

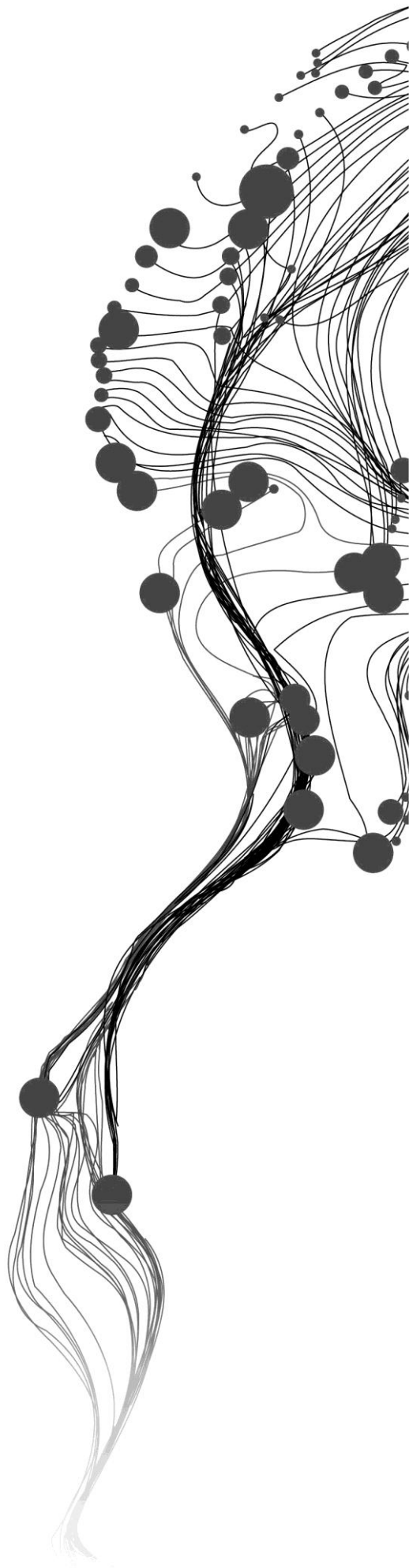
INVESTIGATING THE IMPACT OF SOCIAL TENURE DOMAIN MODEL (STDM) ON TENURE SECURITY -

**A CASE STUDY OF
MISSION STDM PILOT**

TOM WILBERFORCE ARCHER

March, 2016

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DISCLAIMER

This document describes work undertaken as part of a programme of study at the Faculty of Geo-Information Science and Earth Observation of the University of Twente. All views and opinions expressed therein remain the sole responsibility of the author, and do not necessarily represent those of the Faculty.

ABSTRACT

Security of tenure is an important bedrock for socio-economic development as it promotes social and economic stability by reducing land disputes, enhancing feeling of security thereby promoting investments in land among others. While developed countries have gone far in achieving such feat via conventional land administration approaches (cadastre), the opposite epitomizes developing countries where cadastre covers only 30% owing to a myriad of limitations. Hence, the paradigm shift by the global land community to unconventional land administration approaches as appendage to the conventional approaches for which STDM was developed. It is against this backdrop that UN-Habitat/GLTN Secretariat in partnership with other organizations piloted STDM at Mission cluster of Mbale Municipality (Uganda) from 2011 to 2012. The project aimed at pilot testing STDM tool to address the land information requirements of slum dwellers for the purposes of physical and service delivery among others. As part of the implementation procedures, enumeration and documentation of properties took place which therefore set the stage for this study. This study, therefore, seek to contribute to scientific literature by carrying out a comprehensive assessment of the STDM pilot by particularly exploring if the enumeration and documentation exercise contributed to a sense of improvement in tenure security. Consequently, it seeks to investigate the relationship between perceived tenure security and investment in land before and after registration in STDM. Insights on what motivates the land right holders' judgment to invest in their land despite the informal nature of STDM as a land registration tool is assessed.

The findings of the study show that STDM enumeration could not influence tenure security of land right holders despite land right holders being confident of possessing their lands in the near future. Again, falling trend of land disputes which further enhances tenure security was ascribed to effective local governance structures other than STDM. However, respondents felt partially protected against land disputes which somewhat suggests STDM have positive influence on incidence of boundary disputes. Moreover, the STDM enumeration activity appear not to have motivated present investments and intentions of future investments of land right holders rather other socio-economic factors like age, income influenced such investments. Assessment of spatial changes in land use concludes that increase in road parcels occurred as a result of the STDM pilot thus fulfilling the purpose for which STDM was introduced at Mission whereas increase in built-up parcels was linked to other factors.

The study therefore recommends improving legal and regulatory framework to incorporate issuance of Certificates of Residency, re-packaged post-STDM pilot implementation sensitization content to improve awareness, the need to upgrade the STDM database regularly, provision of technical and material resources among others. Results of this study have policy implications for the use of pro-poor land registration tools for the purpose of improving tenure security.

Key words: Land administration, Unconventional land administration approaches, STDM, Tenure security, Land -related investments

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May the Almighty God bless you All.

DEDICATION

THIS MSc. THESIS IS HUMBLY DEDICATED TO :

My Darling Wife
(Mrs. Esenam Abra Archer)

∞

My Late Lovely Mother
(The Late. Rejoice Dovi Biscoff)



*Then Caleb silenced the people before Moses and said, "We should go up and take possession of the land,
for we can certainly do it." (Numbers 13:30 NIV)*

TABLE OF CONTENTS

Abstract.....	i
List of Figures.....	vii
List of Tables.....	viii
Abbreviations.....	x
1. INTRODUCTION.....	1
1.1. Background.....	1
1.2. Justification.....	3
1.3. Conceptual Framework.....	3
1.4. Research Problem.....	4
1.5. Research Objectives.....	5
1.6. Research Questions.....	5
1.7. Research Design Matrix.....	5
1.8. Thesis Structure.....	7
1.9. Conclusion.....	7
2. LITERATURE REVIEW.....	9
2.1. Introduction.....	9
2.2. Concept of Conventional Land Administration Approach within Land Administration Domain.....	9
2.3. Failure of the Conventional Land Administration Approach.....	9
2.4. Unconventional Land Administration Tools to bridge the gap.....	10
2.5. Social Tenure Domain Model (STDM).....	11
2.6. Continuum of Land Rights.....	11
2.7. Background of STDM Development.....	11
2.8. Overview of STDM Pilot Project Implementation in Uganda.....	12
2.8.1. Implementing Partners, Processes and Achievements.....	12
2.9. The Concept of Land Tenure.....	13
2.10. Indicators of Tenure Security.....	14
2.11. Impact of Land Registration on Tenure Security.....	14
2.12. Land Use Change Detection and Analysis.....	15
2.13. Concluding Remarks.....	16
3. STUDY AREA AND METHODOLOGY.....	17
3.1. Introduction.....	17
3.2. Selection of Study Area.....	17
3.3. Operationalization of Variables.....	18
3.4. Research Approach.....	18
3.4.1. Pre-Fieldwork Stage.....	20
3.4.2. Fieldwork Stage.....	20
3.4.3. Post-Fieldwork Stage.....	23
3.5. Approach for Spatiotemporal Land Use Change Detection.....	24
3.6. Land Use Change Detection Process.....	24
3.7. Land Use Classifications for Change Detection for 2011 and 2014.....	25
3.8. Limitations of the Data Collection.....	26
3.9. Concluding Remarks.....	26
4. RESULTS.....	27
4.1. Introduction.....	27
4.2. How land right holders perceive their tenure security after STDM enumeration.....	27
4.2.1. Perception of Tenure Security.....	27
4.2.2. Land-related disputes in the context of STDM enumeration.....	28
4.2.2.1 Nature of land-related disputes.....	28

4.2.2.2	Types of land disputes existing	29
4.2.2.3	Medium of Dispute Resolution	30
4.2.3.	Conclusion: Sub-objective 1	31
4.3.	To ascertain the effect of STD M enumeration on land right holders' motivation to invest in land	31
4.3.1	Trends of present land-related investments and motivation to invest.....	31
4.3.1.1	Impact of STD M enumeration on House Extensions - Extension of Fence wall.....	31
4.3.1.2	External wall construction	31
4.3.1.3	Houses with extension since STD M enumeration and their building materials	32
4.3.1.4	Linking house extension to tenure security from STD M	32
4.3.1.5	Linking house extension to monthly income and household size	32
4.3.2.	Impact of STD M enumeration on Crop investments	33
4.3.2.1	Availability of Crop Investment	33
4.3.2.2	Types and Year of Crop Cultivation	33
4.3.2.3	Funding of crop investments	34
4.3.3	Impact of STD M enumeration on non-crop related investments.....	34
4.3.3.1	Existence and Types of non-crop related investment	34
4.3.3.2	Non-Crop investments since STD M enumeration	34
4.3.3.3	Funding Non-Crop related investments	35
4.3.3.4	Linking non-crop related investments to monthly income.....	35
4.3.3.5	Linking non-crop investments to Household size	36
4.3.4.	Conclusion: Sub-objective 2-1	36
4.3.5.	To ascertain the effect of STD M enumeration on land right holders' motivation to invest in future	37
4.3.5.1	Intention to invest in house extensions and crop investment in the Short term.....	37
4.3.5.2	Intention to invest in non-crop related investment in the Short term.....	37
4.3.5.3	Linking Intentions of investing in House extensions in the Short term to Income.....	37
4.3.5.4	Linking intentions of investing in House Extensions in the short term to Age	38
4.3.5.5	Intention to invest in house extensions and crop investment in the long term (next 10 years)	38
4.3.5.6	Intention to invest in non-crop related investment in the long term	39
4.3.5.7	Linking intentions of investing in House extensions in the long term to Age distribution.....	39
4.3.5.8	Linking Intentions of investing in House extensions in the Long term to Income	40
4.3.5.9	Investment with or without STD M	40
4.3.6	Conclusion: Sub-objective 2-2	41
4.3.7	Type of people investing on the land after STD M	41
4.3.7.1	Year of Land Acquisition and Reason for Migration.....	41
4.3.7.2	Mode of Land Acquisition.....	42
4.3.8	Conclusion: Sub-objective 2.3.....	42
4.4.	To assess changes in the spatial patterns of land use and whether it can be linked to STD M pilot.....	42
4.4.1	Determining the extent of different land uses in the study area in 2011	42
4.4.2	Determining the extent of different land uses in the study area in 2014	43
4.4.3	Spatial Changes in Land Uses between 2011 & 2014 and its linkage to STD M.....	44
4.5.	Conclusion - Objective 3	45
4.6.	Concluding Remarks.....	45
5.	DISCUSSION.....	46
5.1.	Introduction	46
5.2.	Impact of STD M enumeration on Tenure Security	46
5.2.1.	Perception of Tenure Security	46
5.2.2.	Nature of Land-related disputes	46
5.3.	Impact of STD M enumeration on investment in land	47
5.3.1.	Trends of present land-related investment and motivation to invest	47
5.3.2.	Motivation to invest in the future.....	48
5.3.3.	Migration as motivating factor	49

5.4.	Changes in the spatial patterns of land use between 2011/2014 and if it can be linked to STDm.....	49
6.	CONCLUSION AND RECOMMENDATIONS	50
6.1.	Introduction	50
6.2.	Conclusions	50
6.2.1.	Sub-objective 1.....	50
6.2.2.	Sub-objective 2.....	50
6.2.3.	Sub-objective 3.....	51
6.3.	General Conclusion.....	51
6.4.	Recommendations.....	52
	List of References	54

LIST OF FIGURES

Figure 1-1: Global land administration perspective for sustainable development (Williamson et al., 2010).....	1
Figure 1-2: Conceptual Framework.....	3
Figure 2-1: Land ownership security and farm productivity model (Adopted from Feder & Nishio, 1998)	15
Figure 3-1: Map of Uganda projecting Mission cluster study area.....	18
Figure 3-2: Research Design Framework (Thesis Workflow).....	21
Figure 3-3: Interview sessions with land right holders.....	21
Figure 3-4: Built-up and Roads parcels classifications in 2011.....	25
Figure 3-5: Undeveloped parcels classification in 2011.....	25
Figure 3-6: Built-up and Roads parcels classifications in 2014.....	25
Figure 3-7: Undeveloped parcels classification in 2014.....	26
Figure 4-1: Perception about tenure security in 5 years.....	28
Figure 4-2: Perception about tenure security in 15 years.....	28
Figure 4-3: Trend of land-related disputes according to LCCIII.....	29
Figure 4-4: Feelings that STDN checks encroachment	30
Figure 4-5: Photo showing house extensions done by land right holders.....	32
Figure 4-6: Impact of Age on intentions to invest in 5 years	38
Figure 4-7: Impact of Age on intentions to invest in house extensions in 10 years	39
Figure 4-8: Impact of Income on intentions to invest in house extensions in 10 years	40
Figure 4-9: Cross tabulation of Place of Origin and Reasons for Migrating	41
Figure 4-10: Cross tabulation of Land Acquisition and Mode of Property Acquisition.....	42
Figure 4-11: General Land Use Map of 2011	43
Figure 4-12: General Land Use Map of 2014	43
Figure 4-13: Change Detection Map of Built-up and Roads parcels.....	44
Figure 4-14: Change Detection Map of Undeveloped parcels.....	45

LIST OF TABLES

Table 1-1: Research Design Matrix.....	6
Table 3-1: Operationalization of Variables.....	19
Table 3-2: Selection of Sample Size.....	22
Table 3-3: Overview of the Respondents of the Household Survey.....	23
Table 3-4: Feature Extraction Guide.....	25
Table 4-1: Confidence of not losing land in 5 years.....	27
Table 4-2: Confidence of not losing land in 15 years.....	27
Table 4-3: Period of dispute.....	28
Table 4-4: Nature of land disputes.....	29
Table 4-5: Medium for resolving land disputes	30
Table 4-6: Construction materials for external walls	31
Table 4-7: Building materials of houses built after STDm enumeration.....	32
Table 4-8: Relationship between house extensions and tenure security from STDm	32
Table 4-9: Correlations between income/ household size and house extensions	33
Table 4-10: Cross tabulation of existence of crops and where crops are grown.....	33
Table 4-11: Categories of non-crop investments	34
Table 4-12: Non-crop Investments since STDm enumeration	34
Table 4-13: Correlations between Non-crop investment since STDm vs. Monthly Income	35
Table 4-14: Correlations between Household size vs. Non-crop investment	36
Table 4-15: Intention to invest in crop in next 5 years.....	37
Table 4-16: Intention to invest in house extensions in next 5 years	37
Table 4-17: Intention to invest in non-crop in next 5 years	37
Table 4-18: Correlations between Intention to extend House in 5 years and Monthly Income	38
Table 4-19: Intention to invest in house extensions in 10 years	38
Table 4-20: Intention to invest in crop in 10 years	38
Table 4-21: Intention to invest in non-crop in 10 years.....	39
Table 4-22: Intention to invest without STDm.....	40
Table 4-23: Categorized year for land acquisition	41
Table 4-24: Extent of land uses_2011	42
Table 4-25: Extent of land uses_2014.....	43
Table 4-26: Quantitative Analysis of resultant changes of the 3 classes.....	44

LIST OF APPENDICES

Appendix 1: Land Tools according to GLTN.....	59
Appendix 2: Flowchart of Land Use Change Detection Process (an adaptation).....	60
Appendix 3: Semi-structured Questionnaire for Land Right Holders	61
Appendix 4: Local Governance Structure.....	68
Appendix 5: Computation of Smallest Interpretation Unit.....	68
Appendix 6: Questionnaire for National Slum Dwellers Federation/ ACTogether NGO.....	69
Appendix 7: Questionnaire for Local Council Courts.....	71

LIST OF ABBREVIATIONS

FAO	Food and Agricultural Organization
FIG	Fédération Internationale des Géomètres (International Federation of Surveyors)
GLTN	Global Land Tools Network
GIS	Geographical Information System
GPS	Global Positioning System
Ha	Hectare
ITC	Faculty of Geo-Information Science and Earth Observation of University of Twente
LCCIII	Local Council Court Representative 3
m ²	Square Metres
MoLHUD	Ministry of Land and Housing and Urban Development
NGO	Non-Governmental Organization
SDI	Shack/Slum Dwellers International
STDm	Social Tenure Domain Model
TSUPU	Transforming the Settlements of the Urban Poor in Uganda

1. INTRODUCTION

1.1. Background

Land tenure security is an important bedrock for socio-economic development as it promotes social stability by reducing uncertainty and conflicts over land and also mitigate tenure insecurity. Land tenure security constitutes a subcomponent of land governance which is much broader. Land governance involves the policies, processes and institutions by which land is managed (Deininger, Augustinus, Enemark, & Munro-Faure, 2010) which encompasses land administration as well. Land administration is the process of identifying, documenting and making information available regarding land ownership and land use when enforcing land management policies (Enemark & van der Molen, 2008). Land administration functions form the operational component of the land management paradigm, which has three other components including land policy framework, land information infrastructures within an institutional arrangement to support sustainable development. The operational component of the land management concept includes the areas of land tenure, land value, land use and land development shown in Figure 1-1 (Williamson, Enemark, Wallace, & Rajabifard, 2010).

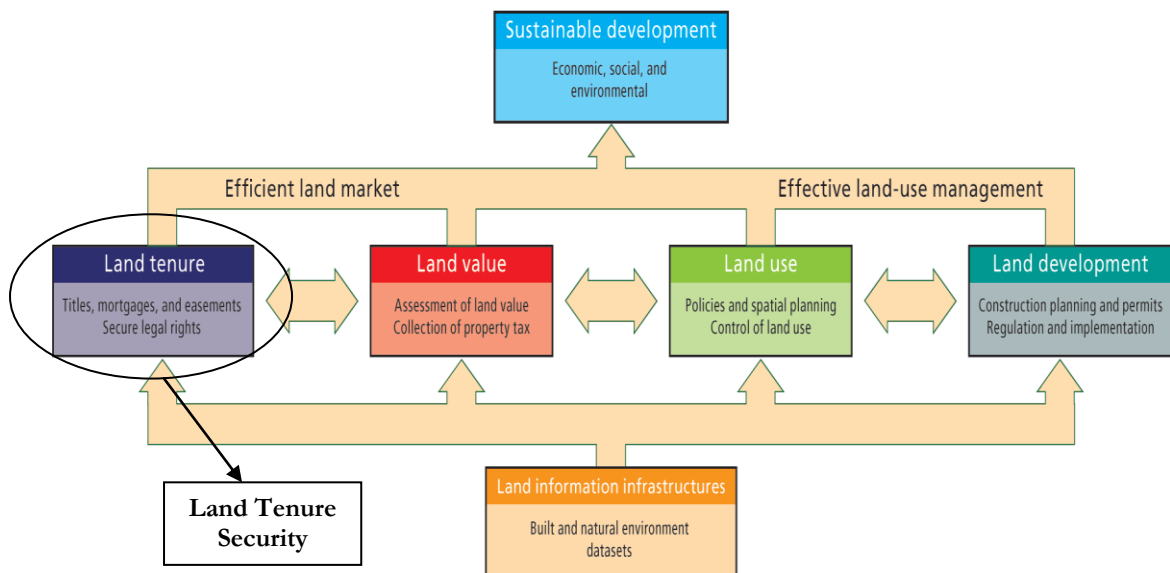


Figure 1-1: Global land administration perspective for sustainable development (Williamson et al., 2010)

According to FAO (2007), the principles of good governance comprise accountability, effectiveness and efficiency, participation, equity, security and stability, legitimacy, consistency and impartiality, transparency, dedication to integrity, responsiveness and sustainability. Tenure security which has been identified as a principle of good governance has been further highlighted by guiding principles of responsible tenure governance of (FAO, 2012) to the effect that States should recognize and respect all legitimate tenure right holders making every effort to identify and record their rights, whether formally recorded or not. The numerous advantages of tenure security include: reduced land conflicts; greater land-related investment by people; higher agricultural productivity; enhanced livelihoods of the rural and urban poor among others (Palmer et al., 2009). Therefore, tenure security emanating from good governance creates a long term perspective which motivates land owners to use land in a sustainable manner (Zakout & Wehrmann, 2006).

Formal land registration systems often referred to as conventional land administration system have emerged in mankind's history as an institutional arrangement to enhance tenure security. Thus with land tenure officially recorded, the probability of facing land-related disputes is minimized thereby be a motivating factor for land owners to undertake land-related investments (Palmer et al., 2009). Conventional land administration system involves the use of cadastre, an information system made up of interests and geometric description of land (Williamson et al., 2010). Formal land administration systems are generally based on the privatization of land and the awarding of land titles to individuals. Formal land administration systems therefore often works against the needs and aspirations of ordinary people, including urban Africa where informal form of land tenure are often adaptations of rural customs. Formal land administration systems cover only a limited part of land and reach only certain segments of society, usually the rich and well-connected. Hence, (Lemmen, Augustinus, Oosterom, & Molen, 2007) emphasizing that only 30% of developing countries are covered by cadastre. This has been attributed to factors like bureaucracy (Tuladhar, Bogaerts, & Molen, 2004) and cost (Hanstad, 1998). Other contributing factors include the increasing pace of urbanization, failure of delivering tenure security to the poor and its inability to cope with the existence of multiple tenure systems (Van Asperen & Zevenbergen, 2012). UN-Habitat (2007a) highlights the importance of security of tenure beyond property rights and the need to promote innovative approaches to securing land rights.

Consequently, these demerits of the conventional approach has led development of less expensive and more innovative land administration systems that will handle the unreached portion in the cadastre (Deininger et al., 2010) which includes multiple tenure arrangements as well as complex set of secondary rights. Thus, it has been accepted by the global land administration community that an option to deliver tenure security is through the continuum of land rights which the pro-poor land tools operates on.

Pro-poor (innovative) land tools which are practical ways to solve land management problems aims to benefit the poor and disadvantaged and are characterized as affordable, equitable and gender-responsive, governance, subsidiarity, sustainable and systematic (UN-Habitat, IIRR., & GLTN., 2012). Examples of pro-poor land tools include Open Title, Solutions for Open Land Administration (SOLA), Social Tenure Domain Model (STDM), Crowdsourcing among others. According to UN-Habitat (2012a), numerous benefits derived from recording via pro-poor land tools include improved access to consumer loans; act as a proxy concerning participation in democratization; being the first step on the tenure rights ladder or continuum, eventually leading to full ownership; be the foundation for capital formation. Moreover, it would ensure efficiency by reducing ad hoc land related activities by the state, decrease some of the conflict over land by increasing predictability and make it possible to make large investments that take a long time to recoup. STDM is a more flexible land information system that allows for the recordation of all possible types of tenures identified on the continuum of land rights. According to FIG (2010), STDM is meant specifically for developing countries, countries with very little cadastral coverage in urban areas with slums, or in rural customary areas as well as post-conflict areas. The aim of STDM is on all relationships between people and land irrespective of the legality of the relationship.

1.2. Justification

Various studies have been undertaken in the area of land administration systems. These studies have highlighted the immense benefits of land administration through conventional land administration systems as contribution towards security of tenure, poverty alleviation, management of land disputes and enhancing environmental protection amongst others (Williamson, Enemark, Wallace, & Rajabifard, 2010; Burns, 2007; Magel, 2006). However, in view of the fact that conventional land administration system has not been able to cope with the demand to deliver security particularly for the range of tenure types that exist on the continuum of land rights, studies are being conducted by land experts in the area of pro-poor land administration tools as an alternative. As Fourie (2001) asserts, there is the need for new forms of spatial information, not the formal cadastre, to provide tenure security in informal settlements particularly in slum upgrading initiatives.

Various studies (Lemmen et al., 2007; Augustinus, Lemmen, & Oosterom, 2006) discussed how developing the solutions to fill this technical gap was taken from 2002 onwards by development of the Social Tenure Domain Model (STDM). This started at the conceptual level alongside with the development of the FIG-led Land Administration Domain Model (LADM). Other literature further hinted the development of the design of the STDM model comprising the technical aspects, testing of initial version of the STDM prototype in the context of the rural land administration, UN-Habitat/GLTN Secretariat's efforts in working on its further development and reshaping STDM system to cater for the information needs and requirements of informal settlements (Zevenbergen & Haile, 2010). A recent study conducted by (Antonio, 2013) underlines the framework of STDM development, its current and potential applications as well as the STDM pilot in Uganda. While much research has been done concerning the economic and social impacts of conventional land administration systems (Feder & Nishio, 1998; Brasselle, Gaspart & Platteau, 2002) the contrary exist in relation to impact of STDM on tenure security in the context of unconventional land administration systems. This study therefore seeks to explore the relationship between the perceived tenure security and investment in land after registration in STDM. Insights on what motivates the land right holders' judgment and decision-making to invest in their land despite the informal nature of STDM as a land registration tool is also assessed.

