, P. (2014a). *Evaluation of innovative land tools in sub-Saharan Africa: Three cases from a peri-urban context*. (PhD Thesis) Amsterdam, The Netherlands, Delft University of Technology: IOS Press under the imprint Delft University Press. Retrieved from <https://ncgeo.nl/downloads/pdf112014/PaulvanAsperen17092014.pdf>
- van Asperen, P. (2014b). *Evaluation of innovative land tools in sub-Saharan Africa: Three cases from a peri-urban context*. IOS Press under the imprint Delft University Press. Delft University of Technology, Amsterdam, The Netherlands. Retrieved from <http://www.otb.bk.tudelft.nl>
- Van der Molen & Christiaan Lemmen. (2005). Unconventional Approaches To Land Administration. In *FIG 2005: Secure land tenure* (pp. 1–13). Nairobi, Kenya, 11-12 November 2004: International Federation of Surveyors (FIG). Retrieved from https://www.fig.net/resources/proceedings/2004/nairobi_2004_comm7/papers/ts_04_3_vandermolen_lemmen.pdf
- Williamson, I., Enemark, S., Wallace, J., & Rajabifard, A. (2010). *Land Administration for Sustainable Development*. ESRI Press Academic (1st Ed.). Redlands, California.
- Wilson, A. (2016). 5 Key Benefits of Business Integration – Stay Ahead of the Game. Retrieved January 2, 2020, from <https://www.rolustech.com/blog/5-key-benefits-of-business-integration/amp>
- World Bank. (2017). Why Secure Land Rights Matter. Retrieved May 18, 2019, from <http://www.worldbank.org/en/news/feature/2017/03/24/why-secure-land-rights-matter>
- Yankey, J. A., Jacobus, B. W., & Koney, K. M. (2001). *Merging nonprofit organizations: The art and Science of the Deal*. Mandel Center for Nonprofit Organizations. Cleveland, Ohio, USA: United States of America by the Mandel Center for Nonprofit Organizations, Case Western Reserve University. Retrieved from [http://www.orgwise.ca/sites/osi.ocasi.org.stage/files/resources/Merging Nonprofit Organizations The Art and Science of the Deal_0.pdf](http://www.orgwise.ca/sites/osi.ocasi.org.stage/files/resources/Merging%20Nonprofit%20Organizations%20The%20Art%20and%20Science%20of%20the%20Deal_0.pdf)
- Zevenbergen, J. (2002a). A Systems Approach to Land Registration and Cadastre. In *FIG XXII International Congress* (pp. 1–10). Washington DC, USA, 19-26 April 2002: Publication on Geodesy. Retrieved from https://www.fig.net/resources/proceedings/fig_proceedings/fig_2002/TS7-2/TS7_2_zevenbergen.pdf
- Zevenbergen, J. (2002b). *Systems of Land Registration, Aspects and Effects*. PhD Thesis. The University of Delft, Delft, The Netherlands: Publications on Geodesy. Retrieved from <http://www.ncgeo.nl/phocadownload/51Zevenbergen.pdf>
- Zevenbergen, J. (2004). A Systems Approach to Land Registration and Cadastre. *Nordic Journal of Surveying*

and Real Estate Research, 1, 1, 11–22. Retrieved from <https://www.journal.fi/njs/article/view/41503>
Zevenbergen, J., Augustinus, C., & Antonio, D. (2012). *Designing a Land Records System for the Poor*. Nairobi.
Zikmund, W. G., Babin, B. J., Carr, J. C., & Griffin, M. (2010). *Business Research Methods* (8th Ed.).

