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Opportunities and Challenges for Modern Land Information System Spesifically: Examining the Ongoing Opportunities and Challenges of Cadastral Surveying and Mapping Practice in Bahir Dar City, in Case Study of Fasilo Sub City.

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OPPORTUNITIES AND CHALLENGES FOR MODERN LAND INFORMATION SYSTEM

SPESIFICALLY:

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Abstract

Land becomes a very scarce commodity and a source of conflict at present. In order to solve this problem and to have full and secured information about land issues, the government is on the way to have cadaster_ supported land administration system in the rural as well as in the urban areas of the country.

To have full and secured information about land issues cadaster plays a great role in the land information system by addressing information about special locations and identifies of individual land units or parcels. To have that land information the cadastral system should be in line with the stated provisions and satisfies the society's needs, but the availabilities of cadastral surveying and mapping were not feasible in most urban area, so the tarry and other infeasible cadastral benefits of Cadteral system interests the researcher to examine the challenges which affects its performance.

To examine this challenge, the researcher use both primary and secondary data source, to collect relevant data the researcher use questionnaires, unstructured interview and field observation way of data collection techniques by applying on defined study area (Fasilo sub city, Bahrdar). To found challenges which obstacles the process of cadastral surveying and mapping work inconsistence of second and third survey control points in proposed urban land use plan, non- existence cooperation between cadastral surveying and mapping team and urban development experts during the establishment of survey control point on existed land use plan. Weak integrity between right creator and cadastral surveying and mapping institute, use dimension based measurements during parcel survey and map preparation stages, weak involvement of Cadteral surveying and mapping stake holders and shortage of trained man power and financial make the cadastral surveying and mapping work not accessible and time consuming in the study area .To shape those

challenges the researcher try to recommend on the issues which have been investigated in the study area on survey control points ,integrity of cadastral and right creator institutes, shortage of trained manpower and on the involvement of cadastral surveying and mapping works.

Acronyms and abbreviations

ANRS	Amara National Regional state
FIG	International federation of surveyor
GIS	geographic information system
GPS	geographic positioning system
LIS	land information system
LIMS	land information management system
LAS	land administration system
MPC	multipurpose cadaster
SDI	special data information

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CHAPTER ONE

1. Introduction

1.1 Back ground of the study

Cadastral systems have a long tradition. Egypt has had such an institution since about 3000 BC. The Romans, particularly under Emperor Diocletian us in the 3rd century AD, introduced land inventories in occupied territories. Also, in China a taxation system was developed for land. Spain introduced its first cadaster for taxation purposes in 1714. The colonialists in the late 19th and early 20th century introduced systematic inventories on land in the colonies to enforce their power. The purpose of the cadasters has changed over time. Initially, taxation was the main purpose, later on juridical cadastral systems for land use control were established; and after private land ownership became more common, the systems were providing security and reliability and became a basis for land markets (De Soto, 2000).

The cadaster is a parcel-based system, i.e. information is geographically referenced to unique, well-defined units of land. These units are defined by the formal or informal boundaries marking the extent of lands held for exclusive use by individuals and specific groups of individuals (e.g. families, corporations, and communal groups). Each parcel is given a unique code or parcel identifier. Examples of these codes include addresses, co-ordinates, or lot numbers shown on a survey plan or map. (Williamson et al, 2001).

Cadastral Maps are the backbone of LIS which have to be updated by undertaking regular surveying operations to capture the ground realities with regards to fragmentation of parcels or consolidation of boundaries. The word cadaster is come from the Latin language which refers to the registry of lands. Cadastral Surveying is a discipline which deals with large scale surveying of parcels of land

and preparation of Cadasters, to serve as public register of the lands for fiscal purposes in addition to establishing the ownership rights. Implementation of LIS therefore is not a simple matter as it involves legal, political and technical issues. Therefore, the needs to resolve these three most important issues are significant (Enemark et al, 2005).