1.3 Conceptual Framework

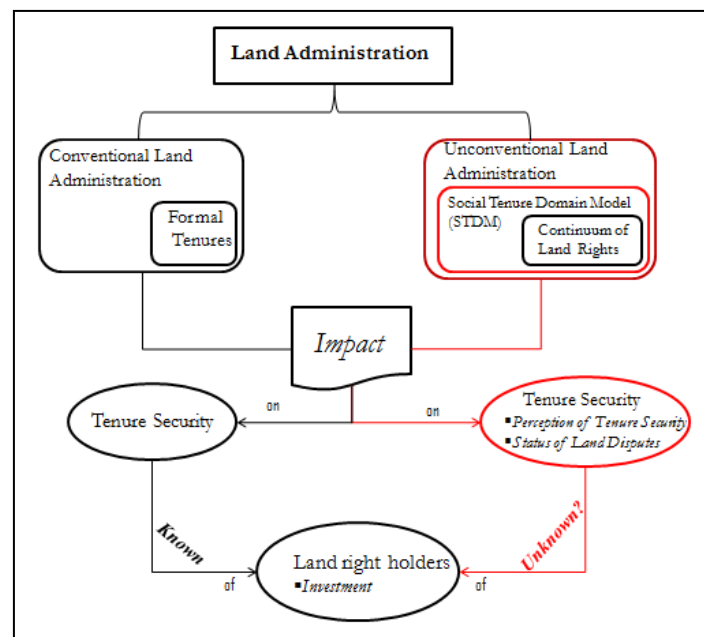


Figure 1-2: Conceptual Framework

Figure 1-2 illustrates in detail the fundamental concepts of this study and their interrelationships. Within the framework, there are six main concepts namely: Land Administration Systems comprising conventional land administration approach and unconventional land administration approach like Social Tenure Domain Model (STDM), impact, tenure security and land investments of land right holders all associated with a number of relationships. The left portion of the diagram has already been established in literature to the effect that conventional land administration system or approach has a positive and negative correlation with tenure security thereby minimizing or increases the risk of contesting ones' ownership; leading to investments and improvements in land and enhancing ones capacity to access credit; stimulating land transactions leading to vibrant land markets among others. However, with the advent of unconventional land administration approaches there still exist an unknown relationship between the Impact of Social Tenure Domain Model (STDM) on investment potential of land right holders by providing Tenure Security (evidenced through better perception of tenure security and reduced land disputes). This is the link that this study seeks to uncover which is illustrated on the right-hand portion of the framework to ascertain if using unconventional land administration approaches like STDM to speed up the registration process actually conveys similar benefits as the conventional land approach.

1.4 Research Problem

The Global Land Tool Network (GLTN) and its partners developed the Social Tenure Domain Model (STDM) to promote the continuum of land rights owing to limitations of the conventional land administration system. STDM is a more flexible land information system based on a global standard called the Land Administration Domain Model (LADM) and supports the recognition of the continuum of land rights approach rather than a focus only on issuing individual freehold/leasehold titles.

The UN-Habitat/GLTN Secretariat in partnership with Shack/Slum Dwellers International, Cities Alliance, International Federation of Surveyors, Actogether NGO and national and local authorities and stakeholder groups undertook STDM pilot in Mbale Municipality of Uganda in 2011-2012. The long-term objectives were to address the land information requirements of women and men living in slum communities, to build their capacity for using and applying the land information systems based on free and open-source software packages, and to mainstream the thinking behind the continuum of land rights. This was to form a basis for dialogue between local communities and cities in negotiations for improving tenure security and enhance access to basic services and infrastructure. The pilot culminated in the enumeration of land right holders and occupants. The pilot experience was very successful and subsequently informed the GLTN Secretariat and its partners in replicating and scaling up the process and greatly assisted in its current technical development (Antonio, 2013). Initial achievements of the project were that STDM was tested and proven to be technically sound to address the information requirements of informal settlers, data analysis informed communities' plan to pursue priority projects such as social amenities hence communities use the information to negotiate with local authorities on possible community development initiatives as informed by collected data using STDM. Consequently, it has led to an international acknowledgement of the STDM pilot experience and international recognition of STDM as a tool to promote tenure security.

However, there is dearth of knowledge in connection with how the STDM pilot influences land right holders' perception about their tenure security hence impacts their land-related investments. It is against this backdrop that this study is conducted to ascertain the relationship between perceived tenure security and investment in land before and after registration in STDM. Insights on what motivates the land right holders' judgment and decision-making to invest in their land despite the informal nature of STDM as a land registration tool is assessed. Hence this study shall focus on indicators such as nature of land-related investments comprising house extensions, increased agricultural activities due to tenure security which

shall be assessed through better perception of tenure security and reduced land disputes. Results have policy implications for the use of pro-poor land registration tools for the purpose of improving tenure security.

1.5 Research Objectives

▪ Main Objective

The main research objective is to investigate the impact of Social Tenure Domain Model (STDM) on tenure security in Mission cluster in Namakwekwe ward of Mbale city (Uganda). To attain this objective, the following sub-objectives shall be considered:

- 1) To find out how land right holders perceive their tenure security after the STDM enumeration.
- 2) To ascertain the effect of STDM enumeration on land right holders' motivation to invest in land.
- 3) To assess changes in spatial patterns of land use and whether it can be linked to the STDM enumeration.

Where:

Land right holders refers to the house owners who were enumerated and had their information documented during the STDM pilot.

Cluster is equivalent to a suburb or sector which is the smallest unit of local governance structure of Uganda (Appendix 4)

1.6 Research Questions

For each sub-objective to be met, the following questions will be answered:

- 1) To find out how land right holders perceive their tenure security after the STDM enumeration.
 - 1.1 *What is the perception/feeling of land right holders about tenure security after the STDM enumeration?*
 - 1.2 *What is the status and trend of land-related disputes in the study area after the enumeration?*
- 2) To ascertain the effect of STDM registration on land right holders' motivation to invest in land.
 - 2.1 *What motivates the land right holders' judgment and decision-making to invest in their land presently?*
 - 2.2 *What motivates land right holders to invest in their land in future?*
 - 2.3 *Who are the people investing in the land?*
- 3) To assess changes in the spatial patterns of land use and whether it can be linked to the STDM enumeration.
 - 3.1 *What was the extent of different land use classes in the study area in 2011?*
 - 3.2 *What is the extent of different land use classes in the study area in 2014 after the STDM enumeration?*
 - 3.3 *What are the changes in spatial patterns of land use and whether it can be linked to the STDM enumeration?*

1.7 Research Design Matrix

The research objectives, and sub-objectives, research questions, data collection and analysis techniques and the anticipated results are summarized in the table below (Table 1-1):

Research Sub-Objectives	Research Questions	Data Collection Sources	Techniques of Data Collection	Techniques of Data Analysis	Anticipated Result
1) To find out how land right holders perceive their tenure security before and after STDM enumeration.	1. What is the perception/feeling of land right holders' tenure security before and after STDM enumeration?	-Land right holders	-Interviews(structured/ semi structured) -Observations -Literature Review	-SPSS Tool	-List of how land right holders perceive their tenure security after STDM -Variations in perception of tenure security before and after the STDM
	2. How has STDM impacted land-related disputes?	-Land right holders -Key informants (Staff of Local Council Courts)	-Interviews(structured/ semi structured) -Observations -Literature Review	-SPSS Tool	-Trends in different types of land conflicts
2) To ascertain the effect of STDM registration on land right holders' motivation to invest in land.	1. What motivates land right holders' judgment and decision-making to invest in their land presently?	-Land right holders	-Interviews(structured/ semi structured) -Observations -Literature Review	-SPSS Tool	Trend in quality of building materials/ crop investment / non-crop related investment since 2011 and in future, and if linked to STDM enumeration
	2. What motivates land right holders to invest in their land in future?	-Land right holders	-Interviews(structured/ semi structured) -Observations -Literature Review	-SPSS Tool	
	3. Who are the people investing in their land?	-Land right holders	-Interviews(structured/ semi structured) -Observations -Literature Review	-SPSS Tool	Trend in transaction regarding the kind of people investing in Mission (either indigenes or immigrants)
3) To assess changes in the spatial patterns of land use and whether it can be linked to STDM enumeration.	What are the spatial changes in land use and whether it can be linked to STDM enumeration?	-Satellite Imagery from Google (2011 and 2014) -Mission Housing/Boundary GIS Data	-Literature Review	- ArcGIS Tools	-Change Detection Maps (2011-2014)

Table 1-2: Research Design Matrix

1.8 Thesis Structure

This study is structured into six chapters as follows:

Chapter One: Introduction

The Chapter 1 presents general exposition of the background and justification of the research. It captures the conceptual framework leading to the problem statement, objectives specifying the follow-up sub-objectives and research questions.

Chapter 2: Literature Review

Chapter 2 reviews relevant literature in order to explore existing knowledge in the field of the study. This includes review of existing literature on the main concepts anchoring the study comprising Land administration systems, Social Tenure Domain Model (STDM) tool, failure of the conventional land administration systems, continuum of land rights, concept of land tenure, indicators of tenure security, impact of land registration on tenure security and land use change detection.

Chapter 3: Research Methodology

This chapter describes the research approach which has been compartmentalized into pre-field work, field-work and post-field work stages, description and justification of the study area, operationalization of variables. It has also discussed the approach for spatiotemporal change detection, land use change detection processes and the challenges faced during the data collection.

Chapter 4: Results

Chapter 4 presents the findings from the fieldwork regarding how land right holders perceive their tenure security after the pilot, impact of STDM on tenure security via reduction in land cases as well as motivation to invest presently and in the near future on the part of land right holders.

Chapter 5: Discussion

Chapter 5 discusses into detail the results obtained from the previous chapter and compare them to the findings arrived at in relevant scientific literature.

Chapter 6: Conclusion and Recommendations

This chapter draws conclusions from the findings and prescribe recommendations for further research including policy implications of the research.

1.9 Conclusion

This chapter served as the introductory chapter of the research. It described the research background and justification of the research, conceptual framework leading to the problem statement, research objectives specifying the follow-up sub-objectives and research questions. The next chapter shall explore relevant contemporary literature on the concepts and terms of the research.

2. LITERATURE REVIEW

2.1 Introduction

Chapter 1 provided an exposition on the issue of tenure security and the limitations of the conventional land administration approaches and explained the need for unconventional (pro-poor) land approaches as support to the conventional land approaches. This chapter discusses existing literature of the key concepts of this study. Essentially, this chapter captures the theoretical background of concepts such as unconventional land administration approaches with chief emphasis on emergence of STDm with an overview of STDm pilot project in Uganda, the concept of tenure security with its rippling effects. Again the final section highlights the issue of land use change detection and analysis.

2.2 The Concept of Conventional Land Administration Approach within Land Administration Domain

According to UNECE (1996), land administration refers to the process of identifying, documenting and making information available regarding land ownership and land use when enforcing land management policies and its associated resources. As illustrated in the land management paradigm (Figure 1.1) put forward by (Williamson et al., 2010), land administration provides the background information for change with regards to land tenure, land value, land use and land development. Land administration is therefore a wide term which encompasses land registration and cadastre (Zevenbergen, 1998). Henssen (1995) describes cadastre as methodically arranged public inventory of land data of a nation using fixed boundaries. Again, he defines land registration as a process of official recording of rights in land through deeds or title. Land administration can therefore be referred to as conventional land administration approach. Such systems have proved successful in western economies since they were developed based on effective and efficient institutional and technical arrangements designed in western market-driven countries while it has not favoured developing countries (Zevenbergen & Haile, 2010; Williamson et al., 2010).

2.3 Failure of the Conventional Land Administration Approach

Numerous articles abound focussing on why conventional land administration approach has not been successful in developing countries. These can be grouped into four reasons. First and foremost, developing countries lack the capacity and capability to effectively adopt conventional land administration approach. This is due to the fact that they lack appropriate land policy, clear administrative procedures for their specific needs and lack efficient institutions. In addition, absence of high technology in collection, storage, management, and dissemination of land information thereby augmenting effective integrated service as well as capacity and manpower challenges are contributory factors (Burns & Dalrymple, 2006; Williamson et al., 2010). Second, such approach is considered slow, complex, bureaucratic (Tuladhar et al., 2004), expensive (Hanstad, 1998) and too much in favour of the middle and elite classes (World Bank, 2003). As a consequence Lemmen, Augustinus, Oosterom, & Molen (2007) estimates that less than 30% of lands of developing countries are covered by such systems. Third, other limitations include the inability of conventional land approach to include the range of multiple tenure systems and land rights found in real-life situations such as customary or complex set of secondary rights (like access to fruits, share cropping etc) and informal tenures in their registrations (Van Asperen & Zevenbergen, 2012). Such secondary right holders may find tenure security within extra-legal areas but not in formal cases. This has led to the designing of land tenure types in terms of continuum of land rights. Finally, complicated global land challenges such as rapid urbanization characterized by upsurge of informality (including invasion, illegal subdivision and ignoring building codes) have proved very tough for conventional land

administration to handle. Urban population growth in developing countries is characterized by such informality. UN-Habitat reports that the world's urban slum population is expected to increase to 1.4 billion by 2020. As noted by Payne (2001), conventional land approach enhances the process of unauthorized development instead of minimizing it. Other limitations include heavy burden placed on land registries, some governments using titling programmes as an excuse to evict informal settlers from prime inner-city and grant them titles on plots outside the city and very high expenses incurred by governments in attempt to grant formal titles to informal settlers.

It is against this back drop that there is growing consensus to radically diversify land administration approaches to support the extension of security of tenure to incorporate forms of land tenure (Dekker, 2003). It is thus not surprising when (Buckley & Kalarickal, 2006) argues that it would be suicidal to promote conventional land administration programmes as the only solution to enhancing tenure security. Hence, it was recommended during the joint conference of African Union Ministers of Agriculture to the effect that member states should recognize multiple land tenures and develop effective documentation system to prove land ownership (UNECA, 2012). In the same vein, according to (AMCHUD, 2010), African governments are to promote security of tenure for all by identifying intermediate tenure arrangements and develop fit-for-purpose land administration systems. United Nations (2011) further underpins this approach by tasking member countries to recognize plurality of tenure systems and adopt alternative land administration approaches.

2.4 Unconventional Land Administration Tools to bridge the gap

In light of conventional land administration failing to meet its expectations, there has been the developing of alternative and innovative land tools to augment the former. For the purpose of clarity of the study these innovative land administration tools shall be referred to as unconventional land administration approaches. In a broader sense, it forms part of the toolbox approach currently propagated by Global Land Tools Network (GLTN) coordinated through UN-Habitat. As maintained by (Williamson et al., 2010), the toolbox approach involves identifying and implementing appropriate tools given a certain country context to support formal land market. In the absence of a generally accepted definition for land tool, the recent one put forward by (UN-Habitat et al., 2012b) states that a land tool is a pragmatic way to unravel land administration challenges and ensuring effectual implementation of land policies. UN-Habitat et al., (2012b) identifies eighteen innovative tools (see Appendix 1) with features such as the tools being pro-poor, affordable, equitable and gender-responsive, subsidiarity, sustainable, systematic and governance. Williamson et al. (2010) in his attempt to differentiate pro-poor land tools from land market tools, points out that pro-poor tools are mainly premised on socially driven systems whereas land market tools hinge on legal systems. In connection with defining pro-poor land tools (UN-Habitat, 2007b) defines pro-poor land tools as tools that take the needs of the poor into account by enabling the poor to gain and secure their rights to land.

Some benefits of pro-poor land tools include improved access to loans; bring the poor onto the first step on the tenure ladder eventually leading to full ownership hence be the foundation for capital formation. Also they generate land records themselves which contribute to better local dispute resolution and make it possible to make large investments that take a long time to recoup. In view of conventional systems not capable of accommodating social tenures in developing countries, one of the pro-poor land tool (unconventional system) which can fill this gap is Social Tenure Domain Model (STDM).

2.5 Social Tenure Domain Model (STDM)

STDM is a more flexible land information system that allows for the recordation of all possible types of tenures identified on the continuum of land rights rather than focus only on issuing individual leasehold and freehold titles. STDM is less expensive, quicker, less bureaucratic pro-poor approach that covers the uncovered portion by recording all forms of land rights, social tenure relationships and overlapping claims (Augustinus et al., 2006). STDM is meant specifically for developing countries where there is very little cadastral coverage in urban areas with slums, in rural customary areas or in complex situations like post-crisis context areas. The purpose of STDM is concentrating on all types of relationships between people and land irrespective of the legality of the relationship. This principle makes the STDM tool to be more flexible for other applications and contexts. The Global Land Tool Network (GLTN), facilitated by UN-Habitat has taken the lead in the development of Social Tenure Domain Model (STDM). The development of STDM can be summarized in three distinct perspectives: *STDM as a concept* (i.e. provides a standard for representing flexible ‘people-land’ relationships having ‘social tenure relationships’ to spatial units); *STDM as a model* (i.e. specialization of the ISO-approved Land Administration Domain Model (LADM) where any form of right, responsibility or restriction in a formal system is considered as a social tenure relationship in STDM); and *STDM as an information tool* (thus it represents the implementation of the model as a software package that enables the recordation and visualization of the ‘people-land’ relationships and other information). Basically, STDM links social tenure relationships, party (natural or non-natural persons) and spatial units (land parcels) whereby social tenure relationships are supported by various types of documents, audios, videos, photos etc.

2.6 Continuum of Land Rights

In many urban and peri-urban area of developing countries, there is upsurge of many non-formal tenure. The range of such tenures including customary, religious and statutory tenures to land can be considered as lying on a continuum. Across a continuum, various tenure systems may operate and may change in status in future. At one end are formal land rights, where the owner is an individual, who holds a set of registered rights to a parcel of land that are enshrined in law: the parcel is delineated on a map; held in a record office; the owner has the right to occupy the land, build on it (subject to approvals), sell it, rent it out, transfer it to his or her heirs, and prevent other people from coming on to it. At the informal end of the continuum are informal rights: a group of individuals (such as a clan) may have traditional rights to use a piece of land. The boundaries of the land may not be clearly marked on the ground or on a map, and there may be no official paperwork certifying who owns or has what rights to the land. In between these two extremes are a wide range of rights including customary, occupancy, alternatives to eviction, adverse possession and group tenure (UN-Habitat et al., 2012b). Durand-Lasserre & Selod (2009) suggests the following continuum: squatters, occupants in unauthorized land, holders of temporary permits and renewable to occupy, leaseholders, long-term registered leaseholders and freeholders.

2.7 Background of Social Tenure Domain Model (STDM) Development

In 2005, UN-Habitat with its partners upon realizing inadequate attention on pro-poor tools and shortcomings of conventional land approaches formed the Global Land Tool Network. STDM was seen by partners as one of the technical gaps therefore formed part of the GLTN’s agenda, which all partners agreed to work on jointly. The organizations interested in the STDM development were the International Federation of Surveyors (FIG), ITC, UN-Habitat and the World Bank (Augustinus, 2005). In 2008, UN-Habitat/GLTN and ITC developed the STDM design elements (user, technical and functional designs) and a prototype. In July 2008, a team did a first simple field test with the use of high resolution satellite imagery as base for data collection (GLTN & UN-Habitat, n.d.). Then in August, 2009, the initial version of the STDM prototype was tested by UN-Habitat and ITC in the context of rural land administration in Ethiopia, particularly in Amhara region in collaboration with the World Bank (Zevenbergen & Haile, 2010). After the first cycle of prototype development, the system was further revised to a far more stable

version. Other improvements were carried out and the final version was delivered to UN-Habitat in September 2010 (<http://www.stdm.gltn.net/history/>). There was then data testing of the prototype in collaboration with Pamoja Trust Slum Dwellers International affiliate from Nairobi, Kenya. Ongoing is further refinement of an intermediate version which is built on STDm prototype to attend to issues of informal settlements. UN-Habitat has led projects with developed functions in Kenya, Uganda and the Caribbean in cooperation with potential partners since 2011.

2.8 Overview of STDm Pilot Project Implementation in Uganda

In June 2010, a joint project proposal was developed between UN-Habitat/GLTN and SDI aimed to pilot STDm in Uganda to address the information requirements of the urban poor for wider learning purposes. Mission together with Bufumbo clusters in Mbale Municipality benefited from the first STDm pilot in Uganda in 2011.

The long-term objective was to address the land information requirements of the poor living in slum communities so as to enhance their capacity in the use of land information systems. And most importantly mainstream the thinking behind the continuum of land rights. This was to form the basis for dialogue between local communities and cities to improve tenure security and enhance access to social amenities. The specific objective was to pilot test the STDm and to document the process and capacity building requirements around its use. The project was implemented together with another project called Transforming the Settlements of the Urban Poor in Uganda (TSUPU). TSUPU seeks to enhance the linkages between various urban sector initiatives and programmes via introducing systematic changes in delivering urban services and developing planning (Antonio, Zevenbergen, & Augustinus, 2015).

2.8.1 Implementing Partners, Processes and Achievements

According to Antonio (2013), the various partners who took part in the project were classified according to their roles comprising facilitators, supporters and implementors.

The *facilitators* comprised Cities Alliance and FIG. Aside Cities Alliance being the project's funding agency, it particularly ensured the project coincided with the implementation of TSUPU. FIG supported the development of STDm and promotion of continuum of land rights since the STDm inception.

The *supporters* included UN-Habitat/GLTN Secretariat, SDI, Ministry of Land and Housing and Urban Development (MoLHUD), ACTogether and Municipality of Mbale. In addition to co-financing the project, UN-Habitat/GLTN coordinated the planning and consultative meetings, provided technical support and also led in the customization of STDm to suit local context. Aside co-financing the project, SDI provided the necessary political, technical and administrative support in the over-all project implementation. The MoLHUD provided the needed political and technical support and enabled the project to be mainstreamed in TSUPU. ACTogether served as a technical arm of the project implementation by providing relevant technical and information support to National Slum Federation-Mbale and community leaders and members in its project implementation. The Municipality of Mbale through its leadership provided enough technical and logistical support in addition to accommodating Slum Federation. It allowed its staff to participate in advocacy, educational campaigns, and field implementation.

The *implementors* included National Slum Dweller Federation (Mbale) and community leaders and members. Aside leaders of Slum Dweller Federation taking the lead in policy and consultative dialogues with national and Mbale local authorities, it took part in community sensitization, capacity development, mapping, household interviews, enumeration, data collection and analysis. It also served as the steady bridge between the technical and political partners and community members. Community leaders and members who were active members of the Slum Dwellers Federation took part in enumeration, community mobilisation, data collection up to data analysis and validation. As further described by (Antonio, 2014), the processes and activities implemented included:

1. *Planning and consultations:* The SDI and the UN Habitat/GLTN Secretariat engaged series of meetings with authorities (national and municipal), ACTogether, Slum Federation and community members. This culminated into in-depth understanding of STDM and its objectives, the completion of the enumeration questionnaire, finalization of an implementation plan, an agreement on the roles and mobilization of the needed resources.
2. *Mobilization and sensitization processes:* Mbale Slum Federation leaders and members together with the municipal officials and ACTogether motivated community leaders and members through an awareness-building process. Enumerators were then selected from among community members trained on mapping, data collection and administering of questionnaires.
3. *Customization of STDM:* This involved UN Habitat/GLTN Secretariat which proceeded to make adjustments to STDM to customize the system in order to meet the needs of the local context following agreement with local stakeholders and identification of resources available such as satellite imagery and handheld GPS.
4. *Mapping and structure numbering:* With assistance from ACTogether, the Slum Federation and community members then digitized the existing structures from the available satellite imagery and produced initial maps. Using the printed map, assigned enumerators numbered all existing structures and houses in the slum settlements using a unique code.
5. *Interviews and data collection:* Enumeration teams in the company of local leaders and municipal officials administered the questionnaire from house to house. During such interviews, they collected other information such as supporting documents and photos, with the unique code painted or written on the structure as a background.
6. *Data entry, validation and continuous updating:* The enumeration teams then entered all the mobilized data, documents and photographs into the STDM system. At this stage, the initial digital maps were updated. Slum Federation leaders and enumerators were trained on how to use STDM to analyze the data and produce reports. As part of quality assurance, the gathered data was validated by community members which increased its credibility. Then enumeration teams and Slum Federation leaders updated the information in the STDM plug-in.