APPENDICES

Appendix 1: Research Design Matrix

Research Questions	Indicator	Data required	Source of data	Techniques of data collection	Techniques of Data Analysis	Anticipated results
Research Sub-objective 1						
A. To explore the innovative land tools used in Zambia.						
1. What are the characteristics of conventional and innovative land tools for land registration in Zambia?	General information	Name of the tool Name of the organisation Funding Period of existence Aim of capturing information Clients Equipment (tools)/software Mapping software Data storage tools Data formats Number of parcels recorded	MLNR and organisations for the innovative tools (MAST, Medeem, Medici, LCC, PPHPZ, ZLA, NLTC)	Literature reviews,	Descriptive/ Content analysis	Information on tools used, the implementer of the tool, Funding sources, Technology/ software, Information on the data storage, management and protection, Number of registered land parcels, Data formats
2. What are the similarities and differences in the spatial, legal and institutional requirements of conventional and innovative approaches?	Spatial requirements	Techniques for fieldwork Spatial boundary Spatial accuracy Spatial reference system Spatial coverage (rural/urban) Cost for data collection Time taken for data collection Data updating Data accessibility Data quality Data standards	Literature Field data collection	Semi-structured Interviews	Descriptive/ Content/ Gap analysis	List of Methods used for capturing data Spatial coverage of data (rural/urban) Level of accuracy for data collection Type of boundaries considered for the delineation Cost for the process Time and speed for the process Similarities and differences after comparing the requirements on Spatial, Legal, Institutional for land registration using the conventional approach
	Legal requirements	Land tenure Types Required time for registration Cost for registration of parcels Registration procedures Documents for registration				Information on Tenure types Required time for registration Cost for the registration of parcels List of registration procedures List of documents required for registration
	Institutional requirements	Key actors involved and their roles Organisational activities Institutional collaboration Staffing levels/capacity				List of Key actors involved and their roles Organisational activities Degree of collaboration among institutions Staffing levels/capacity

Research Questions	Indicator	Data required	Source of data	Techniques of data collection	Techniques of Data Analysis	Anticipated results
Research Sub-objective 2: B. To assess the gaps of the spatial, legal and organisational requirements of the conventional and innovative approaches in Zambia.						
1. What are the emerged spatial, legal and institutional gaps as a result of comparing the conventional and innovative approaches?	Spatial	Techniques for fieldwork Spatial boundary Spatial accuracy Spatial reference system Spatial coverage (rural/urban) Cost for data collection Time taken for data collection Data updating Data accessibility Data quality Data standards	Field data collected on the spatial, legal and institutional requirements	Semi-structured Interviews	Gap analysis	Gaps in the Spatial, legal and institutional requirements of the two approaches
	Legal	Land tenure Types Required time for registration Cost for registration of parcels Registration procedures Documents for registration				
	Institutional	Key actors involved and their roles Organisational activities Institutional collaboration Staffing levels/capacity				
Research Sub-objective 3: C. To propose methods for the integration of spatial, legal and institutional frameworks of the conventional and innovative approaches.						
1. What are the spatial, legal and institutional reasons for not integrating conventional and innovative approaches?	Spatial reasons	Compatibility of the tools with the existing arrangement Methods used for data collection Required levels of accuracy Types of boundaries Costs for the process Speed and time for the process Standards Data quality Data accessibility	MLNR and organisations for the innovative tools (MAST, Medeem, Medici, LCC, PPHPZ, ZLA. NLTC)	Semi-structured Interviews/ Discussions	Descriptive/ Content analysis	Identified reasons for not integrating the two approaches
	Legal reasons	Documents required for the process Tenure types Procedures/Activities Costs for the process Speed and time for the process				

Research Questions	Indicator	Data required	Source of data	Techniques of data collection	Techniques of Data Analysis	Anticipated results
	Institutional reasons	Different actors and roles Different activities Different levels of communication Different levels of training and staffing			analysis	
2. What are the spatial, legal and institutional effects that may result with integrating the and non-integration of the conventional and innovative approaches?	Spatial effects	Data harmonisation and sharing Data duplication Data inconsistency (accuracy) Fragmented Data Spatial boundaries Time frame in delivery of services Cost for the services	MLNR and organisations for the innovative tools (MAST, Medeem, Medici, LCC, PPHPZ, ZLA. NLTC)	Discussions	EPISTLE analysis	Identified effects considered as positive (benefits) and negative (risks) leading to challenges for Land information integration
	Legal effects	Tenure types Procedures Costs for the process Speed and time for the process Documents for registration				
	Institutional effects	Harmonisation of the required standards Participation of the key actors Activities and process Interaction among the organisation				
3. What are the proposed methods for integrating the spatial, legal and institutional frameworks for the conventional and innovative approaches?	Spatial	Spatial methods of data acquisition Spatial Accuracy Type of boundary Cost Time	MLNR and organisations for the innovative tools (MAST, Medeem, Medici, LCC, PPHPZ, ZLA. NLTC)		Descriptive analysis EPISTLE analysis	Identified actions on spatial, legal and institutional to support or enable the integration
	Legal	Required Land tenure types Required time for registration Cost for registration of parcels Registration procedures Documents for registration				
	Institutional	Types of activities Key actors involved and their roles Staffing (Capacity building) Institutional collaboration				