The initial impacts of the project were: STDM was tested and proven to be technically sound to address the information requirements of informal settlers; community members are able to use STDM system and continuously update the information; the process provides an opportunity for the authorities and slum communities to initiate dialogues for inclusive planning, access to basic services and potential tenure security improvement and finally data generated, for instance the house numbers, would be used as a physical address system which will then enhance slum dwellers' access to other services (Antonio et al., 2015). According to Antonio et al. (2015), the pilot experience was successful and subsequently informed the GLTN Secretariat and partners in replicating and scaling up the process and greatly assisted in its current technical development.

2.9 The Concept of Land Tenure

Land tenure simply concerns the way in which social relations relate to land use. According to FAO, land tenure is the way in which land is held or owned by individuals and groups, or the set of relationships legally or customarily defined by people in regards to land. Land tenure can be viewed as bundle of right within a society. They are rules of tenure regulating how property rights to land are to be allocated within societies. They define how access is granted to rights to use, control, and transfer land. Dekker (2003) also relates land tenure to social constructs relating to exploitation and management of land. Land tenure therefore deals with right, restrictions and obligations associated with land. The above definition underpins land tenure as the means of land holding and the way the benefits are distributed between individual citizens. In connection to the above definition, the Uganda Lands Act 1998 categorically

identifies the following forms of land tenure systems via customary, freehold, leasehold and 'mailo' tenures.

2.10 Indicators of Tenure Security

The primary objective of conventional and unconventional land tools is to ensure tenure security. According to (UN-Habitat, 2008), tenure security is broadly defined as *"the degree of confidence that land users will not be arbitrarily deprived of the rights they enjoy over land and the economic benefits that flow from it; the certainty that an individual's rights to land will be recognised by others and protected in cases of specific challenges; or, more specifically the right of all individuals and groups to effective government protection against forced evictions"*.

Security of tenure seems to comprise both objective and subjective elements. The 'objective' elements deals with nature, content, duration and enforceability of the rights, state guarantee, quality of boundary descriptions and conflict handling while the 'subjective' elements involves the degree of confidence about uninterrupted use of land as well as landholders' perception of their security of rights (Kanji, Cotula, Hilhorst, Toulmin, & Written, 2005). Therefore security or insecurity of tenure is more than having or not having a piece of paper with your name on it. (Nabutola, 2005; Smith, 2005) categorize security of tenure into legal and economic dimensions. The legal dimension concerns the types and number of rights offered. In contrast, economic dimension concerns economic benefits such as the ability to undertake investments or access credits. The economic dimension focuses on adequate number of absolute rights, adequate duration and assurance.

Security of tenure has also been grouped into active and passive forms. Active tenure security means being capable of performing transactions on a land parcel whereas passive concerns the perception that one will not lose physical possession from his land (UN-Habitat et al., 2012b). From the viewpoint of Van Gelder (2010), tenure security is made up of a tri-partite model consisting of legal, de facto and perceived where each one influences the other. And that it highlights a psychological dimension where there could exist a perceived risk of being evicted or fear of being evicted. Simbizi, Bennett, & Zevenbergen (2014) revisiting the concept of tenure security, identified three schools of thought of tenure security comprising the legal oriented which builds on legal system as a source of tenure security, the economic or market oriented school and the adaptation paradigm. Other factors influencing tenure security comprise land registration system, protection against 'land grabbing', good (land) governance among others. Hence, for the purpose of clarity, this study focussed on the subjective or perceived tenure security.

2.11 Impact of Land Registration on Tenure Security

A wealth of literature have linked tenure security emanating from conventional land administration approach to investments in land. As asserted by Feder & Nishio (1998), tenure security based on economic theory is believed to increase credit use via better motivation for investment, promote vibrant land market, mitigate land disputes among others. Figure 2-1 shows clearly benefits expected to come from titling which includes bringing more security to farmers leading to higher investments and enhancing productivity (as illustrated on the left-hand portion of Figure 2-1) while the right-hand side shows security lenders will have with titled lands as mortgages (Feder & Nishio, 1998).

Salas, Knight & Saenz (1970) found in Costa Rica that a positive correlation existed between farm investment and tenure security. In the case of Africa, Moor (1996) found out in Zimbabwe that the long-term on-farm investments are influenced greatly by tenure security emanating from land titling. Whereas the above studies make a consistent and valid case for direct variation existing between land titling and investments, the picture emerging from comparative case studies conducted by (Payne, Durand-Lasserve, & Rakodi, 2009) has been mixed.

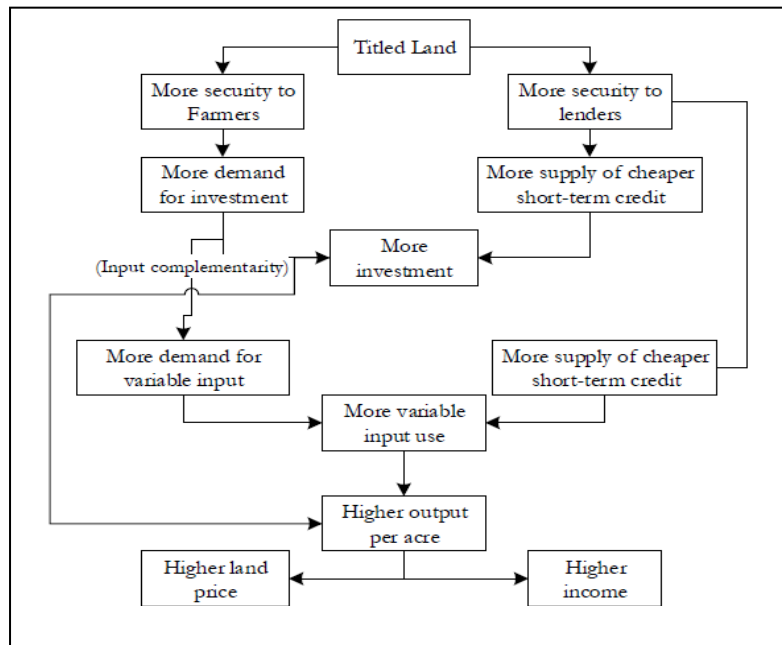


Figure 2-1: Land ownership security and farm productivity model (Adopted from Feder & Nishio, 1998)

The authors found out that where threat of eviction is possible having a title is appropriate to enhance investment whereas where the contrary exist people invest without registering their interests in land. Payne et al. (2009) also concludes that alternatives forms of tenure like the informal tenures also provide high levels of security as the known formal land tenures hence suggested pro-poor approaches to augment conventional land administration approach.

Recently, studies focussing on impact of unconventional land administration approaches on feeling of tenure security, landed investments and land-related disputes have been conducted in two African countries: Ethiopia (Deininger, Ali, & Alemu, 2008; Belay, 2010) and Rwanda (Simbizi, Zevenbergen, & Bennett, 2015). These approaches differed from the traditional titling programmes as it involved issuing non-alienable use-right certificates rather than full titles; ensured gender equity and were more participatory and highly decentralized. In summary they sought to ascertain the impact of land certification programmes on perceived tenure security, land-related investment, land disputes and land market participation among others. The studies concluded that unconventional land administration approaches yield similar benefits as the conventional approach as such land certification programmes enhanced the feeling of tenure security, led to reduction of incidence of land disputes and boosted land investments (Deininger et al., 2008; Belay, 2010; Simbizi et al., 2015).

2.12 Land Use Change Detection and Analysis

Land use in simple terms refers to the ways in which human activities such as farming, transport etc have changed the earth's surface. As defined by Meyer & Turner II (1994) land use is the way in which human beings use the land. In the land administration domain, Williamson et al. (2010) looks at land use as the processes associated with regulation of land use through implementation of land-use regulations at different scales. Land use is often used interchangeably with land cover although they are two different terms.

Land cover concerns the biological and physical cover over the earth's surface. According to Moser (1996), land cover originally referred to the type of vegetation that covered the land surface but now extended to include human structures and the physical environment.

The essence of land use change analysis is to indicate those patterns of land use that are related to environmental preservation. In addition, analysis of land use change aids in evaluating either past, present or future changes in patterns of land use in terms of certain criteria such as economic growth among others. Briassoulis (2000) defines land use and land cover change as quantitative changes in the areal extent of a given type of land use or land cover. The detection and measurement of such change depends highly on factors such as the spatial scale and land cover which can be detected and recorded. Turner II, Meyer, & Skole (1994) maintains that land cover changes are caused by geomorphologic processes as well as human actions.

Change detection involves the comparison of spatial information recorded over the same area at different times purposely to detect or identify changes in the features of interest (Alkema, Bijker, Sharifa, Vekerd, & Verhoef, 2013). In change detection, changes could be gradual, sudden and periodic. These changes are caused by processes which are natural, man-made, seasonal, deterministic or random. Characteristics of the processes to be known when determining appropriate data sources for the change detection includes speed, duration, characteristics, spatial size, trend of expected change and seasonality. Change detection can be done at various levels of detail including detection, identification, extent and spatio-temporal pattern of the change.

Many categories of change detection techniques have been developed over the years. According to Lu, Mausel, Brondizio, & Moran (2004), these categories are algebra, transformation, classification, advanced models, visual analysis, GIS and others. As asserted by Alkema et al. (2013), the algebra group of change detection technique involves use of algorithms which are based on combination of values of pixel in subsequent images such as image ratioing, image differencing, vegetation index differencing and image regression. It is often used to detect a very specific change such as detection of forest fires, deforestation mapping and detection of vegetation change. About the classification category, it involves some kind of classification of separate or combined images. This involves techniques such as post-classification comparison, spectral-temporal combined analysis, unsupervised, hybrid and artificial neural networks. Another category is visual analysis which is supported by the display of multi-temporal colour composites, movies or animations. Here results are heavily dependent on skills of the analyst and his familiarity with the area. Alkema et al. (2013) emphasizes further about integrated GIS and remote sensing method where change is normally detected by combining images and maps. Here past and current maps of land use land cover are employed and integrated with topographic and geological data.

2.13 Concluding Remarks

This chapter extensively reviewed literature on the key concepts identified in the conceptual framework. To fully comprehend the key concepts in this study, a wealth of literature were thoroughly reviewed in regards to the failures of conventional land administration approaches ushering in unconventional land approaches such as the STDM and the development of STDM based on the continuum of land rights. What tenure security entails as well as impacts of land registration on tenure security in respect of enhancing perception of tenure security and trend of land cases eventually affecting investments in land were the other concepts examined. The research approach, operationalization of variables and the qualitative and quantitative methods adopted for the study will be taken up in the next chapter.

3. STUDY AREA AND METHODOLOGY

3.1 Introduction

This chapter provides insight into how the research sub-objectives are operationalized describing the techniques that were used to obtain answers to the research questions outlined in chapter one. *Section 3.2* begins the chapter with description and justification of the study area then followed by *Section 3.3* which presents an operationalization of variables. *Section 3.4* also touches on the research approach with *Sections 3.5* and *3.6* discussing approach for spatiotemporal change detection and land use change detection processes respectively. The limitations faced during the collection of data is captured in *Section 3.7*.

3.2 Selection of Study Area

In connection with investigating the impact of Social Tenure Domain Model (STDM) on tenure security, Mission cluster of Namakwekwe ward/settlement located in the Northern division in Mbale municipality is chosen as the study area for this research. Mission cluster (Appendix 4) together with Bufumbo cluster all in Mbale Municipality were the two slum clusters of Namakwekwe settlement which benefited from the first STDM pilot in Uganda in 2011.

Mbale is bordered by Tororo District in the south, Manafwa District in the south-east, Sironko District in the north-east, Kumi District in the north, Budaka District in the north-west, and Butaleja District in the south-west. Mbale Municipality is the third largest town in Uganda after Kampala, the capital city. It lies between the longitudes 35° E and latitudes 4°5'N with land area of 534.4 sq.km. Mbale has gentle hills and valleys covering a geographical area of 2,435 hectares. Its relief varies from 4,040 feet above sea level in the south-eastern border region to 3,600 feet above sea level in the west (Mbale Local Government, 2012). Mbale municipality has 1 county with 11 sub counties and 1 municipality with 3 divisions. It consists of three autonomous but inter-dependent Lower Local Government Councils namely Industrial, Northern and Wanale Division Councils, which together with the mother council are responsible for the socio-economic development and planning of the town. Each of these is headed by council comprising of democratically elected and appointed political leaders on one hand and a team of civil servants headed by Chief Administrative Officer (Mbale Local Government, 2012). According to the 2014 Uganda Population and Housing Census, out of a total population of 96,189 of Mbale city, the Northern division constitutes a population of 39,076 (Uganda Bureau of Statistics, 2014).

Mission cluster started in the 1960s, by people who had been sent away from the missionary farm who therefore decided to settle in this area. They were sent away from their original land. Mission cluster covers an area of approximately 157,419 square metres. Mission cluster has about 81 housing structures which are used for residential purposes. Majority of the population here is employed as casual labourers who work in the town area. Other people are businessmen and women with small scale enterprises like grocery shops, kiosks to mention but a few.

The choice of this area is hinged on the fact that Mission is capable of providing the author with the necessary data as land right holders have already benefitted from the STDM in 2011 hence the pilot could better influence their investment in land as compared to recent pilot areas in Zambia, Mombasa (Kenya). Moreover, there was also willingness on the part of ACTogether NGO, a key implementor of the STDM pilot in Mbale to support the author by providing relevant data. Finally, there is no ongoing research activity relating to STDM as far as this investigation is concerned.

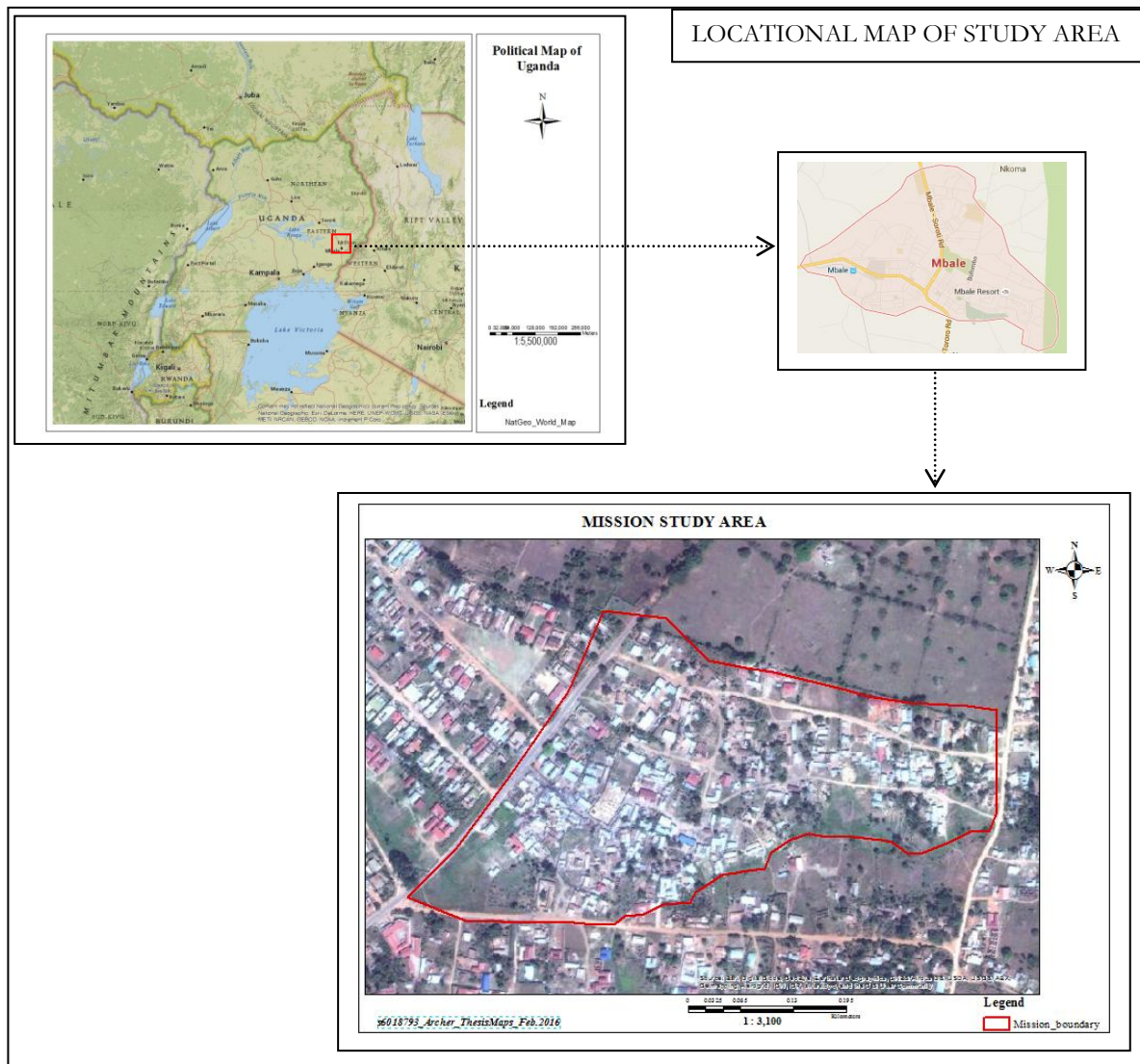


Figure 3-1: Map of Uganda projecting Mission cluster study area

3.3 Operationalization of Variables

In order to attain the main research objective of investigating the impact of STDM on tenure security in Mission cluster, concepts, indicators and variables were formulated. As shown in (Table 3-1) the concept of tenure security was translated to indicators comprising perception of tenure security and conflicts which were demystified into variables that are measurable such as level of confidence that respondents will not lose their lands, respondents experiencing conflicts, types of conflicts, respondents following conflict resolution procedures among others. Furthermore, other concepts like investment and land use change were broken down into indicators such as motivation to undertake investments and change detection which were measured in the form of variables (Table 3-1).

3.4 Research Approach

The research approach used is the case study approach. According to Kumar (1999), the case study method is hinged on the assumption that the case being studied is typical of cases of a certain type so that, through intensive analysis, generalizations may be made that will be applicable to other cases of the same type. It is against this back drop that single case study was adopted as (Pettigrew, 1985) puts it single case studies enable theory building by developing and refining concepts. Both quantitative and the qualitative methods were used. The research approach is compartmentalized into three phases. They comprise the

Sub objectives	Concepts	Indicators	Research Questions	Variables
1. To find out how land right holders perceive their tenure security before and after STDM pilot	Tenure security	1. Perception of tenure security	1. What is the feeling of land right holders about tenure security after STDM?	1. % confidence will not be taken away in the next 5 years (short term) 2. % confidence land will not be taken away in the next 15 years (long term)
		2. Conflicts	2. What is the nature of conflicts in the context of STDM?	1. % experiencing land conflicts before and after STDM 2. Types of land conflicts existing or going to the Courts 3. % following conflict resolution procedures & how 4. # of conflicts reported at courts over time according to categories? 5. Evaluation of land disputes before and after STDM by Court?
2. To ascertain the effect of STDM registration on land right holders' motivation to invest in land.	Investment on land (temporal aspect)	3. Motivation	1. What are the trends of investment since STDM piloting?	1. Type /material for fence and external wall 2. % houses with extension since 2011 3. Types of building material since 2011 4. % own effort to extend house 5. % supported by other programs 6. % housing conditions has improved since 2011
				1. % adopting crop investments 2. Types of crops grown 3. Types of crops before 2011 4. % own effort to invest 5. % supported by other programs 6. % productivity has increased after 2011
				1. % adopting non-crop related investments 2. Types of non-crop investment 3. Types of non-crop investment after 2011 4. % own effort to invest 5. % supported by other programs 6. % productivity has increased after 2011
			2. What motivates the land right holders to invest in their land in future?	1. # of residents intending to invest in (crop, non-crop, house extension) in the short term (5 years) 2. # of residents intending to invest in long term(10 yrs) 3. Type of livelihood/job 4. # of income generating activities by STDM beneficiaries 5. % would invest even without STDM enumeration 6. % would not invest, and reasons
3. To assess changes in the spatial patterns of land use and whether it can be linked to STDM pilot.	Land Use Change	Land Use Change detection and its link to STDM?	3. Who are the people investing on the land?	1. Year in which person acquired land 2. Mode of acquisition of plot 3. % of population acquiring property in Mission after 2011
			1. What was the extent of different land use classes in the study area in 2011?	Land size of different land use classifications (built-up, roads, undeveloped classes) in 2011

Table 3-1: Operationalization of Variables

Sub objectives	Concepts	Indicators	Research Questions	Variables
3. To assess changes in the spatial patterns of land use and whether it can be linked to STDM	Land use change (spatial aspects)	Land Use Change detection and its link to STDM?	2. What is the extent of different land use classes in 2014?	Land size of different land use classifications in 2014
			3. What are the changes in spatial patterns of land use and whether it can be linked to the enumeration?	1. Type of changes in land use identified in change detection maps? 2. Which land use type is increasing and which is decreasing & why? 3. % of land use changes influenced by STDM enumeration?

Table 3-1: Operationalization of Variables

pre-fieldwork phase which involved identification of the research problem and research objectives, fieldwork phase where the relevant data was collected; and finally the post-fieldwork phase where the data collected was analyzed, conclusions drawn from the findings with recommendations made (Figure 3-2).

3.4.1 Pre-Fieldwork Stage

The pre-fieldwork stage involved justification of the study, identification of the research problem pivoted on the development of a conceptual framework and formulation of research objectives and research questions. The selection of study area, designing of semi-structured questionnaire and change detection maps were produced for verification during fieldwork stage were done in this stage. The questionnaires was hinged on the respective research sub objectives viz how land right holders perceive their tenure security, trend of land disputes, land right holders' motivation to invest in houses or crops or non-crop investments presently and in future, kind of people investing in the area.

With regards to literature review, relevant literature were reviewed in order to explore existing knowledge in the field of the study. This included review of existing literature on the main concepts anchoring the study comprising Land administrations, Social Tenure Domain Model (STDM) tool, failure of the conventional land administration approach, Continuum of Land Rights, Concept of land tenure, indicators of tenure security, impact of land registration on tenure security, land use change detection and analysis.

3.4.2 Fieldwork Stage

The fieldwork stage comprised the employment of both primary and secondary data collection tools to generate data. The field work was conducted with the intention of collecting the relevant information in order to answer the research questions outlined above.

3.4.2a Primary Data Collection

The primary data collection tools used included interviews and field observation. Semi-structured interviews were conducted for land right holders, ACTogether NGO as well as Local Council Court Representatives.

a. Interviews

Semi-structured interviews, an interactive technique was used for collecting data (Appendix 3). The semi-structured interviews were conducted for forty-six (46) land right holders as their perceptions about tenure security and motivation for investing presently and in future were discussed in-depth and there was more flexibility in asking questions and probing (Bryman, 2012) during the field work. The interview questions comprised a mixture of closed-ended, 5-point Likert scale and few open questions. Another interactive method the researcher employed was the conducting of key informant interview which was also framed in a semi-structured way for Staff of ACTogether NGO/Slum Dwellers Federation(Appendix 6) and (1) Local Council Courts Representative(Appendix 7). The key informant interviews was to seek information regarding their role in the STDM implementation and their motive for the pilot. Two research assistants who acted as translators were engaged to assist in the data collection exercise.

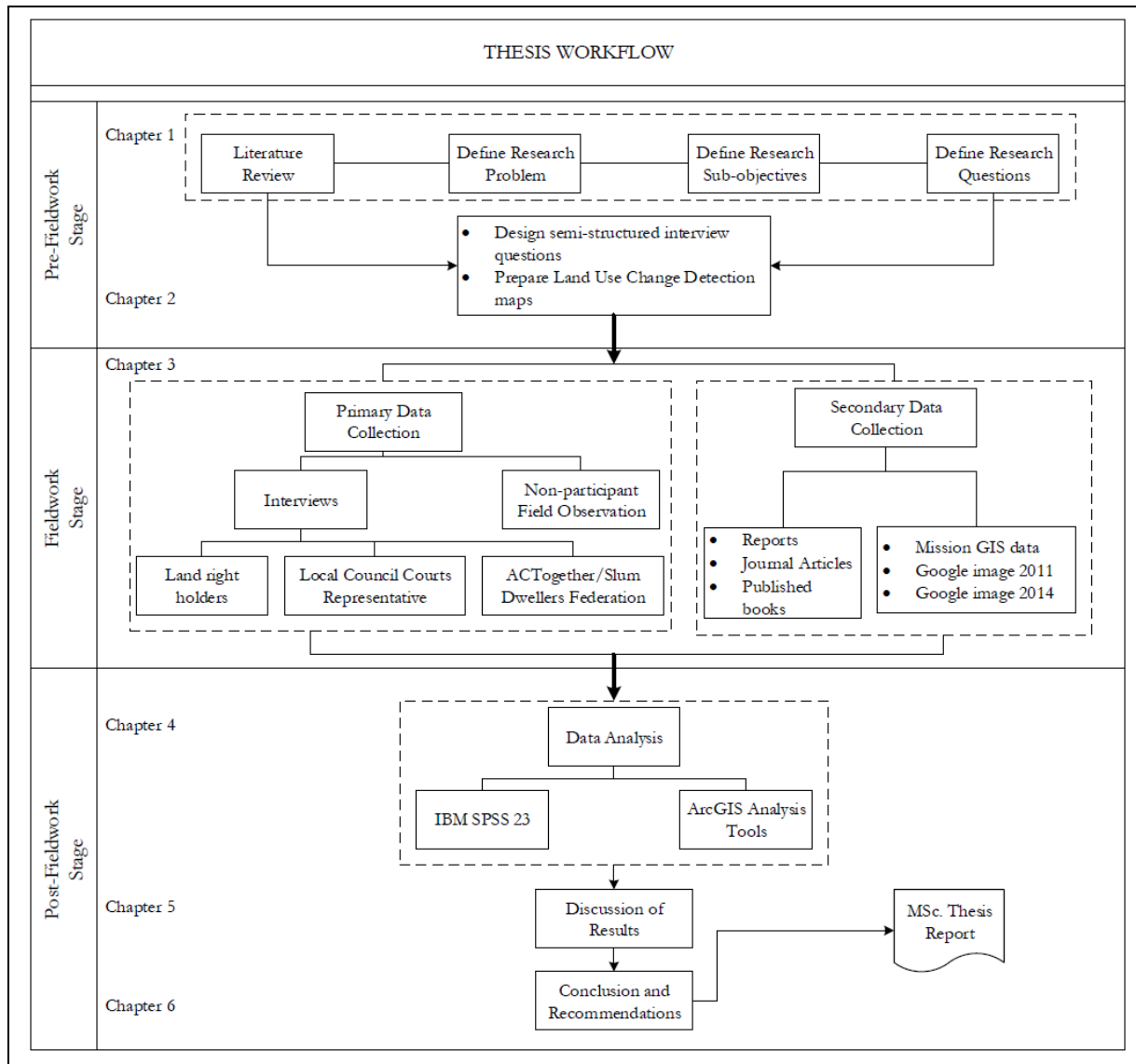


Figure 3-2: Research Design Framework (Thesis Workflow)

They were staff of the Slum Dwellers Federation who implemented the pilot project activities in the study area therefore had local knowledge and well vest in the STDM activities. They were well briefed on the purpose and objectives of the research before the data collection activity. Their translations from their local language into English and vice versa as well as earliest information obtained from the ground enabled the researcher to fine-tune most of the interview questions to suit the area.



Figure 3-3: Interview sessions with land right holders

▪ Sampling Technique

Both random and non-random sampling techniques was used for obtaining the sample from the study population. The sampling design used in the selection of land right holders was the simple random sampling technique whereby each element in the study population has an equal chance of being selected (Kumar, 1999). Initial contact with ACTogether NGO was made to obtain an excel list of tenure status of beneficiaries which was processed further in ArcMap to arrive at population of land right holders. They were made up of house owners and relatives of house owners from the pilot and numbered 81 in all. The accuracy of the outcome of a study is highly dependent on the selection of the sample size. In this regard, the researcher adopted Alain Bouchard sampling formula as shown below:

$$\text{Sample Size (n)} = \frac{(Z\alpha/2)^2 * p(1-p) * N}{[E^2 * N] + [(Z\alpha/2)^2 * p(p-1)]}$$

where; N = Population Size (N= 81)

p = the estimated frequency for the sample size n; that is proportion of success (50% in this study)

E = Tolerable Error (10% for this study)

Z α /2 = Value given for the confidence interval according to the precision desired (1.96 for this study).

$$n = \frac{1.96^2 * 0.5(1-0.5) * 81}{[0.1^2 * 81] + [1.96^2 * 0.5(1-0.5)]} \quad n = 43.94 \approx 44$$

Hence per the formula, the sample size was 44 land right holders (i.e. house owners), however in conforming to the general rule that the larger the sample size, the more accurate will be the estimates 46 households were accessed. In order to incorporate new residential house owners in the research, 9 respondents were interviewed in addition to 37 old residential house owners (Table 3-2).

Categories of House Owners	Population Size	Targeted Sample Size	Reached Sample Size	Variance
Owners of old houses	51	29	37	8
Owners of new houses	30	15	9	-6
Total	81	44	46	2

Table 3-2: Selection of Sample Size

After arriving at the sample size for both categories of house owners, change detection map (2011-2014) was produced from Google imagery which culminated into identification of the targeted sample size via systematic random sampling. However in connection with the staff of ACTogether/Slum Dwellers Federation and the Local Council Courts, a non-random approach comprising purposive was used to select the key informants. This is mainly due to the fact that the author has concluded on the appropriate people who can best provide the needed information towards the realization of the research objective (Kumar, 1999).

b. Field Observation

An observational method like non-participant observation where the researcher shall not get involved in the activities of the group but remains a passive observer watching the land right holders' activities and drawing conclusions was employed (Kumar, 1999). In this regard, the researcher observed land investments as well as crop and non-crop related investments first during recording of the interview responses on the interview sheets and most significantly to verify and validate the new developments which were spotted on the Google imagery before visiting the study area.

Gender	Male	14	30%
	Female	32	70%
Age Distribution	20 - 40 years	6	14%
	41 - 60 years	23	52%
	Above and 61 years	15	34%
Household Size	Less or equal to 5	18	41%
	6 - 8 people	13	30%
	Above 8 people	13	30%
Educational Level	Never attended school	5	11%
	Primary	20	43%
	Secondary/Technical/Vocational	14	30%
	Training College/Nursing Training	5	11%
	University	2	4%

Table 3-3: Overview of the Respondents of the Household Survey

3.4.2b Secondary Data Collection

The secondary data used in the research included data collected from books, and journal articles on land administration, reports, laws, regulations, enumeration and profiling forms.

a. GIS Data

Copy of GIS data containing housing, electricity, roads, boundary and water shapefiles of Mission cluster produced from the STDM pilot was obtained from the GLTN website in August 2015. The boundary and Housing shapefiles of Mission were taken to ArcMap. The image quality of the buildings of Mission is a scale of 1: 3,000 which is sufficiently high to enable easy interpretation of images in the study area. The vector data was in WGS_1984_UTM_Zone_36N Projected Coordinate System based on Transverse Mercator projection with False Easting of 500000 and False Northing of 0 at a scale factor of 0.9996 and in distances measured in Metres. The Geographic Coordinate System is GCS_WGS_1984 on D_WGS_1984 Datum with angular units in Degrees. The extent is 120508 m at the top, 120151m at the bottom, 631713m at the left and 632348 m at the right. This data showed the built-up situation in the study area as at 2011 when the STDM was piloted thereby aiding in the creation of land use maps. It also helped in identifying house owners who were enumerated during the pilot. In addition, World imagery which is an online basemap in ArcMap was accessed which was used as the basemap for the land use change detection analysis.

b. Raster Data

The data collected included Google raster images of 2011 and 2014 of Mission area. Historical Google images of 6th June, 2011 was downloaded from Google Pro in a jpeg format at an altitude of 1130m on screen with resolution at maximum (4800 x 2718). The raster information is 4800, 2718 columns and rows, 3 number of bands with uncompressed size is 37.33MB. The Google 2014 image of 13/12/2014 was also downloaded in a jpeg format and has the same raster characteristics with Google 2011 image. Both images are of 8 bit pixel depth with the pyramids on level 3 and resampling was with nearest neighbour. These images were used in the land use classification and spatiotemporal analysis of changes in land use between 2011 and 2014.

3.4.3. Post Fieldwork Stage

3.4.3a. Processing of Primary and Secondary Data Collected

Data collected from the land right holders was entered into Statistical Package for the Social Sciences (SPSS). IBM SPSS 23 was then used in processing the data to produce results which were graphically displayed using charts, tables and graphs. The data collected via the key informant interviews were transcribed to augment information gathered from the land right holders. The Google images of 2011 and 2014 were taken to ArcMap and georeferenced on the World Imagery Basemap to geometrically

align with Mission Housing and Mission boundary shapefiles. These datasets were used for the land use change detection analysis.

3.4.3b. Methods of Data Analysis

Both quantitative and qualitative methods of data analysis were used. The analysis were carried out according to the research objectives. In connection with key informant interviews, qualitative interpretation of the interview was done and relevant documents were compiled, reviewed and interpreted. The results was discussed in connection with scientific literature, after which conclusions were drawn and recommendations prescribed in forthcoming chapters. Data collected from land right holders was analyzed using descriptive statistics and cross tabulation of IBM SPSS 23 software to produce results shown in statistical tables and bar charts. These aided in the quantitative analysis. The quantitative analysis of land use change was done with the help of field calculator and statistics report generator in ArcMap. They were used in calculating the total shape area for each land use class.

3.5 Approach for Spatiotemporal Land Use Change Detection

Land use change technique were used for the periods 2011 and 2014. While there exist a general approach for land detection, it was adopted to suit the objectives of the study. The approach for the land use change broadly consist of Feature (Classes) extraction, production of land use maps for 2011 and 2014 and finally land use change detection. The feature extraction was done based on the identification of three different land use classes for 2011 and 2014. These land use classes comprised built-up parcels, road parcels and undeveloped parcels. The mapping of these classes into thematic maps was done according to a Feature Extraction Guide (Table 3-4). The feature extraction guide serves as guide for the extraction process by giving clear description of objects to be extracted, requirements on input data and attributes, and clear digitizing rules. Moreover, the smallest interpretation unit was derived as 28.8m² (Appendix 5). The beneath three classes were extracted for the period 2011 and 2014 which were used to produce thematic maps for the land use change detection analysis. The land use change detection analysis was done in respect of quantitative comparison of the thematic maps for both 2011 and 2014 in addition to creation of land use change detection maps in order to assess changes in spatial patterns of land use.

3.6 Land Use Change Detection Process

The process of spatiotemporal land use change adopted by this study is shown in the flowchart of Appendix 2 with the steps as follows:

Step 1: The obtaining of datasets included GIS (vector) data of Mission Housing and Mission Boundary, raster images of Google Earth (2011 and 2014).

Step 2: Investigation of the coordinate and projection systems of Mission Housing vector data and geo-referencing of the Google raster images on world imagery basemap was carried out.

Step 3: Delineating of Mission study area was done to enable the researcher clearly focus on the boundary extent of the area. Mission housing and Mission boundary vector data were overlaid on the Google images of 2011 and 2014 in ArcMap.

Step 4: This involved feature extraction of the built-up parcels, roads parcels and undeveloped parcels with the aid of feature extraction guide. In ArcMap, the three classes for the two periods were digitized using editor tool on Google images of 2011 and 2014.

Step 5: Thematic land use maps for all the classes were produced for 2011 and 2014 with the aid of merge geoprocessing tool and erase spatial analysis tool all in ArcMap. These were used for the land use change detection phase.

Step 6: The final stage involved quantitative land use analysis and the generation of land use change detection maps for each class. The statistical analysis of the land use classes in respect of land sizes for both periods were compared. The land use change detection maps were produced in ArcMap with model builder.

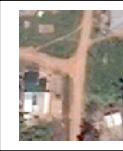
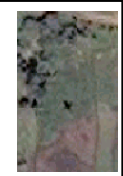
Class	ID	Definition & Appearance	Appearance on Google 2014	Attributes	Geometry	Digitizing Rules	Topology
Built-up parcels	BU	Developed area on which a roofed building is present without any space for other land uses. <i>Appearance:</i> Red, brown, blue, black metallic roofing sheets present.		ID: Long Integer Shape_Area: double	Polygon	Digitize outline of the roof boundary of a specific building	-Must not overlap with undeveloped parcels -Must not overlap with roads parcels
Roads parcels	RD	Area allocated for cars, motorcycles, bicycles, pedestrians. <i>Appearance:</i> unpaved road with brown or grey colour		ID: Long Integer Shape_Area: double	Polygon	Digitize the outer rim of the road	-Must not overlap with built-up and undeveloped parcels
Undeveloped parcels	AG	Area not used for buildings nor roads but used as backyard gardens and bare parcels. <i>Appearance:</i> Green colour vegetation and bare lands		ID: Long Integer Shape_Area: double	Polygon	Digitize the perimeter of undeveloped and bare parcels.	-Must not overlap with built-up parcels and roads parcels

Table 3-4: Feature Extraction Guide

3.7 Land Use Classifications for Change Detection for 2011 and 2014

The generation of thematic land use maps for the three classes for the periods of 2011 and 2014 were used for the production of land use change detection maps and quantitative analysis. Figure 3-4 shows extracted built-up parcels and road parcels during the STDM pilot in 2011 while Figure 3-5 reveals undeveloped parcels during the pilot.

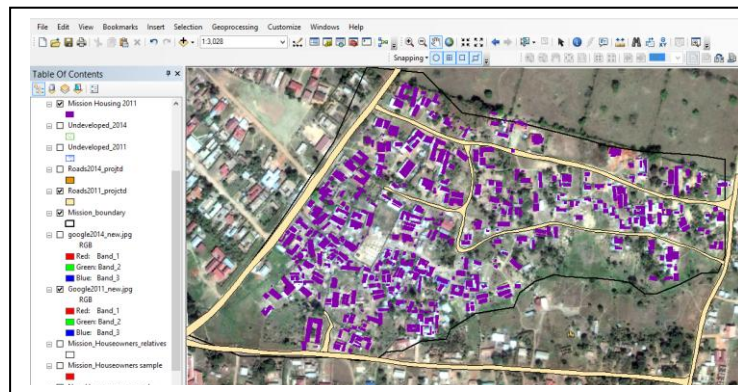


Figure 3-4: Built-up and Roads parcels classifications in 2011

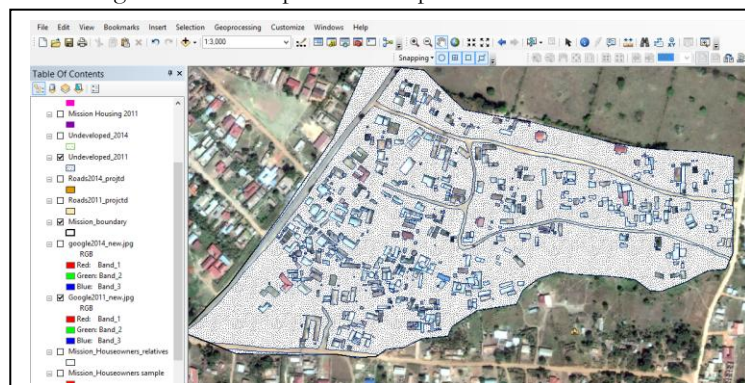


Figure 3-5: Undeveloped parcels classification in 2011

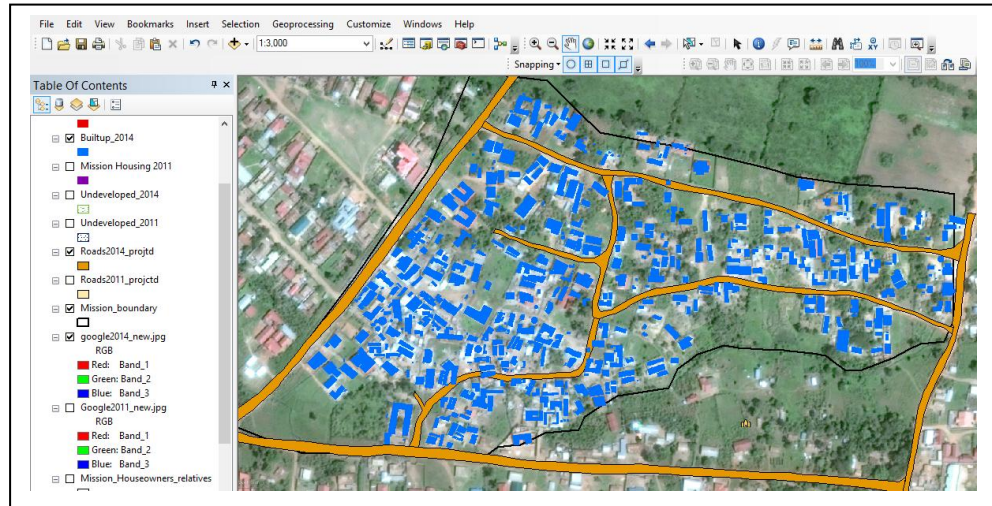


Figure 3-6: Built-up and Roads parcels classifications in 2014

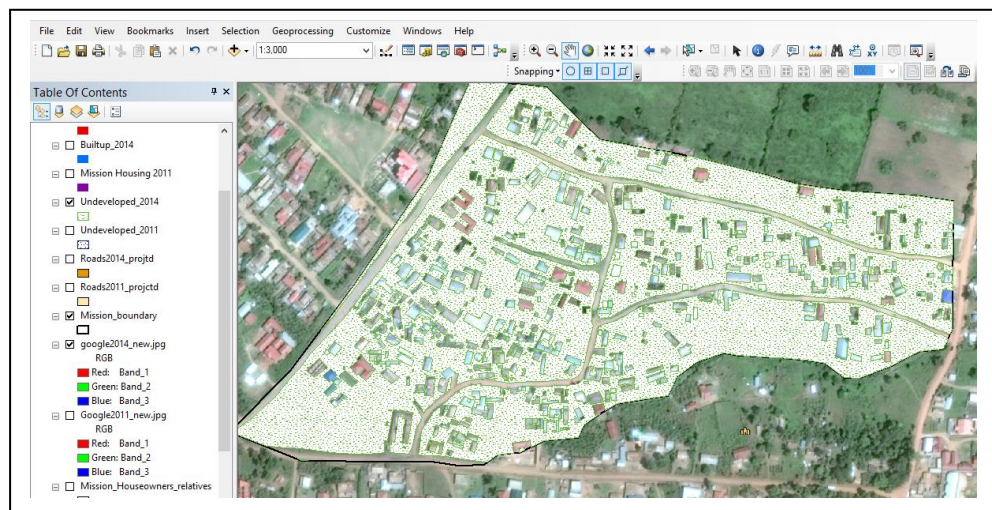


Figure 3-7: Undeveloped parcels classification in 2014

Figures 3-6 & 3-7 above depicts clearly the built-up parcels, roads parcels and undeveloped parcels after the STDM pilot in 2014. This unveils changes in spatial patterns of land use 3 years after the pilot. These maps were used in the generation of land use change detection in ArcMap with spatial analysis tools.

3.8 Limitations of the Data Collection

Like many research works this study was not without limitations. Most of the owners of the new digitized houses were not available to respond to the interviews leaving behind caretakers who had no clue about the research questions. Some of the respondents either discontinued with the interview or simply declined to respond to the research questions premising such inaction on the fact that no positive results emanates from such interviews after having participated in a lot of interviews in times past.

3.9 Concluding Remarks

The methodology outlined in this chapter has given a gist of the techniques used in undertaking this research specifying how such data is going to be analyzed. Each of the methods and techniques used for the data collection were chosen in relation to the research sub-objectives and questions. The forthcoming chapters intends to show an in-depth analysis of the responses gathered from the field rightly pivoting on the research sub-objectives.

4. RESULTS

4.1 Introduction

The preceding chapter offered an extensive description regarding the methods and techniques used for the data collection towards the realization of research objectives and questions. The description includes the approach for spatiotemporal change detection and the study area. The aim of this chapter is to present findings from fieldwork data gathering according to the research question. *Section 4.2* shows results relating to how respondents perceive their tenure security in addition to trend of land disputes after the STDM enumeration. Trends of current present land investments as well as motivation for future investments are presented in *Section 4.3* while *Section 4.4* gives results in respect of changes in spatial patterns of land use.

4.2 How land right holders perceive their tenure security after STDM enumeration

4.2.1 Perception of Tenure Security

Anecdotal evidences frequently points to instances of rampant compulsory land acquisition and eviction of slum dwellers in Africa which leads to high tenure insecurity among slum dwellers. Therefore the confidence of landowners not losing their lands in the short and long term span definitely influences security perceptions which may perhaps influence their intentions of investing or not investing on their lands. Hence, a semi-structured interview was carried out with land right holders in order to ascertain a variation of land right holders' perception about their tenure security after the STDM pilot by specifically testing their confidence of not losing land in the short and long term.

Respondents were therefore asked whether the enumeration increases security against evictions or provides some form of benefits. All the respondents said that they expect the enumeration exercise to support them and their leaders to effectively dialogue with city authorities so they can have infrastructure services like roads, public toilets, water points among others. Further question was probed to investigate in-depth how respondents perceive security of tenure in the short term. As shown in Table 4-1, 41% said they were very confident followed by 24% who were not confident at all with the minority 4% who expressed that they are slightly not confident. Moreover, pertaining to how they perceive tenure security in the long term, majority (43%) of the respondents expressed that they were very confident, followed by 22% who were not confident at all while the minority (4%) were slightly confident (Table 4-2).

Description	Frequency	Percentage(%)
Not confident at all	11	24
Slightly not confident	2	4
Do not know	6	13
Confident	8	17
Very confident	19	41
Total	46	100

Table 4-1: Confidence of not losing land in 5 years

Description	Frequency	Percentage(%)
Not confident at all	10	22
Slightly not confident	2	4
Do not know	6	13
Confident	8	17
Very confident	20	43
Total	46	100

Table 4-2: Confidence of not losing land in 15 years

In order to obtain further clarification, a cross-tabulation was done to explore the relationship existing between their proof of ownership (as independent variable) and perception of tenure security (as dependent variable). Therefore, in regards to how land right holders perceive tenure security in the short term (Figure 4-1), the highest percentage were those who are very confident constituting 28% falling in respondents possessing 1 document (i.e. only written agreements) as proof of ownership. The respondents in this category said inasmuch as they have a written agreement, no one can dispossess them of their interests in their land parcels. This is followed by 20% who are not confident at all also falling in the same 1 document category. According to these respondents, they are afraid because the municipal authority

could compulsorily acquire their lands in the near future in which case they will not be compensated since they have no registered land documents. Finally, higher percentage of respondents who were not sure of their tenure security also possessed 1 document. This category explained further that the municipal assembly could compulsorily acquire their lands at any possible time for which they will not be in the position to receive proper compensation as they have no written documents to prove their ownership.