Appendix 2: Operationalisation Matrix

Sub objectives	Research Questions	Concept	Indicator	Variables	Interview questions
A. To explore the innovative land tools used in Zambia.	1. What are the characteristics of conventional and innovative land tools for land registration in Zambia?	Conventional and innovative tools	General Information	Name of the tool Name of the organisation Funding Period of existence Aim of capturing information Clients Equipment (tools)/software Mapping software Data storage tools Data formats Number of parcels recorded	Who are the implementers of the tools used? What is the name of your organisation? What is the source of funding? When did they start the project? What are the main aims of tenure documenting? Who are the main clients you capture information for? What equipment is used for capturing data? What are the tools and software used? (Open source/Licensed) What data storage tools used for storing data? What are the data formats used when storing data? How many parcels have been captured?
	2. What are the similarities and differences in the spatial, legal and institutional requirements of conventional and innovative approaches?	Conventional and innovative tools	Spatial framework	Techniques for fieldwork Spatial boundary Spatial accuracy Spatial reference system Spatial coverage (rural/urban) Cost for data collection Time taken for data collection Data updating Data accessibility Data quality Data standards	What are the techniques used for data collection? What type of boundary is used when demarcating parcels? What level of accuracy is used? What is the spatial reference used? In which areas is the registration mostly done, rural/urban? What is the required cost? How much time and spent when capturing data? How is the data upgraded/updated? Is the data accessible and who has access? Is the data checked for quality? Are there standards followed when capturing and processing data?
			Legal framework	Land tenure Types Required time for registration Cost for registration of parcels Registration procedures Documents for registration	What is the required tenure type for registration/recording? How much time is required for documentation? What is the cost of the registration/recording? What are the required procedures for registration? What are the required documents for recording?
			Institutional framework	Key actors involved and their roles Organisational activities Institutional collaboration Staffing levels/capacity	Who are the key actors involved and what their responsibilities during the process? What are the required activities to be performed during the process? How is the collaboration with other organisation? How are the staffing and skill levels in the organisation?
B. To assess the	1. What are the	Conventional	Spatial	Techniques for fieldwork Spatial boundary	Identification of gaps in the framework. What gaps have emerged from the comparison of the spatial requirements of the conventional

Sub objectives	Research Questions	Concept	Indicator	Variables	Interview questions
gaps of the spatial, legal and organisational requirements of the conventional and innovative approaches in Zambia.	emerged spatial, legal and institutional gaps as a result of comparing the conventional and innovative approaches?	and innovative tools	requirements	Spatial accuracy Spatial reference system Spatial coverage (rural/urban) Cost for data collection Time taken for data collection Data updating Data accessibility Data quality Data standards	and innovative approaches?
			Legal requirements	Land tenure Types Required time for registration Cost for registration of parcels Registration procedures Documents for registration	Identification of gaps in the framework. What gaps have emerged from the comparison of the legal requirements of conventional and innovative approaches?
			Institutional requirements	Key actors involved and their roles Organisational activities Institutional collaboration Staffing levels/capacity	Identification of gaps in the framework. What gaps have emerged from the comparison of the institutional, requirements of the conventional and innovative approaches?
C. To propose methods for the integration of spatial, legal and institutional frameworks of the conventional and innovative approaches.	1. What are the spatial, legal and institutional reasons for not integrating conventional and innovative approaches?	Integration or Merging	Spatial	Compatibility of the tools with the existing arrangement Data formats Methods of capturing data Accuracy levels Types of spatial boundaries Costs for the process Speed and time for the process	Spatial reason for not integrating
			Legal	Required documents Land tenure types Procedures for registration Costs for the registration process Speed and time for the process Delays in the process	The legal reason for not integrating
			Institutional	Actors involved and the roles Activities during the process Levels of communication Levels of training and staffing	The institutional reason for not integrating