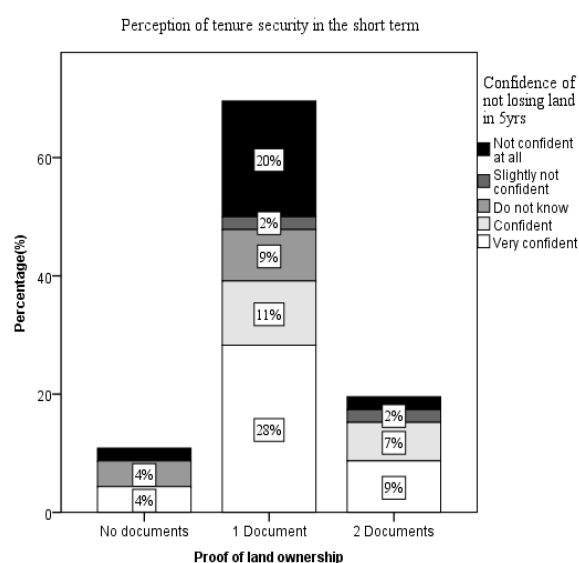


Figure 4-1: Perception about tenure security in 5 years

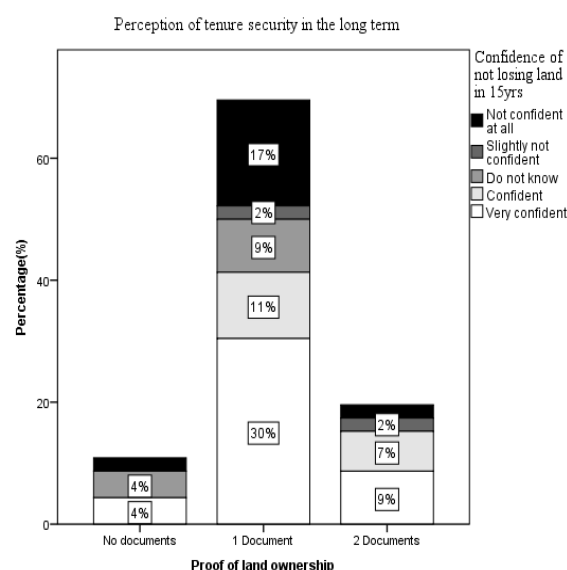


Figure 4-2: Perception about tenure security in 15 years

From Figure 4-2, the survey results relating to how respondents view tenure security in the long term did not differ much from Figure 4-1. It shows that the highest percentage of respondents who were not confident at all and very confident were respondents with only 1 document (i.e. only written agreements) at 17% and 30% respectively. According to respondents who were not confident at all, until they engage a surveyor to survey their parcels and further proceed to register finally at the lands department they will still harbour fears of losing their parcels in the near future. In addition, the respondents who are very confident conferred that inasmuch as they possess a written agreement evidencing their land transaction, they are comfortable that they cannot be dispossessed in future.

4.2.2 Land-related disputes in the context of STDM enumeration

4.2.2.1 Nature of land-related disputes

Another approach of testing how land right holders perceive their tenure security was assessing the trend and variations in land cases after the pilot. For this reason the third part of the interview sheet was designed to test respondents' perception of tenure in connection with the period and type of land disputes existing in the study area, the medium respondents used in resolving their disputes as well as the impact of STDM pilot in checking land disputes.

Description	Frequency	Percentage
Before 2011	5	50%
From 2011 onwards	5	50%
Total	10	100

Table 4-3: Period of dispute

The survey results indicates that 78% responded they have never faced any land dispute and 22% of the respondents reported in the affirmative. The figures confirm that majority of the respondents did not encounter land disputes at all. This was confirmed during an interview with the Local Council Court Representative 1 attributing this to high membership nature of local land administration structures and

knowledge of community members' boundaries by everybody. He explained further that the land committee comprising 10 - 11 members are always informed of any land transactions in Mission and they are expected to be present to identify the boundaries as witnesses in any land transaction hence the minimized land disputes. Out of the 10 respondents who faced disputes, half of the respondents confirmed having the land dispute before STDM enumeration while the remaining half had it after the enumeration. That notwithstanding, one would not be far from right to conclude that land related disputes are declining especially assessing from 1981 when the first land dispute arose before the pilot compared to 4 years after the pilot.

4.2.2.2 Types of land disputes existing

Another issue identified was the categories of land disputes respondents faced. Table 4-4 reveals that 10 respondents encountered land disputes. Boundary disputes with neighbours constituted the majority while 1 respondent each had land ownership disputes within families and expropriation issues respectively.

Description	Frequency	Percentage(%)
Boundary disputes with neighbours	8	17
Ownership disputes within family	1	2
Expropriation of land	1	2
Total	10	22
No disputes	36	78
Total	46	100

Table 4-4: Nature of land disputes

However according to land dispute data of Mission cell gathered from Local Council Court Representative III illustrated in Figure 4-3 majority of the disputes were default of rental contract by tenants while expropriation/land grabbing formed the minority. On the overall, a close observation of the status of trend of cases since the STDM enumeration reveals clearly a fall in cases from 44 in 2011 to 16 in 2014. He expatiated further that the reduction was attributed to the sensitization campaigns undertaken during the pilot which was aimed at awakening slum dwellers' roles and responsibilities in securing their lands among other issues. This led to many land right holders engaging surveyors to survey their boundaries to enable them register their parcels at the lands departments. In addition, the existence of a stronger local governance structure at the grassroots' level enabled land disputes to be resolved by the local citizenry themselves who had enough knowledge about local context issues.

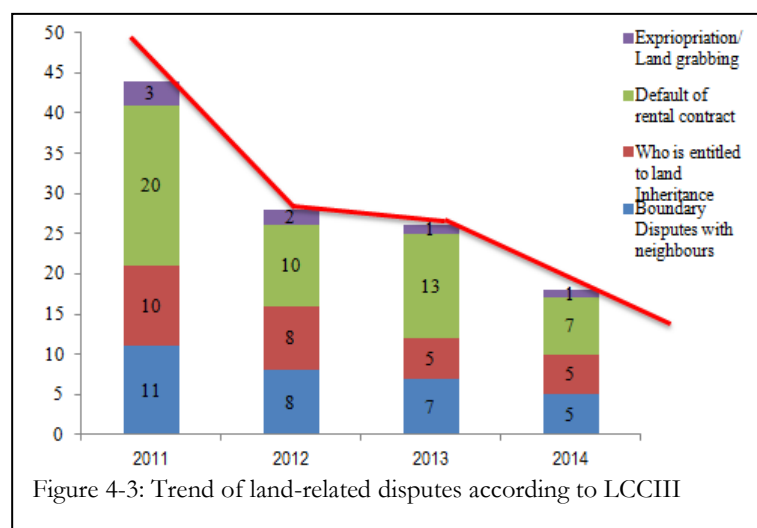


Figure 4-3: Trend of land-related disputes according to LCCIII

4.2.2.3 Medium of Dispute Resolution

From Table 4-5 the survey results shows 9 respondents responded that they resorted to some medium for resolving their dispute whereas the remaining 1 respondent did not seek any help at all. It reveals that majority of the respondents relied on some form of dispute resolution mechanisms to resolve their land disputes. Out of the 9 respondents, 7 respondents resorted to the Local Council Courts then followed by 2 who relied on family or neighbours to resolve the issue domestically while none resorted to the other media. This means that the respondents had much confidence in the capacity of the Local Council Court to resolve their disputes since the Local Councils Court are empowered by the Local Council Courts Act, 2006 to have jurisdiction in matters relating to land among other things.

Description	Frequency	Percentage(%)
Family or neighbours	2	4
Local Council Court (LCC)	7	15
<i>Total</i>	<i>9</i>	<i>90</i>
Do not seek help	1	10
Total	10	100

Table 4-5: Medium for resolving land disputes

Due to local knowledge that the Local Council Representatives have concerning boundary issues, the Local Council Court do not rely much on the STDM database as evidence during resettlement of land disputes. Hence the STDM database was not influential at all over the final decision in any land claim. However, the respondents responded that they were awaiting the Certificates of Residency promised them during the project implementation.

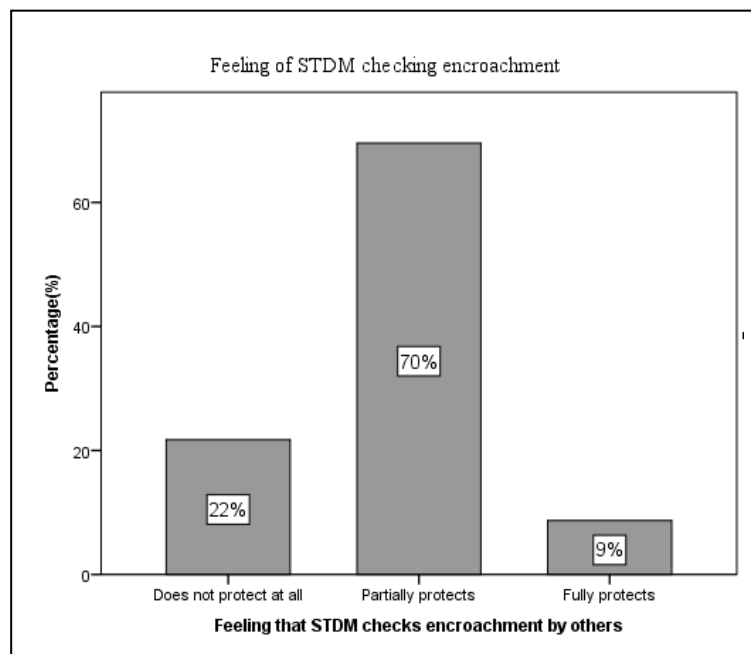


Figure 4-4: Feelings that STDM checks encroachment

Regarding the extent to which STDM protects respondents from encroachment of land boundaries by neighbours, the majority constituting 70% said that STDM can partially protect their lands followed by 22% of the respondents who confirmed that they see STDM as not being capable to protect their lands while minority responded that STDM will fully protect their interest in land. The 22% of respondents were of the view that they would feel fully protected after they have fully completed their land registration processes therefore most of them still planning to begin registration after having their lands surveyed. Moreover, they were highly expectant of benefiting from social amenities such as water points, public toilets, bitumen streets and sewerage systems.

4.2.3 Conclusion: Sub-objective 1

From the findings above, majority of respondents were very confident of their tenure security in the next 5 to 15 years deriving such confidence from 1 document (written land agreement) they possessed. However, they never associated it to the STDM enumeration activity. This implies that STDM enumeration could not influence tenure security of respondents despite respondents being confident of possessing their lands in the near future. Again, results shows falling trend of land disputes which further enhances tenure security owing to effective local governance structures hence motivates respondents to undertake landed investments. It is worth noting that majority of respondents feeling partially protected against land disputes somewhat suggests STDM have positive influence on incidence of boundary disputes.

4.3 To ascertain the effect of STDM enumeration on land right holders' motivation to invest in land.

In connection with ascertaining the effect of STDM enumeration on land right holders' motivation to invest in land, it is appropriate to validate how land right holders perceive their tenure security by posing questions pertaining to the impact of STDM registration on land right holders' motivation to undertake investments in land presently and in future and the kind of people undertaking such investments.

4.3.1 Trends of present land-related investments and motivation to invest

4.3.1.1 Impact of STDM enumeration on House Extensions - Extension of Fence wall

Out of the 46 respondents interviewed, 89% constituting the majority had no form of fencing whereas 11% had secured their boundaries with some form of fencing while the remaining. Out of the 5 respondents who had fencing, 2 used plants while the remaining 3 used wooden planks. In addition, the 5 respondents undertook the construction in 1993 and 1998 which therefore stands to reason that the STDM enumeration had no influence on fence construction.

4.3.1.2 External wall construction

It is evident from the survey that out of the 46 respondents who ticked multiple answers, over half of the responded cases used mud only, followed by 43% who used combined burnt bricks and cement while 2% responded cases used a combination of wooden planks and mud for external wall construction (Table 4-6).

Description	Responses		Percentage of Cases(%)
	No	Percentage	
Mud only	31	52	67
Burnt bricks	3	5	7
Burnt bricks & Cement	20	33	43
Cement blocks	5	8	11
Wooden planks & Mud	1	2	2
Total	60	100	130

Table 4-6: Construction materials for external walls

4.3.1.3 Houses with extension since STDM enumeration and their building materials

It was revealed during the survey that there were 13 cases of respondents who undertook extensions on their existing property. These extensions involved building of new houses. Of these reported cases, extensions made from combination of burnt bricks and cement recorded 54% and extensions from mud only as well as cement blocks were the minority at 23% (Table 4-7).

Description	Responses	Percent of Cases(%)
	No.	
Mud only	3	23
Burnt bricks with cement	7	54
Cement blocks	3	23
Total	13	100

Table 4-7: Building materials of houses built after STDM enumeration

According to the respondents who used burnt bricks with cement and cement blocks, they undertook such extension because they were warned by municipal authority to upgrade their mud structures to permanent structures in order to keep their parcels. In connection with funding the extensions, all the 13 respondents who undertook extension funded it with their own income.



Figure 4-5: Photo showing house extensions done by land right holders

4.3.1.4 Linking house extension to tenure security from STDM

Out of the 15 respondents who undertook house extensions, 1 respondent attributed the extension to tenure security emanating from STDM enumeration while the remaining majority related the extension to other factors such as income, household size (Table 4-8), cost of building materials, age, educational level of respondents.

Description	Frequency	Percentage(%)
Yes	1	7
No	14	93
Total	15	100

Table 4-8: Relationship between house extensions and tenure security from STDM

4.3.1.5 Linking house extension to monthly income and household size

A bivariate analysis was done to explore relationships existing between house extensions and monthly income capacity of respondents. To this end, the spearman's rho analysis was used to ascertain the relationship between a dichotomous variable (i.e. House extensions as dependent variable) and ordinal variables (i.e. monthly income and household size as independent variables). From Table 4-9 , the correlation coefficient is negative (-) indicating negative relationship. Thus, the higher a respondent's income the less likely he will not extend his house whereas the lower ones income the more likely he will not extend his house. The correlation coefficient $r = 0.138$ implies a very weak negative relationship. This suggests that the richer a respondent, the less likely he would not extend his house but that other variables clearly influence whether he would extend his house or not. To assess if the test is significant, $P \leq 0.05$

however in connection with the table below the $\rho=0.371$ which implies that there is no significant relationship between monthly income of respondents and house extensions ($r(42) = -0.138, \rho = 0.371$).

From Table 4-9, the correlation coefficient shows positive relationship. Thus, the higher a household size the higher the house extension value and vice versa. The correlation coefficient $r = 0.153$ implies a very weak positive relationship. This suggests that the bigger the household size of a respondent, the more likely he would not extend his house but that other variables clearly influence whether he would extend his house or not. To assess if the test is significant, $\rho \leq 0.05$, however $\rho = 0.327$ which implies that there is not a significant relationship between household size of respondents and house extensions ($r(41) = 0.153, \rho = 0.327$).

			Extensions to house_2011?	Monthly Income bracket	Categorised household size
Spearman's rho	Extensions to house_2011?	Correlation Coefficient	1.000	-0.138	0.153
		Sig. (2-tailed)	.	0.371	0.327
		N	44	44	43
	Monthly income bracket	Correlation Coefficient	-0.138	1.000	0.049
		Sig. (2-tailed)	0.371	.	0.751
		N	44	46	44
	Categorised household size	Correlation Coefficient	0.153	0.049	1.000
		Sig. (2-tailed)	0.327	.751	.
		N	43	44	44

Table 4-9: Correlations between income/ household size and house extensions

4.3.2 Impact of STDM enumeration on Crop investments

4.3.2.1 Availability of Crop Investment

From the survey, almost two-thirds (2/3rd) of the respondents were engaged in crop farming. They cultivated crops either in their backyard gardens or distant farms. Out of the 30 respondents engaged in farming, the majority comprising those who farmed on backyard gardens formed 80% whereas the remaining 20% cultivated on distant farms (Table 4-10).

			Crops exist or not?	
Description			Yes	Total
Where are crops grown?	Backyard garden	Count	24	24
		% within crops exist or not?	80%	80%
	Farm	Count	6	6
		% within crops exist or not?	20%	20%
Total		Count	30	30
		% within crops exist or not?	100%	100%

Table 4-10: Cross tabulation of existence of crops and where crops are grown

4.3.2.2 Types and Year of Crop Cultivation

Out of 29 respondents engaged in farming, all the respondents were cultivating annual crops in their backyard gardens or farms with none of them cultivating crops lasting for two years or more. Annual crops grown comprises cassava, cocoyam, beans, garden eggs, pepper and groundnut. Moreover, these annual crops are grown on subsistence basis to cater for domestic purposes.

Out of 27 respondents involved in crop farming, it was found that substantial majority (23) were involved in annual crop farming before the pilot while the remaining minority (4) began cultivation from 2011. They said that the need to supplement their livelihood as well as the availability of arable lands necessitated the backyard farming activity.

4.3.2.3 Funding of crop investments

In relation to source of funding the crop farming activity, all the respondents who have undertaken crop farming said they funded it themselves. This is chiefly attributed to the low capital intensive nature of the activity therefore respondents finding it easy to engage in the activity. In connection with the productivity of their crop investments, the respondents found it difficult to explain as they cultivated the annual crops primarily for domestic consumption. Some of the respondents related higher productivity of their crop farming to favourable weather conditions, good soil, planting crops timely in their due season, application of fertilizer among others.

4.3.3 Impact of STDM enumeration on non-crop related investments

4.3.3.1 Existence and Types of non-crop related investment

Regarding investments in non-crop activity, over half of the respondents said they were involved in it while the approximately half were not undertaking the activity. The non-crop related investments respondents undertook includes rearing cattle, sheep and goats, poultry and commercial investments like store or table-top selling activity. It is evident from Table 4-11 that out of the 25 respondents who responded on the above issue there were 34 responses. Majority of the responses went in favour of poultry rearing, followed by 44% of the cases engaged in rearing of sheep /goats while the minority of the cases were selling in kiosk/store. This implies that poultry rearing is the major non-crop investments respondents undertake.

Description	Responses		Percentage of Cases(%)
	Freq.	Percent	
Cattle	5	15	20
Sheep/ Goat	11	32	44
Poultry	15	44	60
Store/ Kiosk	3	9	12
Total	34	100	136

Table 4-11: Categories of non-crop investments

4.3.3.2 Non-Crop investments since STDM enumeration

The table below presents non-crop related investments which respondents undertook since the STDM enumeration. It is observed from Table 4-12 that there were 13 responses obtained from the respondents. Majority of the responses were into sheep/goat rearing while minority were undertaking cattle and kiosk/store investment. This shows that sheep/goat rearing constituted the major non-crop investments respondents engaged in after the enumeration.

Description	Responses		Percentage of Cases(%)
	No	Percent	
Cattle	1	8	8
Sheep/ Goat	6	46	50
Poultry	5	38	42
Store/ Kiosk	1	8	8
Total	13	100	108

Table 4-12: Non-crop Investments since STDM enumeration

4.3.3.3 Funding Non-Crop related investments

Out of the 25 respondents who engaged in non-crop related investments, significant majority funded the investments themselves followed by 2 respondents who took informal loans whereas 1 respondent had funds via other support programmes. Respondents who took informal loans clarified that they took the loans from friends and relatives while the other support programmes included government support initiatives of boosting livestock production. According to the respondents they are not motivated to go for loans to undertake such investments due to the high bank interest rates and the fear of losing livestock to diseases.

On the issue of evaluation of productivity levels of those investments, out of the 22 respondents who responded, 14 were not able to explain the productivity levels of the investments while the remaining 8 respondents said that their productivity was increasing. They attributed the improvements in the investments to higher income, good feeding, timely diseases treatment, increasing births of female livestock among others. Respondents never related increasing productivity to security insured from STDM enumeration.

4.3.3.4 Linking non-crop related investments to monthly income

In the light of finding out which factors could lead to non-crop related investments, a bivariate analysis was done to explore if there exist any relationships between non-crop investment since STDM and monthly income capacity of respondents. To this end, the spearman's rho bivariate method of analysis was used to ascertain the relationship between a dichotomous variable (i.e. non-crop investment since STDM representing dependent variable) and ordinal variable (i.e. monthly income as independent variable).

From Table 4-13, the coefficient of the relationship is prefixed with negative (-) indicating a negative relationship. This means that, as the monthly income of the respondent increases more likely there would be non-crop investments and vice versa. The correlation coefficient $r = 0.023$ reveals a very weak negative relationship. This suggests that the richer a respondent, the more likely he would undertake non-crop investment but that other variables clearly influence whether he would engage in it or not.

To assess if the test is significant, $P \leq 0.05$ however in connection with the table below the $P = 0.913$ which implies that there is not a significant relationship between monthly income of respondents and non-crop investment since STDM. Therefore in conclusion, there is no significant relationship between monthly income and house extensions, $r(23) = -0.023$, $P = 0.913$.

		Investment since STDM?	Monthly income
Spearman's rho	Investment since STDM?	Correlation Coefficient	1.000
		Sig. (2-tailed)	-0.023
		N	0.913
	Monthly income	Correlation Coefficient	25
		Sig. (2-tailed)	-0.023
		N	0.913
			25
			46

Table 4-13: Correlations between Non-crop investment since STDM vs. Monthly Income

4.3.3.5 Linking non-crop investments to Household size

The spearman's rho bivariate analysis was used to ascertain the relationship between a dichotomous variable (i.e. non-crop investment since STDM as dependent variable) and ratio variable (i.e. household size as independent variable).

From Table 4-14, the coefficient of the relationship is non-prefixed indicating a positive relationship. This means that, as the household size of the respondent increases the higher the non-crop investment since STDM's value (i.e. $y=2$ which means no non-crop investment) while as the respondent's household size reduces the lower the value for non-crop investment since STDM (i.e. $y=1$ indicating the possibility of non-crop investment since STDM). The correlation coefficient $r = 0.080$ reveals a very weak positive relationship. This suggests that the bigger the household of a respondent, the more likely he would not undertake non-crop investment but that other variables clearly influence whether he would undertake non-crop investment or not.

To assess if the test is significant, $P \leq 0.05$ however from Table 4-14 ($P=0.711$) which implies that there is no significant relationship between household size of respondents and non-crop investment since STDM. Therefore in conclusion, there is no significant relationship between household size and non-crop investment since STDM, $r(22) = 0.080$, $P=0.711$.

		Investment since STDM?	Household size
Spearman's rho	Investment since STDM?	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	25
	Household size	Correlation Coefficient	0.080
		Sig. (2-tailed)	0.711
		N	24

Table 4-14: Correlations between Household size vs. Non-crop investment

4.3.4 Conclusion: Sub-objective 2-1

Regarding house extensions, it was found that STDM enumeration had no influence on the construction of fence wall and new houses. Results indicate that STDM enumeration was not a motivating factor hence further analysis proved a weak positive relationship with income and household size implying other factors like cost of building materials, age etc could play a role. Considering crop farming, it was revealed that STDM had no impact on crop farming. In connection with the productivity of crop investments, the respondents found it difficult to explain as they cultivated crops primarily for domestic consumption. Concerning non-crop investments, the study showed no relation between non-crop investment and tenure security from STDM, spearman rho bivariate analysis showed there is no significant relationship between household size/monthly income and non-crop investment. Respondents ascribed productivity of their investments to good feeding, timely diseases treatment, increasing births of female livestock among others.

4.3.5 To ascertain the effect of STDM enumeration on land right holders' motivation to invest in the future

Using Likert scale, questions were posed to land right holders about their intentions to invest in the short (next 5 years) and long term (next 10 years). The general thrust of these interview questions are to investigate whether STDM enumeration could be their source of motivation or other factors played a role.

4.3.5.1 Intention to invest in house extensions and crop investment in the Short term

Table 4-16 shows that majority of the respondents intend to extend their houses in 3-5 years. They cited their incapacity to extend in the shortest time to inadequate income but remained optimistic to extend their houses in 3-5 years while minority intends to extend in 1 year or has already done it. 15% will not extend due to inadequate space and low income.

Table 4-15 reveals that more than half of respondents have already done crop investments while minority had intentions of engaging in it in the next 3-5 years. Respondents who had no intentions to grow crops also assigned this to the non-availability of space as they resided on less than 50 ft x 50 ft plot size.

Description	Frequency	Percentage(%)
Will not do	7	15
3-5years	32	70
2-3years	3	7
1 year	2	4
Already done	2	4
Total	46	100

Table 4-16: Intention to invest in house extensions in next 5 years

Description	Frequency	Percentage(%)
Will not do	20	43
3-5years	1	2
Already done	25	54
Total	46	100

Table 4-15: Intention to invest in crop in next 5 years

4.3.5.2 Intention to invest in non-crop related investment in the Short term

Out of the 46 respondents, majority of the respondents had already undertaken the activity whereas minority were optimistic of engaging in non-crop investments in the next 2-3 years (Table 4-17). Those who will not do non-crop investments said they had meagre plot size and low income.

Description	Frequency	Percentage(%)
Will not do	19	41
3-5years	5	11
2-3years	2	4
Already done	20	43
Total	46	100

Table 4-17: Intention to invest in non-crop in next 5 years

4.3.5.3 Linking Intentions of investing in House extensions in the Short term to Income

Spearman's rho bivariate method of analysis was used to ascertain the relationship between intention to extend house in the short term as dependent variable and monthly income as independent variable which are both ordinal variables. From Table 4-18, the correlation coefficient being negative (-) implies a negative relationship. Thus, respondents with higher monthly income intends to extend in 1 or 2 years while lower income earners intend extending in 3-5 years time. The correlation coefficient $r = 0.063$ shows a very weak negative relationship. This suggests that the richer a respondent, the more likely he intends extending in the shortest possible time however other variables clearly influence whether he would do that or not.

To assess if the test is significant, $P \leq 0.05$, however in connection with Table 4-18 the $P = 0.679$ which implies that there is no significant relationship between both variables (i.e. $r(44) = -0.063$, $P = 0.679$).

			House extension in 5yrs	Monthly Income
Spearman's rho	House extension in 5yrs	Correlation Coefficient	1.000	-0.063
		Sig. (2-tailed)	.	0.679
		N	46	46
	Monthly income	Correlation Coefficient	-0.063	1.000
		Sig. (2-tailed)	0.679	.
		N	46	46

Table 4-18: Correlations between Intention to extend House in 5 years and Monthly Income

4.3.5.4 Linking intentions of investing in House Extensions in the short term to Age

By exploring the relationship existing between intention to undertake house extensions (as dependent variable) to age (as independent variable) of respondents, Figure 4-6 shows that in respect of respondents who intend investing in the next 3-5 years, 83% forming the majority fall within the age category 20-40 years. Again in respect of those who will not invest, majority fall in the age category of 61 years and above while in regards to those who have already invested majority fall within 20-40 years. Also in connection with respondents who plan investing in the next 2-3 years, age category 61 years and above form the highest. This signifies that the adults have ambitions of bracing themselves well for the future by investing in the latter stage of short term while the aged category of 61 and above feel very responsible to engage in house extension activity within 1-3 years as they are ageing.

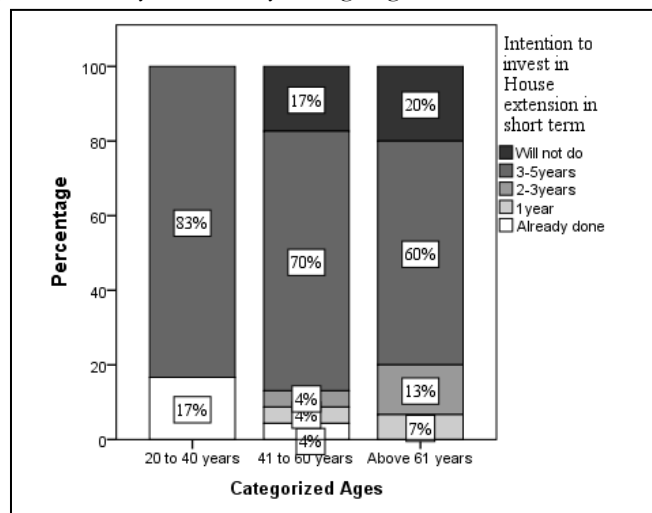


Figure 4-6: Impact of Age on intentions to invest in 5 years

4.3.5.5 Intention to invest in house extensions and crop investment in the long term (next 10 years)

In connection with respondents' intentions of extending their house in the long term, majority said that they were planning to extend their houses in the next 9-10 years followed by 7% of the respondents intending to do that in the next 6 years while minority had no intentions of extending their houses as shown in Table 4-19. Table 4-20 also shows that about half constituting the majority said that they will not do it or they have already undertaken crop farming whereas the minority forming 2% intend doing that in the next 6 years.

Description	Frequency	Percentage(%)
Will not do	7	15
9-10years	36	78
6years	3	7
Total	46	100

Table 4-19: Intention to invest in house extensions in 10 years

Description	Frequency	Percentage(%)
Will not do	21	46
9-10years	3	7
6years	1	2
Already done	21	46
Total	46	100

Table 4-20: Intention to invest in crop in 10 years

Out of the 46 respondents who responded on their intentions to carry out non-crop investments in the long term, majority intended to undertake it in the next 9-10 years, followed closely by 37% who had no plans of undertaking such activity while 17% of the respondents had already undertaken such activity. In addition, 4% were optimistic of engaging in non-crop investments in the next 6 years and 2% forming the minority planned to do that in the next 7-8 years (Table 4-21). Non-availability of space is the contributing factor for the majority falling in the category of not planning to invest in non-crop investment in the long term.

Description	Frequency	Percentage(%)
Will not do	17	37
9-10years	18	39
7-8years	1	2
6years	2	4
Already done	8	17
Total	46	100

Table 4-21: Intention to invest in non-crop in 10 years

4.3.5.7 Linking intentions of investing in House extensions in the long term to Age distribution

In exploring the relationship existing between intention to undertake house extensions in the long term (as dependent variable) to age (as independent variable) of respondents, Figure 4-7 shows clearly that respondents falling within the age category 20-40 years constitutes the majority in respect of respondents who have intentions of undertaking house extensions in 9-10 years while the aged category recorded the minimum percentage. This stems from the fact that respondents in this age category feel they have more years ahead of them to engage in such activity. Considering respondents who do not have plans of engaging in house extensions in the long term, 20% of the respondents fall within the aged category of 61 years and above. This percentage is not strange but expected as the aged category have already undertaken such investments in the past years.

Moreover, the aged category know for certain that they will eventually retire therefore the need to invest in the earliest portions of the long term span. Regarding respondents who have intentions to undertake house extensions in the next 6 years, the majority fall within the 41-60 years category with the minimum falling in the aged category.

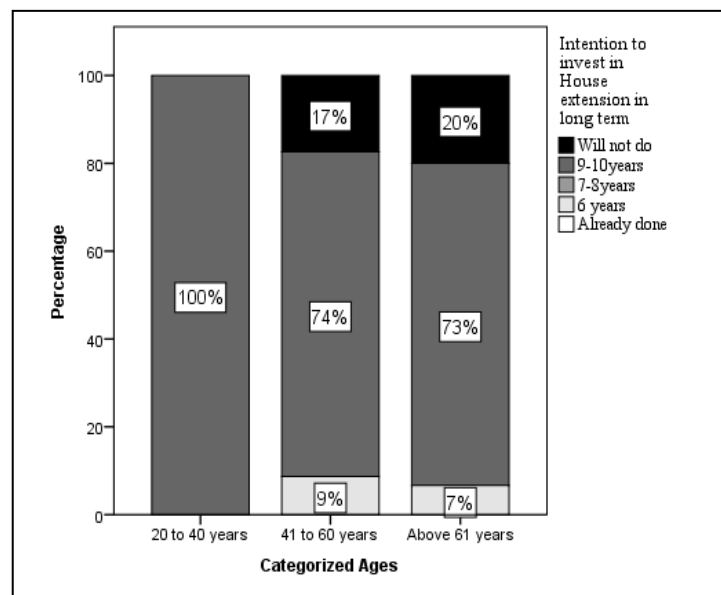


Figure 4-7: Impact of Age on intentions to invest in house extensions in 10 years

4.3.5.8 Linking Intentions of investing in House extensions in the Long term to Income

Figure 4-8 was used to explore the relationship existing between intention to undertake house extensions (as dependent variable) to monthly income (independent variable) of respondents. The figure reveals that respondents falling within the monthly income categories 200,001 to 250,000 and 500,001 to 700,000 Uganda Shillings constitutes the majority in respect of respondents who intend investing in the next 9-10 years while the majority who intend to invest in the next 6 years fall in the income category of 100,001 to 150,000 Shillings. Moreover, in connection with respondents who will not extend their house, the highest recorded are found in the 700,000 and above and 150,000 to 200,000 Shillings monthly income category. This implies that the richer intends to invest in house extensions in the next 9-10 years which means they can have ample time to raise more revenue to build new burnt brick houses.

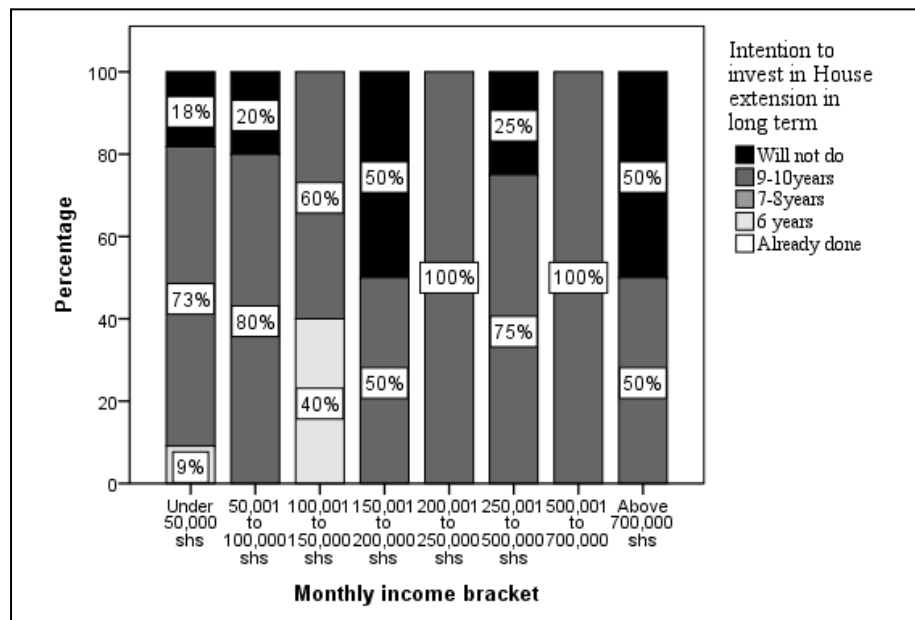


Figure 4-8: Impact of Income on intentions to invest in house extensions in 10 years

4.3.5.9 Investment with or without STDM

When the respondents were interviewed on whether they will go ahead to invest had STDM enumeration not occurred, substantial majority were of the view that they will still go ahead to undertake any form of land-related investments while 9% of the respondents said they will not invest without the STDM enumeration (Table 4-22). Moreover, 16% of the respondents were undecided as to what they will do. According to the majority group, they possess written agreements as proof of their ownership and plans to have them surveyed and registered. And the minority related their position to inadequate space and income to undertake such land-related investments in the future.

Description	Frequency	Percentage(%)
Will not invest without STDM	4	9
Do not know	7	16
Will invest without STDM	34	76
Total	45	100

Table 4-22: Intention to invest without STDM

4.3.6 Conclusion: Sub-objective 2-2

With respect to respondents planning to invest in the short term, results reveal that significant number intend to extend their houses in 3-5 years and nearly half had no intentions to undertake crop and non-crop investments since they have already done it. Moreover, majority responded that they will still go ahead to invest in future without STDM enumeration. Socioeconomic factors like income were not having significant impact on intentions to invest in short term however the contrast happened in regards to age.

Regarding respondents intending to invest in the long term, results indicate that both income and age had influence on respondents' intentions while other socioeconomic factors like education, occupation, succession of household head could not be investigated into.

4.3.7 Type of people investing in land after STDM

In order to find out whether indigenes or immigrants undertook the current land improvements regarding buildings in Mission, questions were asked such as year of respondents acquiring land parcels, mode of land acquisition and their migration status.

4.3.7.1 Year of Land Acquisition and Reason for Migration

From Table 4-23, out of 39 respondents, majority confirmed that they acquired their properties before year 2000 then followed by 10% who acquired in it from year 2000 to 2010 while the remaining minority obtained it since the STDM enumeration. Which implies that the trend of investment after STDM in Mission is less influenced by immigrants.

Description	Frequency	Percentage(%)
Up to 2000	33	85
Year 2001-2010	4	10
Year 2011-2015	2	5
Total	39	100

Table 4-23: Categorized year for land acquisition

From Figure 4-9, it is observed that majority of respondents comprising 46% and 7% from both districts migrated to Mission in search of better education and social amenities whereas the minority forming 20% and 2% of Sironko and Mbale indigenes respectively assigned their reasons to marriage.

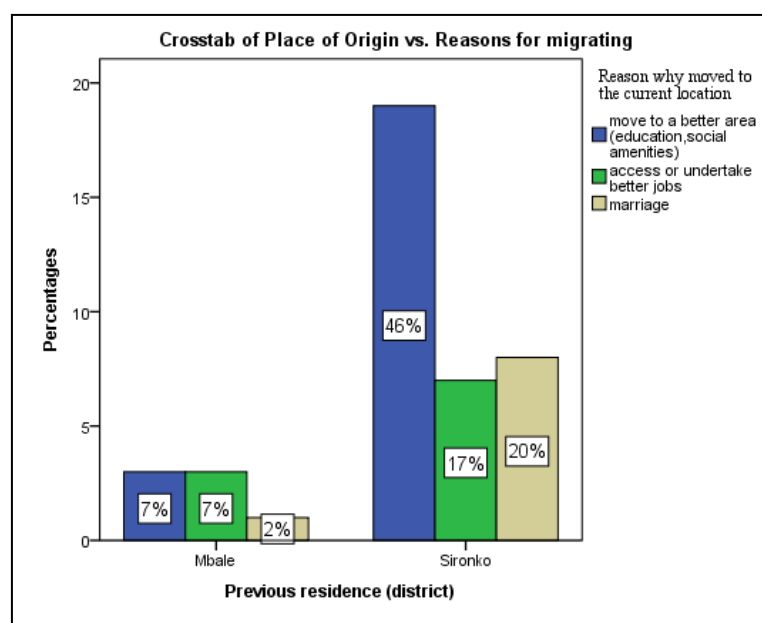


Figure 4-9: Cross tabulation of Place of Origin and Reasons for Migrating

4.3.7.2 Mode of Land Acquisition

From the cross tabulation presented in Figure 4-10, the majority of respondents who acquired land through outright purchase amounted to 72% who fell in the year category since year 2000 with the minority 5% falling in the year category of 2011 to 2015. While the majority 13% of respondents who acquired landed properties through family inheritance fell in the year 1936 to 2000 category with the minority 3% of respondents pegged at 2001 -2010 year category.

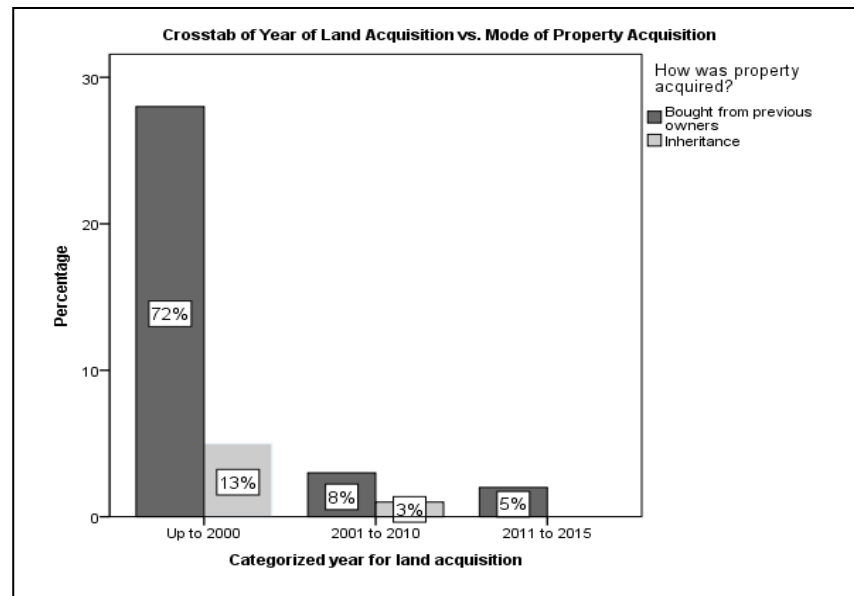


Figure 4-10: Cross tabulation of Land Acquisition and Mode of Property Acquisition

4.3.8 Conclusion: Sub-objective 2.3

In respect of how and when respondents acquired their lands, it was found that nearly all the respondents acquired their properties through purchase before year 2010 which implies that the trend of investment taking place after the pilot is less influenced by immigrants. It therefore stands to reason that the STDM enumeration did not attract many immigrants to undertake investments in Mission however few people migrated to the area due to urbanization of Mbale township.

4.4 To assess changes in the spatial patterns of land use and whether it can be linked to the STDM pilot

The previous section presented results and findings pertaining to how land right holders perceived their tenure security and effect of the STDM enumeration on their motivation to invest in land. This section is meant to explore the extent of spatial changes that occurred in different land uses for the periods of 2011 and 2014. In addition, finding out the connection between these spatial changes and the STDM enumeration shall be done.

4.4.1 Determining the extent of different land uses in the study area in 2011

In regards to determining the extent of different land uses in 2011, Table 4-24 presents results of the quantitative analysis of the 3 different land use classifications.

Description	Land size(sq.m)	Percentage (%)
Built-up parcels	25,572	16%
Roads parcels	9,856	6%
Undeveloped parcels	122,017	78%
Total	157,419	100%

Table 4-24: Extent of land uses_2011

It is observed from Table 4-24 that out of the 157,419 square metres land size of Mission study area, undeveloped parcels form the majority at 78%. This is followed by the built-up parcels constituting 16% while road parcels form the minority at 6%. The graphical illustration of built-up parcels, roads parcels and undeveloped parcels are clearly shown in Figure 4-11.

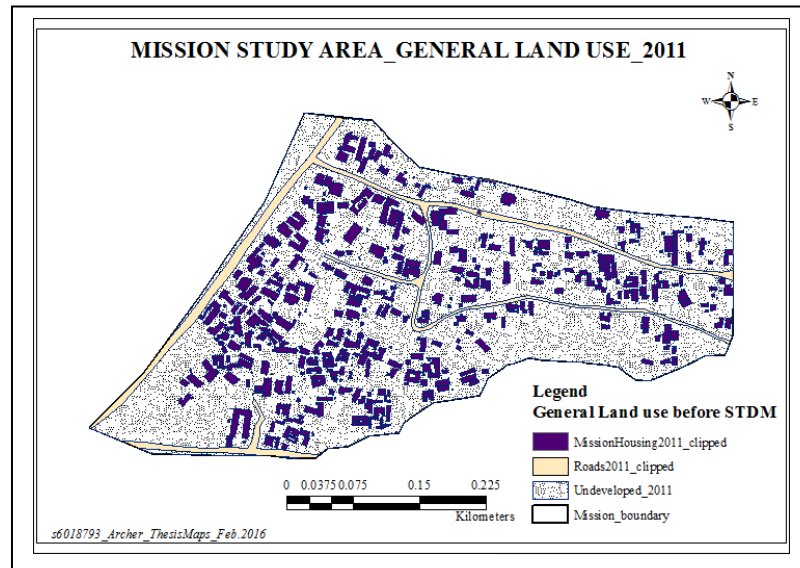


Figure 4-11: General Land Use Map of 2011

4.4.2 Determining the extent of different land uses in the study area in 2014

In relation to determining the extent of different land uses after the STDM enumeration in 2014, the quantitative analysis of the different land use classifications is shown in Table 4-25.

Description	Land size(sq.m)	Percentage(%)
Built-up parcels	29,975	19%
Roads parcels	12,594	8%
Undeveloped parcels	115,032	73%
Total	157,419	100%

Table 4-25: Extent of land uses_2014

In the table above the results indicates that undeveloped parcels still forms the majority at 73% of the total land size while the roads parcels constituted the minority at 8%. The built-up parcels, roads parcels and undeveloped parcels are depicted graphically by Figure 4-12.

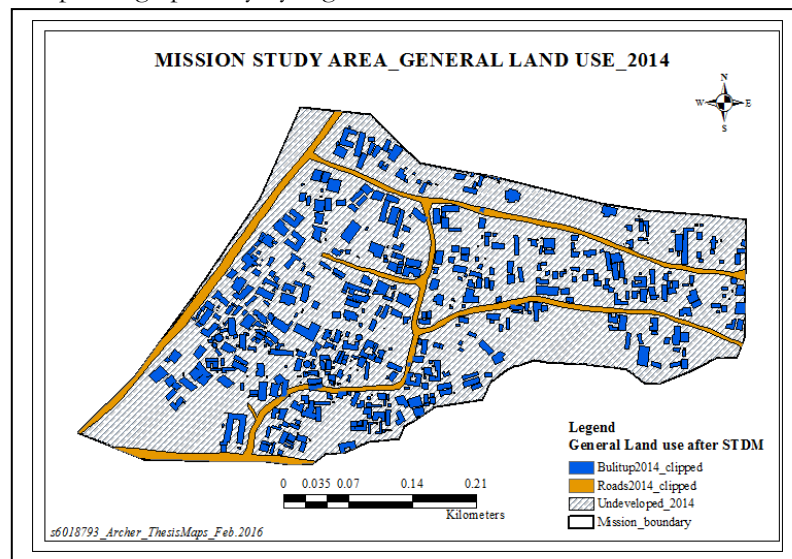


Figure 4-12: General Land Use Map of 2014

4.4.3 Spatial Changes in Land Uses between 2011 & 2014 and its linkage to STDM

Land use change detection maps were generated for the 3 different classifications and the quantitative analysis are summarized in the table below.

Description	Land size(sq.m) 2014	Land size(sq.m) 2011	Resultant Change (Change Detection)
Built-up parcels	29,975	25,572	4,403
Roads parcels	12,594	9,856	2,767
Undeveloped parcels	115,032	122,017	-7,014
Total	157,419	157,419	

Table 4-26: Quantitative analysis of Resultant Changes in 3 classes

As depicted by Table 4-26 extent of built-up parcel and roads parcel increased whereas undeveloped parcels size decreased. Regarding built-up parcels there is an increase of 4,403 square metres from 25,572 square metres as well as road parcels which increase in extent by 2,767 square metres to 12,594 in year 2014. However, with respect to undeveloped parcels land size decreased from 122,017 square metres to 115,032 square metres.

Figures 4-13 & 4-14 graphically illustrates the change detection maps for built-up parcels, roads parcels and undeveloped parcels. In terms of linking these increase in land changes to STDM enumeration, it was obtained during the interviews that the road was obtained on the wheels of the STDM pilot but the increase in built-up has already been linked to other factors like higher income and smaller household size (subsection 4.3.1.5) although not quite significant other than influence from STDM enumeration.