Sub objectives	Research Questions	Concept	Indicator	Variables	Interview questions
	2. What are the spatial, legal and institutional effects that may result with integrating the and non-integration of the conventional and innovative approaches?		Spatial effects	Data harmonisation and sharing Data duplication Data inconsistency (accuracy) Fragmented Data No proper defined boundaries Time frame in delivery of services Cost for the services	Spatial effects for integrating (positive) and non-integration (negative) of the conventional and innovative approaches?
			Legal effects	Tenure types Procedures Costs for the process Speed and time for the process	Legal effects for integrating (positive) and non-integration (negative) of the conventional and innovative approaches?
			Institutional effects	Harmonisation of the required standards Participation of the key actors Activities and process	Institutional effects for integrating (positive) and non-integration (negative) of the conventional and innovative approaches?
	3. What are the proposed methods for integrating the spatial, legal and institutional frameworks for the conventional and innovative approaches?		Spatial methods for integration	Techniques for fieldwork Spatial Accuracy Type of boundary Cost Time	What are the suggested spatial methods to support the integration of conventional and innovative approaches?
			Legal methods for integration	Required Land tenure Types Required time for registration Cost for registration of parcels Registration procedures Documents for registration	What are the suggested legal methods to support the integration of conventional and innovative approaches?
			Institutional methods for integration	Types of activities Key actors involved and their roles Staffing (Capacity building) Institutional collaboration	What are the suggested institutional methods to support the integration of conventional and innovative approaches?

Appendix 3: Guided questionnaire

Exploring the Integration of Conventional and Innovative Approaches of Land Administration in Zambia

Interview Guide (Key Informants)

This interview is meant to collect data for research by the researcher from the Department of Urban and Regional Planning and Geo-information Management, Land Administration domain at the University of Twente - ITC. The main aim of the research is to explore the conventional and innovative land tools currently used in Zambia for registration/documenting land rights. Further, investigate the possibilities of integrating conventional and innovative approaches. Kindly note that your responses will be completely anonymous, confidential and the report will not include the reference to any individuals. The compiler of the questionnaire has sole ownership of the completed questionnaire.

Researchers Name : Elly M. Mulenga
Supervisors : Dr M.N.Lengoiboni
: Dr D. Todorovski

Particulars of the Respondent

Name
(optional):.....
Designation:.....
Ministry/Department:.....
Station/Location:.....
Date:.....

Level of experience of the respondent (please tick the appropriate)
1 – 5 years 6 – 10 years 11- 15 years 16 – 20 years Above 20 years

Section A (General Information)

- 1 Briefly explain the functions of your organisation.
.....
- 2 For how long has the institution been operating in Zambia?
Specify:.....
- 3 What is the aim of capturing the
information?.....
- 4 Who are your clients you capture information for?
Specify:.....
- 5 What tools do you use for data capturing and registering of land parcels?
Specify:.....
- 6 How has been the performance of the tool/s since the commencement?
.....
- 7 What is the mapping software used for the processing of the data collected?
Purchased Licenced/ Open source software
Specify:.....

Section B (Spatial Framework)

1. What are the techniques used for data collection? (*Aerial images, Field Surveys or other*)
Specify:.....
2. In which areas is the registration done mostly to capture data? *Rural/ Urban*
Specify:.....
3. In which cadastral boundaries has the data been captured? Preferably indicate the (*Chiefdom, Township, District and Province*).....
4. What is the coverage of data captured so far in the country by your organisation using the tools?
Percentage/ Number of parcels (Chiefdom, District and Province)
Specify:.....
5. What are the costs involved during the data collection process?
Specify:.....
6. (a) What boundaries are captured during the process? *Fixed/ General*
Specify:.....
(b) Are there any boundary markings placed on the ground after data capturing?
7. How accurate is the tool/instrument used, and how is the precision of marking the parcel
boundary points on the ground during the data capturing?
Specify:.....

8. What is the calibration of the GPS tools/instruments used?
.....
9. How long does it take to collect data for parcels? For example, 1-20 parcels or more either in rural or urban areas. *(Days/Weeks/Months)*
Specify:.....
10. Do you experience any spatial challenges during the process? *If any Specify*
.....

Section C (Legal framework)

1. What is the required tenure type for registration?
Specify:.....
2. How much time is required for registration?
Specify:.....
3. What are the costs for the registration?
Specify:.....
4. What are the next registration procedures to be followed in the office after capturing data on the ground?
Specify:.....
5. What documents do the beneficiaries submit for tenure registration?
Specify:.....
6. Do you experience any legal challenges during the process? *Specify*
.....

Section D (Institutional Framework)

1. What are the procedures needed for issuing the certificate of title? ***Specify***
.....
Who are the key actors involved during the process? ***List the names of actors***
.....
2. What activities are performed by the actors involved during the process? ***Specify***
.....
3. How is the staffing level in your organisation? *(Manpower, skills)*
.....
(a) What approach is used for interaction with other actors during the process?
(Paper, Paper to computer, computer to computer, other) ***Indicate or specify if other***
.....
(b) Has there been communication or collaboration between your institution and the Proprietors of the innovative land tools? **Yes/No**

(c) If the answer is **Yes** in **6a**, to what degree can you rate the institutional communication or collaboration? (*Please ✓ the appropriate*)

Very often	Often	Sometimes	Seldom	Never

(d) If the answer is **Yes** in **6a**, what are the main topics that you discuss? List five (5) or more topics

discussed.....

(e) Do you experience any institutional challenges during the process? *If any, please specify.*

.....

Section E (Data Storage, Maintenance and Protection)

1. What tools are used for storage of data? *Specify*

.....

2. What is the format used for storing data? *Specify*

.....

3. What data protection mechanisms do you use to make sure that the data is well protected?

.....

4. (a) Is the data produced accessible to the public? **Yes/No**

(b) If the answer is **Yes** from **4a**, who has access to the data?

.....

(c) If the answer is **No**,

why?.....

5. (a) Is the data shared with other actors after completion of the process? **Yes/No**

(b) if the answer is **Yes to 5a**, are there any set conditions to that? **Specify**

.....

6. (a) Is there any data quality check before storing it in the database? **Yes/No**, specify

.....

(b) Are there some **standards** to be followed to check the quality of the data captured or produced? **Yes/No** (*if the answer is Yes please specify*)

.....

7. How is the data upgraded in case of any changes to the parcels? **Specify**

.....

8. In your organisation structure, who is responsible for managing the data?

.....

9. Are there any challenges experienced during the management of the data?

Section F (Requirements)

1. What are the specific requirements for the registration of land that to be followed during the process for your organisation?

(a) Spatial Requirements

.....

Legal Requirements

.....

(b) Institutional Requirements

.....

(c) Storage, maintenance and protection of the information

.....

Section G (Integration)

1. (a) Have there been any attempts for the integration of the spatial, legal and institutional frameworks with the Proprietor of the innovative land tools? **Yes/No**

(b) If the answer is **Yes** from **1a**, Which ones have been integrated from the **Spatial**? *Specify*

.....

(c) If the answer is **Yes** from **1a**, Which ones have been integrated from the **Legal**? *Specify*

.....

(d) If the answer is **Yes** from **1a**, Which ones have been integrated from the **Institutional**?

Specify.....

(e) If the answer is **No** from **1a**, what are the reasons for not integrating? List maximum of five (5) **spatial reasons** for not integrating.

.....

(f) List a maximum of five (5) **legal reasons** for not integrating.

.....

(g) List a maximum of five (5) **Institutional reasons** for not integrating.

.....

(h) List a maximum of five (5) **storage, maintenance and protection reasons** for not integrating.

2. (a) Are there any spatial, legal and institutional effects if the information is not integrated? **Yes/No**

(b) If the answer is **Yes** from **2a**, List a maximum of five (5) **spatial effects** if not integrated.

.....