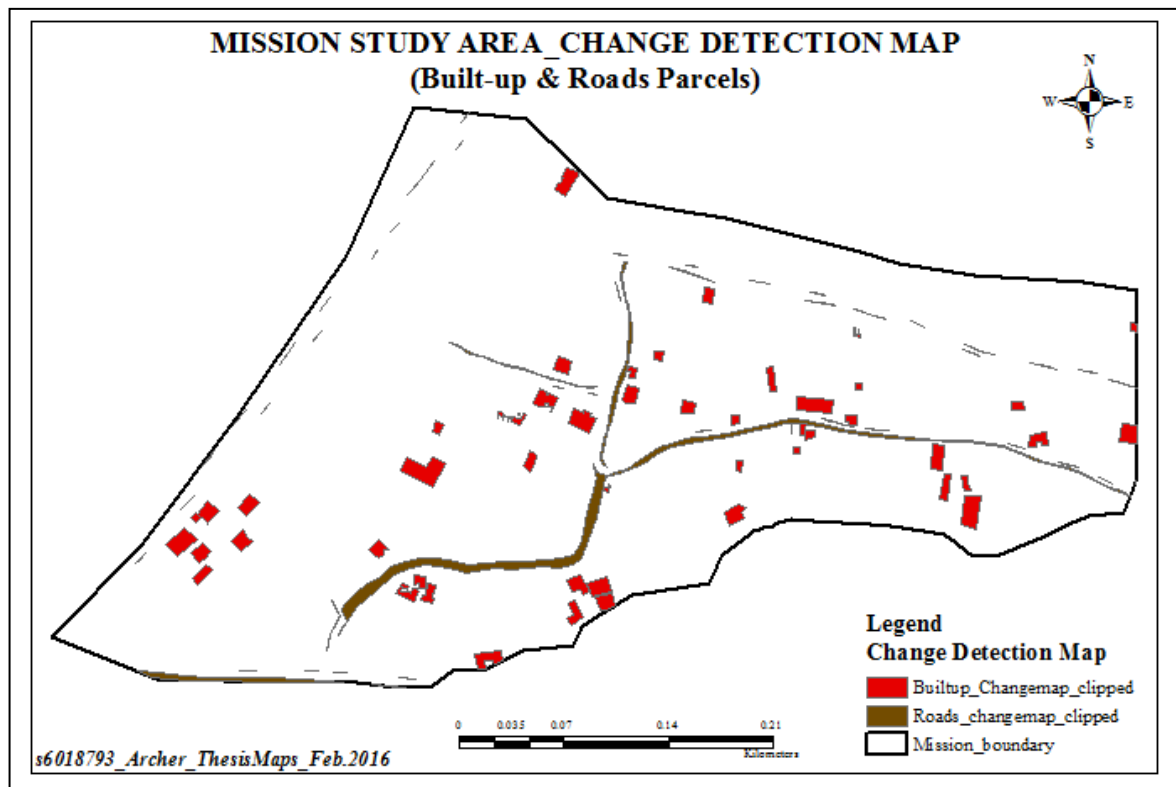


Figure 4-13: Change Detection Maps of Built-up and Roads parcels

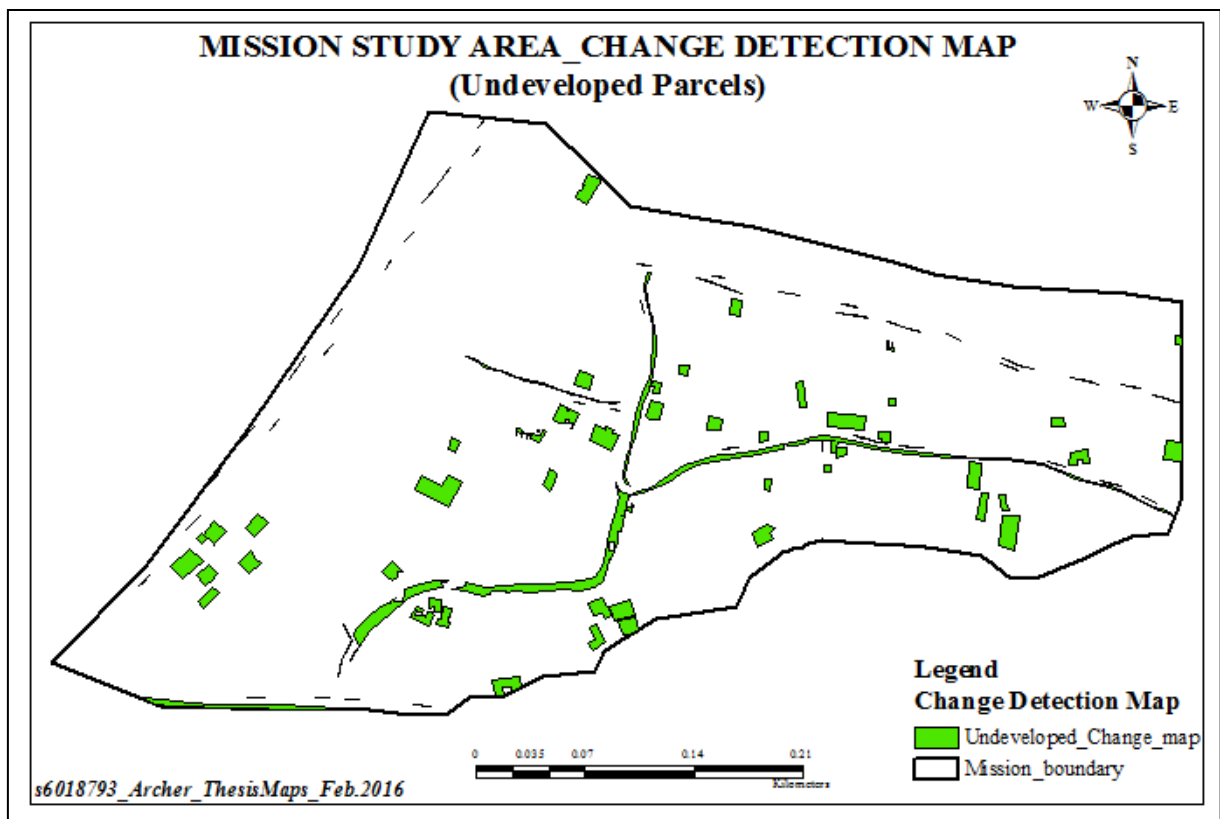


Figure 4-14: Change Detection Map of Undeveloped parcels

4.5 Conclusion - Objective 3

Juxtaposing land use maps of 2011 with 2014 indicates clearly that built-up parcels and roads parcels increased by 17% and 28% respectively at the expense of undeveloped parcels which reduced by 6%. A close analysis of spatial patterns shows that a majority of the new structures are sited scattered in the central and south-eastern portions of Mission while there are few pockets clustered in the south-western outskirts. In terms of linking these increase in land changes to STDM, it was confirmed during the interviews that the road was obtained as a result of the STDM enumeration but the increase in built-up has already been linked to higher income (subsections 4.3.1.5, 4.3.1.6) and smaller household size (subsection 4.3.1.7) albeit their low significance.

4.6 Concluding Remarks

The chapter sought to present results obtained from fieldwork data collection in accordance with the research questions. With regards to how respondents perceive their tenure security after the STDM enumeration, *Section 4.2* concluded that STDM enumeration could not influence tenure security of respondents but had positive influence on incidence of boundary disputes while in respect of assessing trends of present land investments *Section 4.3* also confirms that STDM similarly had no influence on extension of houses, crop investments and non-crop related investments. However, conclusion drawn in *Section 4.5* reveals that STDM led to increase in road parcels hence achieving the purpose for the STDM pilot in Mbale. In the subsequent chapter, the study will provide comprehensive discussion of the results viz-z-viz relevant scientific literature.

5. DISCUSSION

5.1 Introduction

This chapter discusses in-depth the findings presented in Chapter 4 viz-a-viz existing scientific literature. The first part juxtaposes perception of tenure security and status of land disputes at Mission study area against the position of literature on indicators of tenure security. The second part presents further discussion in respect of the impact of STDM enumeration on investment in land (*Section 5.3*) and the final part also discusses spatial changes in land uses between 2011 & 2014 and its linkage to STDM (*Section 5.4*).

5.2 Impact of STDM enumeration on Tenure Security

5.2.1 Perception of Tenure Security

The hypothesis that land right holders would feel more secured about their tenure security after the pilot was tested here. Thus, the subjective element of tenure security dealing with landholder' perception about security of rights noted by Kanji, Cotula, Hilhorst, Toulmin, & Written (2005) was assessed. Specifically, fear of eviction which is the strongest determinant of perceived tenure security was measured (Dekker, 2003; Van Gelder, 2009).

Results indicate that majority of respondents were very confident of their tenure security in the next 5 and 15 years, however, they did not relate it to STDM enumeration but to their written land agreement. Compared with study by (Belay, 2010) in five villages in Amhara region of Ethiopia about how 100 sampled households perceive land rights security after a rural land certification programme, the results revealed that majority of the respondents were confident of still holding onto their lands. However, the increase in tenure security in Amhara can be attributed to the fact that the objective of the land certification programme was to promote tenure security to the rural community compared to the purpose of STDM enumeration in Mbale which was to support infrastructure development rather than enhance tenure security. Hence, land right holders in Mbale ascribing their feeling of secured tenure to written agreements hoping that should any land expropriation take place they stand the chance to receive some form of compensation.

Discussing the positive aspects of state of land tenure security of rural poor after land tenure regularization in Kabushinge cell in Musanze district of Rwanda by Simbizi et al. (2015), they noted that the rural poor are confident that their land rights can be protected whenever challenged. This is based on the issuance of land certificates backed by existing laws and land governance institutions which were in place. This reason, however, differs from results of this study as respondents had not yet received their certificates perhaps majority attributing their higher tenure security to possession of written agreements. It therefore stands to reason that as land right holders perceive higher tenure security this may influence their intentions to undertake land-related investments.

5.2.2 Nature of Land-related disputes

It is always anticipated that an immediate benefit of STDM enumeration or land certification programmes will lead to reduction of land disputes. As observed by Feder & Nishio (1998), tenure security is believed to mitigate land disputes among other benefits.

Results confirm that majority of the respondents did not encounter land disputes at all and out of the 10 respondents who faced disputes, half experienced it before the STDM enumeration. This indicates that land-related disputes are declining compared with 4 years after the enumeration. This result was strengthened by evidence from Local Council Courts showing falling trend of cases since the STDM

enumeration (Figure 4-3) and majority of respondents feeling partially protected against land disputes. This result is consistent with findings of (Holden & Deininger, 2007) to the effect that 66% of respondents in Tigray and Amhara regions of Ethiopia confirmed that land disputes reduced after certification. In the same vein, similar studies conducted by Simbizi et al. (2015) in Musanze district of Rwanda shows a reduction of land conflicts over a period of 5 years since the issuance of land certificates. That notwithstanding, with respect to this study, the reduction is attributed to existence of well-functioning decentralized local governance structure and move by land right holders to demarcate their boundaries owing to sensitization during the pilot. Boundary disputes is the highest recorded land dispute according to the respondents which is similar to study by (Holden, Deininger, & Ghebru, 2009; Belay, 2010). This can therefore be attributed to the interest of respondents who need more land to undertake land-related investments.

Moreover, in regards to medium of dispute resolution, it was evident that a significant number of the cases were sent to Local Council Courts for redress as against resorting to family. This contradicts findings by (Rahmato, 2009) in two villages of Dessie Zuria district in Ethiopia where she found that majority of respondents were willing to take their land disputes first to the community leaders while the local courts was the third option. This is due to the preference for informal institutions for resolving dispute rather than the courts. Therefore, with land disputes declining owing to other factors other than STDM enumeration, tenure security of land right holders is enhanced thereby will influence their intentions to invest more in land.

5.3 Impact of STDM enumeration on investment in land

5.3.1 Trends of present land-related investment and motivation to invest

Various studies points to the fact that investments are influenced greatly by tenure security emanating from titling or land certification programmes (Salas, Knight & Saenz, 1970; Moor, 1996; Bazaglu, Sietchiping, Mboup, & Augustinus, 2011). Hence the hypothesis to be tested that trend of present investments were motivated by STDM enumeration or other factors such as household size, income. The types of land-related investments considered here were extensions to buildings, crop and non-crop related investments. Results obtained were quite mixed.

In the case of house extensions, it was found that STDM enumeration had no influence on the construction of fence wall which contravenes study by (Belay, 2010) who found in Amhara (Ethiopia) that 92% of respondents fenced their farmlands. This difference is attributed to farming being the main occupation of respondents of the former as compared to majority being self-employed artisans and transport operators in this study. Section 4.3.1.4 showed that STDM enumeration was not a motivating factor hence further analysis proved a weak positive relationship with income implying the richer a respondent the more likely he extended his building as well as weak negative relationship with household size however both relationship were not significant. That means that other factors like cost of building materials, pressure from city authorities for respondents to upgrade their houses, age, educational level of respondents which this study could not investigate into could play a role.

Regarding crop farming, it was evident that majority of respondents cultivated annual crops on subsistence basis and that it can be deduced from Section 4.3.2 that STDM had no impact on crop farming. Juxtaposing this study with similar studies shows that while no respondent grows tree plants in this study, findings by (Simbizi et al., 2015; Belay, 2010) indicate 54.4% and 89% invested in tree planting respectively. Perhaps this could be ascribed to the small backyard farming 24 out of 30 farmers of this study engaged in compared with large farmlands farmers cultivated in the comparable studies. In

connection with the productivity of crop investments, the respondents found it difficult to explain as they cultivated crops primarily for domestic consumption. However, in the case of (Belay, 2010) who conducted a study in Amhara (Ethiopia), 55% responded there was no significant change in productivity after certification. Again, the study by (Belay, 2010) confirms responses from land right holders of this study to the effect that high farm productivity depends largely on favourable weather conditions, good soil, price of agricultural inputs such as fertilizer, improved seeds among others.

Concerning non-crop investments, no respondent engaged in compost preparation which contradicts other studies such as 90% and 82% of respondents involved in compost preparation and terracing respectively (Belay, 2010) as well as 32.5% and 85.2% engaged in terracing and anti-erosion structure (Simbizi et al., 2015). The variation is attributed to degradation (via soil erosion, gully formation etc) which is worse in the highlands constituting 95% of Ethiopia's cultivated area caused by steep terrain slope, tropical rain and bad agricultural practices hence farmers focussing more on soil conservation and soil fertility restoration practices whereas respondents in this study cultivated on flat topography.

Upon the study revealing no relation between non-crop investment and tenure security from STDM, bivariate analysis showed there is no significant relationship between household size/monthly income and non-crop investment. A case study evidence of Musanze district of Rwanda by (Simbizi et al., 2015) points to similar direction who found that there was not significant relationship between household with certificate and investments in terracing. Respondents of this study ascribed productivity of their investments to good feeding, timely diseases treatment, increasing births of female livestock among others.

5.3.2 Motivation to invest in the future

The hypothesis to be tested is that enhanced tenure security from STDM and other socioeconomic characteristics will propel land right holders to invest in the next 5 to 10 years.

In the next 5 years, results reveal that significant number intend to extend their houses in 3-5 years and nearly half had no intentions to undertake crop and non-crop investments since they have already done it. Moreover, majority responded that they will still go ahead to invest in future without STDM enumeration. This departs from a study by (Belay, 2010) in Amhara who found that despite the feeling of secured tenure arising from certification and the willingness to invest, respondents were constrained by high prices of agricultural inputs and shortage of rainfall. Hence, this departure is related to respondents feeling more secured after the certification compared to respondents of this study whose security stem from written land agreement evidencing land transaction between vendors and purchasers.

Consequently the next task was to find out if socioeconomic factors like income and age could influence their decision to invest. In terms of income, there is a weak negative relationship implying the richer a respondent the more likely he intends investing in 1 or 2 years and vice versa. However, there isn't a significant relationship meaning other factors could influence the relationship better. In respect of age, respondents from 20-40 years recorded the majority who intend invest in next 3-5 years implying that the young adults have ambitions of bracing themselves well for the future by investing in the latter stage of short term, hence age having an impact.

In the next 10 years, findings show that majority intend to undertake non-crop investment and extend their houses in 9-10 years while in relation to undertaking crop farming the majority said they will not do it (Tables 4.3.5.5 & 4.3.5.6). Moreover, majority responded that they will still go ahead to invest in future without STDM enumeration. Exploring the impact of age on intentions to extend house, age category 20-40 years recorded the highest percentage who intend extending houses in 9-10 years. In the case of

income, 500,001 to 700,000 UGS monthly income category constitutes the majority in respect of respondents who intend investing in the next 9-10 years while the 100,001 to 150,000 UGS category forms majority who intend to invest in the next 6 years implying the richer intends seeking ample time to raise more revenue to build permanent structures. However, this study could not investigate into the impact of other socioeconomic factors like education, occupation, succession of household head on intentions to undertake investments in future.

5.3.3 Migration as motivating factor

The hypothesis to be tested is that immigration will influence land investment activities in the study area. In respect of how and when respondents acquired their lands, it was found that nearly all the respondents acquired their properties through purchase before year 2010 with the minority acquiring through inheritance before year 2000 (Figure 4.3.7). It implies that the trend of investment taking place after the enumeration is less influenced by immigrants.

It can therefore be deduced that the enumeration did not attract many immigrants to undertake investments at Mission but few immigrants engaged in land-related investments due to urbanization of Mbale township, affordable land prices of such peri-urban area among other factors.

5.4 Changes in the spatial patterns of land use between 2011 and 2014 and whether it can be linked to the STDM enumeration

In general, the total land size had increased in respect of built-up and roads since 2011 while the undeveloped land size decreased. In connection with built-up parcels, Table 4-26 shows a detected change of 4,403 square metres land size since STDM enumeration. This finding is consistent with results found in Rwanda by (Fosudo, Bennett, & Zevenbergen, 2014) to the effect that total built parcels increased from 67.1 hectares before the 2008 Land Title Regularization program to 332.4 hectares parcels after the program.

A close analysis of the spatial patterns shows that majority of the new structures are sited scattered in the central and south-eastern portions of Mission while there are few pockets clustered in the south-western outskirts. An explanation to the increment in built-up land size is that old land right holders have extended or built new houses however these extensions were not influenced at all by the STDM enumeration. Moreover, a change of 2,767 m² land size is detected for road parcels since the enumeration in 2011. This is attributed to the construction of a new street from the south-western part to the old street in the central part of the study area as well as the expansion of the old streets. According to the respondents, this new street has been one of the success stories of the enumeration in respect of helping them to acquire social amenities. However, in respect of undeveloped lands there was a reduction in land size of 7,014 square metres since the enumeration which coincides with results found in Rwanda by (Fosudo, Bennett, & Zevenbergen, 2014) to the effect that vacant parcels decreased from 457.5 hectares to 354.5 hectares. This is expected as increment of built-up parcels (4,403m²) and road parcels (2,767m²) occurred at the expense of undeveloped parcels because increases in the former land uses takes portions of the 2011 undeveloped lands. Consequently, it is obvious that land parcels for infrastructure development increased for instance in respect of roads which means that the objectives for the STDM pilot was realized.

6. CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

The previous chapter discussed the perception of tenure security, investments with its underlying motivation factors as well as spatial changes in land use alongside with contemporary literature. This chapter presents summary answers to the research questions of the sub-objectives (1.5 & 1.6) and general objective of the study together with recommendations for further research.

6.2 Conclusions

6.2.1 Sub-objective 1: To find out how land right holders perceive their tenure security before and after the STDM enumeration.

a) *What is the perception/feeling of land right holders about tenure security after the STDM enumeration?*

The result shows that majority of respondents were very confident of their tenure security in the next 5 to 15 years however they did not associate it to the STDM enumeration activity. Rather they related such confidence to the written land agreement they possessed. Hence, STDM enumeration could not influence tenure security of respondents despite respondents being confident of possessing their lands in the near future.

b) *What is the status and trend of land-related disputes in the study area after the enumeration?*

Results indicate falling trend of land disputes which further enhances tenure security owing to effective local governance structures hence motivates respondents to undertake investments in land. It is worth noting that majority of respondents feeling partially protected against land disputes somewhat suggests STDM have positive influence on incidence of boundary disputes.

6.2.2 Sub-objective 2: To ascertain the effect of STDM registration on land right holders' motivation to invest in land

1) *What motivates the land right holders decision-making to invest in land presently?*

Considering house extensions, it was found that STDM enumeration had no influence on the construction of fence wall and new houses. Moreover, further analysis proved a weak positive relationship with income and household size that means other factors like cost of building materials, age etc could have an influence. With regard to crop farming, it was revealed that STDM had no impact on crop farming. In connection with the productivity of crop investments, the respondents found it difficult to explain as they cultivated crops primarily for domestic consumption. Concerning non-crop investments, the study showed no relation between non-crop investment and tenure security from STDM and bivariate analysis also showed there is no significant relationship between household size/monthly income and non-crop investment. Respondents ascribed productivity of their investments to good feeding, timely diseases treatment, increasing births of female livestock among others.

2) *What motivates land right holders to invest in their land in future?*

With respect to respondents planning to invest in the short term, results reveal that significant number intend to extend their houses in 3-5 years and nearly half had no intentions to undertake crop and non-crop investments since they have already done it. Moreover, majority responded that they will still go ahead to invest in future without STDM enumeration. Socioeconomic factors like income were not having significant impact on intentions to invest in short term however the contrast happened with regards to age. In connection with respondents intending to invest in the long term, results indicate that both income and age had influence on respondents' intentions while other socioeconomic factors like education, occupation, succession of household head could not be investigated into.

3) *Who are the people investing in the land?*

In respect of how and when respondents acquired their lands, it was found that nearly all the respondents acquired their properties through purchase before year 2010 with the minority acquiring through inheritance before year 2000 (Figure 4.3.7). It implies that the trend of investment taking place after the enumeration is less influenced by immigrants. It can therefore be deduced that the enumeration did not attract many immigrants to undertake investments at Mission but few immigrants engaged in land-related investments due to urbanization of Mbale township, affordable land prices of such peri-urban area among other factors.

6.2.3 Sub-objective 3: To assess changes in the spatial patterns of land use and whether it can be linked to the STDM enumeration.

1) *What was the extent of different land use classes in the study area in 2011?*

Quantitative analysis of the three (3) land use classifications of 2011 shows that out of 157,419 m² land size of Mission study area, undeveloped parcels form the majority at 78% followed by built-up parcels constituting 16% while road parcels form the minority at 6%.

2) *What is the extent of different land use classes in the study area in 2014 after the STDM enumeration?*

Quantitative analysis of the three (3) land use classifications after the pilot shows that out of the 157,419 m² land size of Mission study area, undeveloped parcels constituted the majority at 73% of the total land size followed by built-up parcels forming 19% while roads parcels constituted the minority at 8%.

3) *What are the changes in spatial patterns of land use and whether it can be linked to the enumeration?*

From data obtained in relation to change occurring in land uses, it is clear that total land size increased in respect of built-up and roads since 2011 while undeveloped land size decreased. In terms of land size, built-up parcels recorded largest size of 4,403m² while 2,767 m² land size is detected for road parcels since the enumeration. However, in respect of undeveloped lands there was a reduction in land size of 7,014 m² since the enumeration. This is expected as increment of built-up (4,403m²) and road parcels (2,767m²) happens at the expense of undeveloped parcels because increases in the former land uses takes portions of the 2011 undeveloped lands. In addition, a close analysis of spatial patterns shows that a majority of the new structures are sited scattered in the central and south-eastern portions of Mission while there are few pockets clustered in the south-western outskirts. In terms of linking these increase in land changes to STDM, it was confirmed during the interviews that the road was obtained as a result of the STDM enumeration but the increase in built-up has already been linked to higher income and smaller household size (subsection 4.3.1.5) albeit their low significance.

6.3 General Conclusion

The study touched on how land right holders feel about their tenure security after the STDM enumeration. Results indicate that STDM enumeration could not influence tenure security of respondents despite respondents being confident of holding onto their lands in the near future. Respondents rather related their confidence to written agreements hence STDM enumeration did not have any positive effect on feeling of enhanced tenure security among land right holders.

Two different pictures were realized in connection with the impact of STDM enumeration on incidence of land disputes. On one hand despite the falling trend of land disputes, it was attributed to effective local governance structures whereas on the other hand respondents feeling partially protected against land disputes somewhat suggests STDM have positive influence on incidence of boundary disputes. Again this study has concluded beyond reasonable doubt that STDM enumeration has not been the motivation factor for the construction of new houses, investment in crop farming as well as non-crop related activity. Moreover detailed analysis proved non significant relationship between income and house extensions as

well as between household size or income and non-crop investment. However the study was not able to investigate the influence of other factors such as cost of building materials, age, occupation, pressure from city authorities for respondents to upgrade their houses on house extensions as well as impact of favourable weather conditions, good soil, price of agricultural inputs such as fertilizer, improved seeds on crop investments. Furthermore how good feeding, timely diseases treatment, increasing births of female livestock enhances productivity of non-crop investments could not be enquired.

This study has found that age is the only socioeconomic factor that played a role in respect of factors significantly motivating respondents to invest in the short term and both income and age influenced intentions to invest in the long run whereas STDM enumeration had no form of influence on respondents' decision. This study could not investigate into how other socioeconomic factors like education, occupation, succession of household head influences intentions of respondents to invest in the short and long term. In addition to the above, it is evident that the nature of house investments taking place after the enumeration was less influenced by immigrants.

Overall, albeit the initial achievements highlighted by other authors in respect of STDM tool proven to be technically able to address information requirements of informal settlers, an investigation into the impact of the STDM programme on tenure security has revealed a meagre contribution. Moreover, the STDM enumeration activity appear not to have influenced present investments and intentions of future investments of land right holders in the area of investments carried out by land right holders.