(c) If the answer is **Yes** from **2a**, List a maximum five (5) **legal effects** if not integrated.

-
- (d) If the answer is **Yes** from **2a**, List a maximum five (5) **Institutional effects** if not integrated.....
 - (e) List a maximum of five (5) **storage, maintenance and protection effects** if not integrated?.....
 - (f) What will be the **advantages or benefits** that may arise due to the integration? List at least five or more.....
 - (g) What will be **disadvantages or challenges** that may arise due to the integration? List at least five or more.....
3. (a) What do you suggest could be the **spatial** requirements for the integration.
.....
- (b) What do you suggest could be the **legal** requirements for the integration.
.....
- (c) What do you suggest could be the **Institutional** requirements for the integration.
.....
- (d) What else can you suggest to be done to support or enable the integration?
.....
- Is there anything of significance that was not covered in the questionnaire or that you would like to say that is an issue and I did not raise in the interview?.....

THANK YOU!

Appendix 5: Samples of Land Certificates and field photos

SIDES METERS	ANGLES OF DIRECTION	CO-ORDINATES SYSTEM UTM 35S		DIAGRAM NUMBER SSD 1680/2019
		X METERS	Y	
AB 24.47	101.26.06	A 630649.94	8290166.81	APPROVED: GOVERNMENT SURVEYOR Date:
BC 11.15	192.35.15	B 630083.95	8290161.88	
CD 24.13	279.29.18	C 630081.52	8290151.00	
DA 12.10	10.48.59	D 630057.71	8290154.92	

SCALE 1:500

BEACON DESCRIPTION: Not Beacons

THE FIGURES: A-B-C-D-A

REPRESENTS: 282 Square Meters

OF LAND BEING: S.LUSAK/SLN 8002/1680

SITUATED IN THE: Lusaka PROVINCE REPUBLIC OF ZAMBIA

SURVEYED IN: November 2019

BY: LAND SURVEYOR

PARENT DIAGRAM NO.:
SURVEY RECORDS NO.: SSR_0002/2019
S G FILE NO.: SD/12/8/110
PLAN NO.: SLN_0002/2019
MAP REFERENCE: PN Sheet 3408

DR1A No.mill

Registered No. 0002/467/2

THE LANDS AND DEEDS REGISTRY ACT
(Section 43)
CERTIFICATE OF TITLE

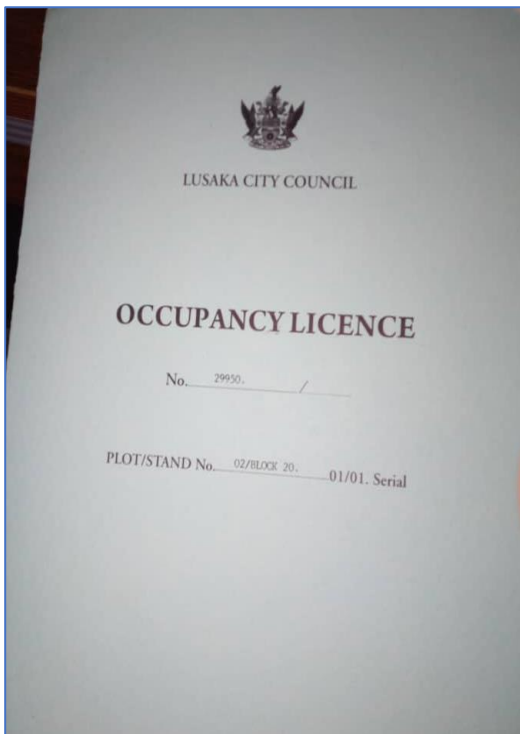
THIS Certificate dated the 11th day of November Two Thousand and Nineteen under the hand and seal of the Registrar of the Lands and Deeds Registry of Zambia WITNESSETH that [redacted] is a tenant or lessee for the unexpired residue of a term of 99 years from the First day of November Two Thousand and Nineteen (subject to such reservations, restrictions, encumbrances, liens, estates and interests as are notified by memorial underwritten or endorsed hereon) of and in ALL that piece of land in extent 282 square meters more or less being stand No. S/LUSAK/SLN.0002/467 situate in the LUSAKA District of LUSAKA Province of Zambia which piece of land is more particularly delineated and described on Diagram No.SSD.2236 except and reserved all minerals, oils and precious stones whatsoever upon or under the said land.

Registrar

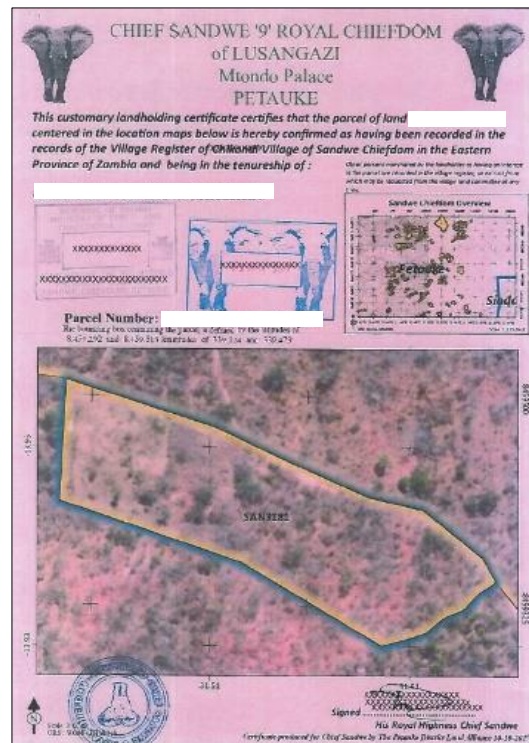
Memorials

Date of Document	Date of Registration	Registered No		Cancellation
11/11/2019	11/11/2019	0002/467/1	Subject to the exceptions, reservations, restrictions, restrictive covenants and conditions mentioned, contained or referred to in the lease made between the President of the Republic of Zambia one part and	

99 years leasehold issued by MLNR (NLTC) for systematic land titling





Occupancy license – LCC



Customary Land tenure certificate - LRG

CHIEF NDAKE ROYAL ESTABLISHMENT NO VZ17/2015
Lwezi Palace
P.O. Box 570052 NYIMBA





TRADITIONAL LAND HOLDING CERTIFICATE
Republic of Zambia

THIS Certificate, dated the 09 day of December 2019 under the hand and seal of His Royal Highness Chief Ndaka, in the Republic of Zambia WITNESSETH that _____ Village whose next of Kin is _____ is given customary right to own, occupy, use and exercise any such other right (subject to such reservations, restrictions, encumbrances, conditions and interests as are notified and underwritten or endorsed hereon) of and in ALL that (Insert description of land). **SUBJECTS** SITUATED IN THE ABOVE SAID VILLAGE.

TO which the aforementioned agrees and declares to observe, follow and abide by the said reservations, restrictions, encumbrances, conditions and interests as are notified and underwritten or endorsed hereon.

Village Headperson/Nduna Chief Ndaka




Customary Land tenure certificate - ZLA

Ref. No: 427

Certificate of Customary Land Occupancy

Chamuka Chiefdom
Chisamba District




Legend

- CHS 001 A
- Neighbour's parcel

Parcel size: Acpk: 10.057 acres

150 0 150 m



The persons listed below are the bonafide occupants of parcel number: **CHS 001 A** highlighted in the map above.

Last Name	First Name	Gender	Tenure Type	Signature
Mwambi	Franco	Female	Individual Owner	
Mwambi	Thacy	Female	Chief of owner	
Ngoma	Tadi	Female	Chief of owner	
Ngoma	Taonga	Female	Chief of owner	
Ngoma	Chipo	Female	Chief of owner	
Sunya	Alex	Male	Chief of owner	

Issued on this day: _____ at Chamuka Oem Palace

Village Headperson Chief

Disclaimer! This document is not a deed. This deed is only issued by the President of the Republic of Zambia through the substantive office of the Commissioner of Lands. The rights covered are described from the persons listed in the document. In case of any changes, this document will be rendered null and void, and a new certificate will need to be issued in consultation with the Chief and respective village head persons.

Customary land tenure certificate Medem



Interview with the key informant