6.4 Recommendations

In short, this study has contributed its quota to existing literature on the impact of unconventional land administration programmes in respect of how beneficiaries perceive their tenure security hence influences their intentions to undertake land-related investment. Thus, this study shall inform policy makers and donor-funding institutions about the potential short and long term ramifications for the use of pro-poor (unconventional) land registration tools for land registration purposes.

That notwithstanding, further research is needed to investigate the influence of other factors such as cost of building materials, age, occupation on ongoing house extensions as well as impact of favourable weather conditions, good soil, price of agricultural inputs such as fertilizer, improved seeds on current crop investments. Furthermore how good feeding, timely diseases treatment, increasing births of female livestock enhances productivity of present non-crop investments could be interrogated. Particularly, how other socioeconomic factors like education, occupation, succession of household head influences intentions of respondents to invest in the short and long term could also be investigated.

Given that there will be issuance of the Certificates of Residency in the near future, a deeper study ought to be undertaken to investigate the economic effects of STDM in respect of how the certificates influences access to credit as well as willingness on the part of land right holders to rent out or transfer their interest in land to prospective buyers.

It is recommended that follow-up research be carried out to investigate how STDM enumeration can contribute to overcoming gender disparity as well as women's participation in the implementation process and land management operations.

Assessment of impacts of similar STDM ongoing or carried-out pilots in rural parts of Uganda, Kenya, Zambia, Colombia, Haiti and Eastern Caribbean will go a long way to identify lapses that need improvement in order to make the STDM tool an effectual and efficient unconventional land administration tool.

In order to ensure that STDM meets its objective as an innovative tool for promoting tenure security, the study concludes by prescribing the under-listed recommendations:

- The mixed results obtained in respect of how respondents view STDM enumeration in terms of contributing to their tenure security would perhaps be different if the STDM implementors had not emphasized on the need for people to register their land through the conventional land administration approach. By emphasizing on the formal registration they influenced people's mind to view that registration in STDM has little influence. Consequently, during implementation, the purpose for STDM as an alternative tool to conventional land registration approach in documenting land tenure/rights should be made clear so that people may trust STDM for some sort of protection.

- Government of Uganda should not relent on its effort of readily accepting and recognizing STDM tool as an alternative to conventional approaches through the active participation of its Ministry of Lands, Housing and Urban Development (MoLHUD) during the project's implementation by ensuring that Certificate of Occupancy or Residency promised land right holders since 2011 are produced and distributed. This should be attainable in view of existence of Uganda Land Act of 1998 which provides recognition and protection of the legitimate tenure rights of indigenous peoples hence the need for government and legislature to improve their legal and regulatory framework in order to give the necessary full legal backing to distribution of Certificates as soon as practicable. In this way land right holders will fully put their trust in such land programmes in the near future.

- On the technical level, interview with the Enumeration, Mapping and Profiling Officer revealed that even though they are expected to upgrade the STDM database at least once every quarter, this has not been possible. He attributed this to the non-availability of G.P.S to locate new developments such as water points, houses and parcels as well as absence of well-defined source of funding to sustain their activities. Hence, there is the need to provide Slum Federation members updating the STDM tool with logistics and most importantly GLTN could educate Federation members to approach the STDM updating as a business entity especially at this time of inadequate funding. This they can do by charging meagre fees to meet expenditures of the office as well as little motivations. In addition, GLTN could use these participants or implementors as resource personnel for further pilots due to expertise they wield. Again, continuous capacity development is needed through short, tailored training locally or on international platforms to abreast implementing staff with current technical developments of the STDM tool.

- Given that the certificates are issued, there is the need for GLTN to embark on a vigorous post-STDM pilot educational campaign to sensitize land right holders of the relevance of the certificates particularly serving as equal replacement for the formal land titles. In this way land right holders would feel more comfortable with the certificates thereby enhance perception of their tenure security thereby influence investments. This intervention is a necessity as objectives for initiating STDM will be fully realizable when the poor being targeted are aware and completely accept it as an appendage to conventional approaches. The courts and land sector agencies should not be excluded from such educational campaign in order for the courts to accept the certificates as evidence in a court case and the land sector departments not to see STDM tool as a potential threat to their professions.

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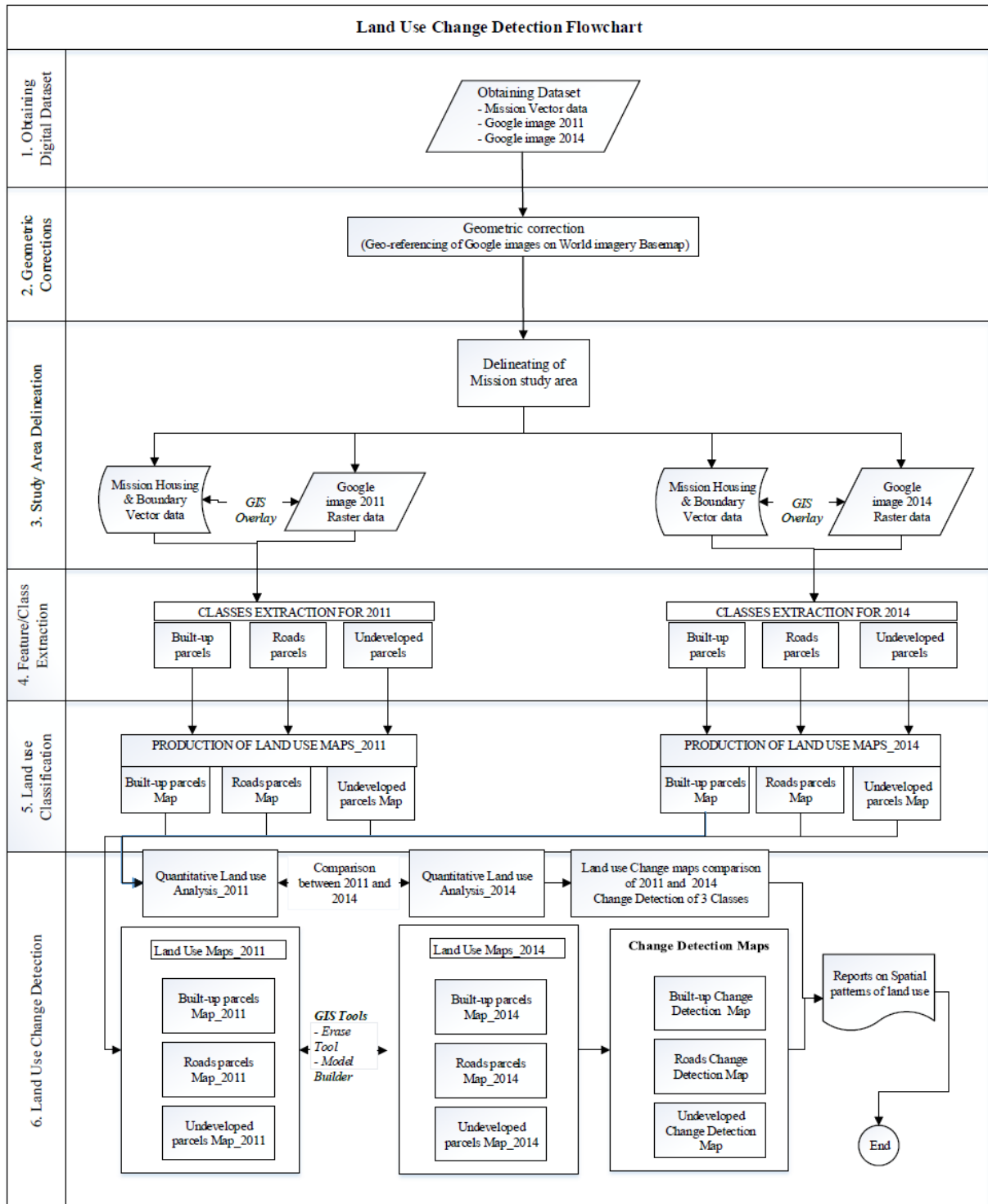
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Appendix 1: Land Tools according to GLTN

No.	Theme, issue	Summary, Purpose of Land Tool
1	<i>Access to land and tenure security</i>	<i>Strengthening citizens through access to land and property</i>
1a	Enumerations for tenure security	Participatory methods of gathering information on population size, ownership and infrastructure in a slum or other area
1b	Building on the continuum of land rights	Taking the range of types of rights to land, from formal to informal, into account to improve tenure security
1c	Maintaining deeds or titles	Systems of recording or registering formal land documents and keeping them up to date
1d	Socially appropriate adjudication	Ensuring the process of ascertaining the rights to parcels of land is fair for women and other disadvantaged groups
1e	Statutory and customary tenure	Linking customary tenure into formal land administration systems
1f	Co-management approaches	Joint management of land by local communities with other actors: such as a government agency, the private sector or an NGO
1g	Land record management for transactability	Simplified ways of keeping land records to allow land to be bought, sold, rented etc.
1h	Family and group rights	Ways to allocate tenure rights to families or groups rather than to individuals
2	<i>Land management and planning</i>	<i>Securing land and property rights for all</i>
2a	Citywide slum upgrading	Improving infrastructure and basic services for slums, and regularizing tenure arrangements
2b	Citywide spatial planning	Planning the use of land in a city in collaboration with local residents
2c	Regional land-use planning	Planning land use in a larger region
2d	Land readjustment (slum upgrading and/or post crisis)	Rearranging the land ownership and use to improve conditions and develop an area
3	<i>Land administration and information</i>	<i>Creating opportunity through property rights</i>
3a	Managing information on spatial units	Developing new approaches to obtaining and managing spatial information about land and people's relationships to it
3b	Costing and financing of land agencies' budget approach	Improving the budgeting of land agencies
4	<i>Land-based financing</i>	<i>Transforming society by raising funds from land</i>
4a	Land tax for financial and land management	Ways to tax land that raise revenue, discourage speculation, and encourage improvement
5	<i>Land policy and legislation</i>	<i>Changing structures through land policies</i>
5a	Regulatory framework for private sector	Designing laws and regulations within a public-private partnership that also benefit the poor
5b	Legal allocation of the assets of a deceased person (estate administration, HIV/aids areas)	Ensuring that the property of people who die without leaving a will is dealt with fairly
5c	Expropriation, eviction and compensation	Preventing evictions, and compensating evicted people for their loss

Source: UN-Habitat et al (2012b) and www.gltn.net

Appendix 2: Flowchart of Land Use Change Detection Process (an adaptation)



Appendix 3: Semi-structured Questionnaire for Land Right Holders

I am a student in the Faculty of Geo-Information Science and Earth Observation (ITC) of the University of Twente in Enschede, The Netherlands. I am pursuing a Master of Science in Geo-Information Science and Earth Observation for Land Administration. I am conducting a research on **Investigating the Impact of Social Tenure Domain Model (STDM) on Tenure Security - A Case Study of STDM Pilot in Mission Cluster (Uganda).**

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Privacy Statement

We acknowledge and respect your privacy. All information obtained from the questionnaire will be used only for the purposes of this research.

Thank you.

Form #:
House #:

1. Do you own or rent this property?

		Tick	Year
1.	I rent this property		
2.	I am a free occupant		
3.	I own this property		
4.	My family own this property		

2. If you own this property, how did you acquire ownership of it?

Tenure Category/ Bundle of Rights	Bought directly from the developers	Bought from previous owner(s)	Government allocation	Inheritance	Gift	Others (specify)
Occupy[build]						
Transfer, Dispose						
Sublet						
Access services						
Access formal credit						

3. Was it undeveloped land or built property?

1.	Developed land	
2.	Undeveloped	

4. If you acquired this property undeveloped, when did you develop the existing constructions (the year of construction)

Year	
------	--

5. Did you receive any Certificate? Y/N

6. Which land documents do you possess as proof of your ownership?

Section 1.1: Perception of Tenure Security[PTS]-B

7. Why did you enrol for the STDM Pilot?

8. How confident are you that the land will not be taken in the next 5 years?

1 2 3 4 5
Not confident Very confident

9. How confident are you that the land will not be taken in the next 15 years?

1 2 3 4 5
Not confident Very confident

Section 1.2: Conflicts [CF]-C

10. Have you had any land dispute with a neighbour/family member or another person about your land?

Y/N [If No, proceed to *Oxn.16*]

11. If *Yes*, what type of land dispute did you face?

	Land Dispute type	Tick	Year
1.	Boundary conflicts between individuals		

2.	Ownership conflicts – within family		
3.	Ownership conflicts – with other entity e.g. government, NGO (<i>please, specify</i>)		
4.	Who is entitled to land inheritance or how much		
5.	Default of rental contract		
6.	Expropriation of land/ Land grabbing cases		
7.	Other, <i>please specify</i>		

12. Did you take your land dispute to any of the following to help resolve it

1.	The Family or Neighbours	
2.	Legal assistance provider/CSO	
3.	The Church	
4.	The Police	
5.	Court	
6.	Other	
7.	No, I did not seek any help	

13. In seeking help for your case, did you rely on STDM Database as evidence of your land claim?

1.	Yes	
2.	No	

14. How much influence did it have over the final decision on the land claim?

1.	It was a decisive factor in rendering a decision	
2.	It was one of the influential factors in rendering a decision	
3.	It somewhat influenced the outcome, but only a little	
4.	It was not influential at all	

15. To what extent do you feel the STDM protects you from others encroaching on your land boundaries?

1.	Fully protects	
2.	Partially protects	
3.	Does not protect at all	

16. Do you have other lingering concerns related to tenure security that are not addressed by the STDM?

1.	Yes	
2.	No	

Please, specify?.....

Section 2.3.1: Motivation (2.3.1a: Trends of Investment since Enumeration Exercise)-D

17. What/ when is the main construction material of the fence of this house?

	Construction Materials	Tick	Year
1.	Mud only		
2.	Burned bricks		
3.	Burned bricks with cement		
4.	Cement blocks		
5.	Wooden planks		
6.	Tree trunks with mud		
7.	Others (<i>please, specify</i>)		

18. What/When is the main construction material of the ***exterior walls*** of this house?

	Construction Materials	Tick	Year
1.	Mud only		
2.	Burned bricks		
3.	Burned bricks with cement		
4.	Cement blocks		
5.	Wooden planks		
6.	Tree trunks with mud		
7.	Others (<i>please, specify</i>)		

19. What is the use of this building?

1.	Shop/comercial		
2.	Residential		If yes, how many people live here including you?
3.	Office		
4.	Rental		
5.	Others		<i>Please Specify:</i>

20. Have you made any extensions to this house since 2011?

Y/N

21. Who funded the extension of this house?

	Source	
1.	Self-financing	
2.	Commercial Credit	
3.	Informal Loan	
4.	Other Support Programmes? (<i>Please Specify</i>)	

22. Will you attribute this extension to tenure security derived from the STDM enumeration exercise?

1.	Yes	
2.	No	

23. If No, then what will you attribute it to?.....

Section 2.3.1: Motivation (2.3.1b: Crops investments)

24. Where do you cultivate your crops?

	Crop Type	Tick	Year
1.	Backyard Garden		
2.	Farm		

25. What types/purpose of crops have you been growing?

	Crop Type	Tick	Purpose
1.	Annual...		
2.	2-year crops		
3.	Tree plants (<i>specify</i>)		
4.	Others (<i>please, specify</i>)		

26. Who funded this farm?

	Source	Tick
1.	Self-financing	
2.	Commercial Credit	
3.	Informal Loan	
4.	Other Support Programmes? <i>(Please, Specify)</i>	

27. How do you evaluate the productivity of your farm lands after enumeration exercise?

1.	Decreased	
2.	The same as before	
3.	Shows increasing trend	
4.	Difficult to explain	

28. If you say *decreased*, what is the main problem?.....

29. What other factors influence the productivity of your farm?
.....

Section 2.3.1: Motivation (2.3.1c: Non-crop related investments)

30. What types/purpose of non-crop related investment have you been undertaking?

	Investment Type	Tick	Year
1.	Compost preparation		
2.	Cattle rearing		
3.	Sheep/Goat rearing		
4.	Poultry farming		
5.	Established new shop, store or other commercial investment		
6.	Others <i>(Specify)</i>		

31. Who funded this investment?

	Source	Tick
1.	Self-financing	
2.	Commercial Credit	
3.	Informal Loan	
4.	Other Support Programmes? <i>Specify</i>	

32. How do you evaluate the productivity of your investment after enumeration exercise?

1.	Decreased	
2.	The same as before	
3.	Shows increasing trend	
4.	Difficult to explain	

33. If you say *decreased*, what is the main problem?.....

34. What other factors influence the productivity of your investment?

2.3.2: Motivations to invest in the future [MIF]-E

These were measured using a 5-point Likert scales: 5 = already done, 4 = will do within 1 year, 3 = will do in 2-3 years, 2 = will do in 3-5 years, and 1 = probably will not do);;

35. How likely are you that you will invest in these assets in the short term (5 years)?

1 2 3 4 5
Will not do 3-5yrs 2-3yrs 1yr Already done

- House extension
- Crop
- Non-crop

36. How likely are you that you will invest in these assets in the long term (10 years)?

1 2 3 4 5
Will not do 9-10yrs 7-8yrs 6yrs Already done

- a. House extension
 b. Crop
 c. Non-crop

37. How likely are you to invest if your tenure had not been recorded by STDM?

1 2 3 4 5
Will not do 3-5yrs 2-3yrs 1yr Already done

2.3.3: Migration Characteristics

38. Did you live elsewhere before coming here?

1.	Yes	
2.	No	

[If No, proceed to **Qxn.42**]

39. If Yes, where did you live before you came to this house?

Within Uganda		If within Uganda, in which province and district? (Write down name of district)	
	Province	District	Village
Foreign Country (outside Uganda)			

40. What was the reason that made you move to your current location?

1.	Resettlement-policy	
2.	Expropriation (prior house/land was taken by the government)	
3.	Move to a better area	
4.	Access better jobs	
5.	Returning resident	
6.	Affordable renting cost	
7.	Others (<i>please, specify</i>)	

41. When it comes to people moving into your neighbourhood, how would you judge the numbers.

1.	Very high	
2.	High	
3.	Medium	
4.	Low	
5.	Very low or none	

42. If Medium to Very High, what types of people are they?

1.	Government workers	
2.	Traders	
3.	Migrant workers	
4.	Others(<i>please, specify</i>)	

Section 4: Socio-economic characteristics

43. Gender

1.	Male	
2.	Female	

44. Date of birth _____ (Year)

45. Marital status

1.	Single	
2.	Married	
3.	Separated/Divorced	
4.	Widowed	
5.	Others	

46. What is your highest level of educational attainment?

1.	Never attended school	
2.	Primary	
3.	Secondary	
4.	Technical Schools	
5.	University	
6.	Post-graduate	
7.	Others, <i>Please specify</i>	

47. What is your occupation [Pick all occupations that apply]

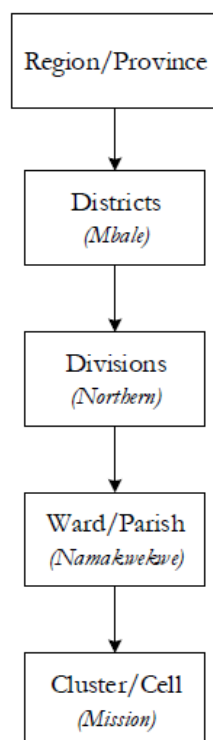
		Land owner <i>Primary</i>	Land owner <i>Secondary</i>
1.	Farmer		
2.	Casual labourer		
3.	Government employee		
4.	NGO employee		
5.	Self-employed/Business		
6.	Student		
7.	(Currently) not employed		
8.	Retired		
9.	Part-time employed		
10.	Others, <i>please specify</i>		

48. In what monthly income bracket is your household? (*To be verified*)

Under 50 000 UG Shillings	50 001 - 100 000 Shillings	100 001 – 150 000 Shillings	150 001 – 200 000 Shillings	200 001 – 250 000 Shillings	250 000 – 500 000 Shillings	500 000 – 700 000 Shillings	Above 700 000 Shillings

Webale/Wenyara (Thank you)

Appendix 4: Local Governance Structure



Appendix 5: Computation of Smallest Interpretation Unit

Houses		On Ground (cm)	On Image (cm)	Per Pixel
1	Length	880	26	33.8462
	Breadth	820	20	41
2	Length	1346	29	46.4138
	Breadth	520	13	40

Average Pixel = 40.315 = 40 cm

Smallest Interpretation Unit = 28.8m^2

Appendix 6: Questionnaire for National Slum Dwellers Federation/ ACTogether NGO

1. Name of respondent.....
2. Designation of respondent.....
3. I know your organization has been involved in the STDM pilot, kindly explain to me the role of your organization in the STDM Pilot

.....

4. How did you partner ACTogether NGO in the implementation of the STDM pilot in Mission cell?

.....

5. When was STDM implemented in Mission cluster?

.....

6. Why was STDM implemented in Mbale?

.....

7. What was the content of your sensitization or education message to inhabitants of Mission cell during your awareness-creation campaigns?

.....

8. What kind or category of data did you collect from slum dwellers in Mbale?

.....

9. Which other clusters in Mbale benefitted from the STDM pilot with their respective dates of implementation?

Cell in Mbale	Year	Reasons for STDM

10. Are you aware of any scaling up of STDM projects in other districts of Uganda?

Y/N

11. If Yes, kindly list some of the sites now implementing and the reasons for the scaling up?

Other Sites in Uganda	Municipality	Year	Level of Implementation	Reasons for STDM

12. Were Certificates distributed during the pilot?

Y/N

13. If Yes, how many certificates were given to farmers?

.....

14. Which type of Certificate were distributed?

i. Certificate of Residency/Occupancy ☐

ii. Certificate of Ownership ☐

iii. Others ☐ (specify).....

15. If No, is there any possibility of Certificates to be distributed in the near future, specifying the period for the distribution?

.....

16. What kind of people were provided with the Certificate?

i. Tenants ☐

ii. Land owners/Relatives of land owners ☐

iii. Others ☐ (specify).....

17. How were they selected?

.....

18. How do people acquire ownership of land and buildings in Mbale - Mission cell?

Bought directly from the developers	
Bought from previous owner(s)	
Government allocation	
Inheritance	
Gift	
Others (<i>please specify</i>)	

Section 1.1: Perception of Tenure Security

19. Will land tenure/ rights of beneficiaries evolve into a stronger/higher land tenure after the STDM pilot? Y/N

.....

20. What type of stronger land right are beneficiaries land tenure expected to evolve into over time?

.....

21. Have you received any information or updates on changed land uses in Mission cell catchment area?

Y/N

21.1. [NB: If Yes, kindly complete the table below]

N o.	House/ parcel Number	Present Land use type	Former Land Use Type [before 2012]	Details of Land Use Type	Connected to which other factors?

22. How often is the STDM updated?

.....

23. In your opinion how has the STDM enumeration exercise influence land use changes in Mission cell?

.....

24. Which land use type is increasing and which is decreasing & Why?

.....

NB: *Please you may add any information you think is relevant for this studies*

Thank you

Appendix 7: Questionnaire for Local Council Courts

Section 1.2: Conflicts

1. Do you have the data that show type of land related cases which came to court concerning **Mission cell** in the following years?

No.	Year/Type of Land Conflict	2011	2012	2013	2014
1.	Encroachment of public lands				
2.	Boundary conflicts between individuals				
3.	Who is entitled to land inheritance or how much				
4.	Default of rental contract				
5.	Expropriation of land/ Land grabbing cases				
6.	Others (<i>please, specify</i>)				

2. Are all land-related conflicts you have had now been resolved?

1.	Yes	
2.	No	

3. If No, which category of conflicts are being resolved and which ones not?

No	Category of Conflict	Time to resolve Conflicts			
		<1mnth	1 -6mn	6-12mn	>1yr
1.	Encroachment of public lands				
2.	Boundary conflicts between individuals				
3.	Who is entitled to land inheritance or how much				
4.	Default of rental contract				
5.	Expropriation or requisitioning of land/ land grabbing cases				
6.	Other, please specify				

4. In your opinion what are some of the reasons for conflicts not being resolved?

5. In your experience have the land conflicts increased or decreased in **Mission cell**?

1.	Decreased	
2.	Increased	

6. Kindly give reasons for the change reported above

7. In your opinion what measures should be taken to mitigate land conflict if land conflict is rising?

NB: Please you may add any information you think is relevant for this studies

Thank you