Moreover, Cadastral systems are the foundation and an integral component of parcel-based land information systems (LIS) that contain a record of interests in land. These systems are a central component of the land administration and land management systems in a state or jurisdiction" (Williamson, 1986). Yet land information systems are a relatively recent application of cadastral systems. Cadastral systems date back a long way and have evolved over thousands of years. Hence, Cadastral systems should be seen as a core component of more comprehensive land administration systems or infrastructures concerned with the processes of determining, recording and disseminating information about tenure value and use of land when implementing land policies. Appropriate land administration systems then provide the basis for sound land management towards economic, social and environmental sustainability. Generally, the process of land administration needs complete, accurate and reliable information about the ownership, use and value of existing land and its resources. Cadasters play the 'book-keeping'' role for this information within the wider land administration and land management systems. The cadaster is considered to be the core of a land administration system (Steudler, 2004; Williamson, 2001a).

1.2. Statement of the problem

An appropriate cadastral survey management system should provide for: easy access to cadastral reference information, a predictable delivery period, transparent quality control system, well defined standards and guidelines, competiveness, clearly defined professional development path, and adaptability to technological advancement and public needs to reduce squatter settlement or illegal construction, (Yang, 2005).

A clear, simple graphic of the parcel is a good way to help assure the owner that the map is a correct reflection of the situation on the ground. To indicate that the property registration system is indeed working properly and Clear marking of parcel boundaries helps assure that owners and their neighbors have common understanding of the location of each land parcel (Roy Chilesh, 2014).

As Williamson (2000) explain as the cadastral system have, more security of land tenure, better access to long-term credit, increased productivity of land, lower transaction costs on the real property market and cheaper information for land administration. More equitable and cost-effective collection of land taxes, improved opportunities to implement land policies, improved opportunities to plan for sustainable development of land and other natural resources (Williamson, 2000).

However, in Bahir Dar city there isn't rapid cadastral system, increase of the court costs for land dispute, expansion of squatter settlement or illegal construction increase very alarmingly, no feasible improved opportunities to sustainable development of land use plan and other natural resources, make the researcher interested to examine the challenges of cadastral surveying and mapping practice in line with the cadastral surveying and mapping proclamations, regulations, directives and adult cadastral surveying and mapping professional literatures by stating a hypothesis in which area the cadastral surveying and mapping work will be fail.

1.3 Objective of the study

1.3.1 General objective of the study

The main objective of the study is to examining the ongoing opportunities and challenges of cadastral surveying and mapping practice in Bahir Dar city in case of Fasilo sub –city.

1.3.2 Specific objective of the study

To meet the general objective, the following specific objectives are designed:

- To check the densification and status of geodetic control points
- To assess mechanisms to solve disputes related to land
- To observe the coordination between stakeholders and the cadastral project office
- To observe the coordination between cadastral surveying experts with cadastral mapping experts
- To evaluate the services given from land registration office for the land owners and
- To identify the challenges faced during the cadastral process.

1.4 Research question

- What looks like the health of geodetic control points for cadastral work?
- Does land related dispute mechanism challenged the cadastral system?
- What looks like the linkage between stakeholders and cadastral project office?
- What looks like the linkage between cadastral surveying and cadastral mapping experts?
- What services are addressed to the land owners?

1.5 Significance of the study

Since knowing the challenges of cadastral surveying and mapping work is knowing half of the solutions, resulted from inappropriate cadastral surveying and mapping practice. So, the final result of this study will be contribute for governments and other private organization as reference to shape the gaps between the standards and the practical cadastral surveying and mapping computations. To set formal and standardized cadastral surveying and mapping computation procedures from the understanding of those challenges which addressed in this researches. The government will be used as a reference to establish sustainable cadastral surveying and mapping system which cannot be demolished by the future generation and it used as to manage the practical cadastral surveying and mapping in a good manner to secure the land holder rights. To provide a required service to land holders by addressing the existed cadastral surveying and mapping challenges and indicate basic components, procedures, rules and cadastral surveying and mapping computations in the study area. In addition to this, the research may be use as a reference for another new researcher.

1.6 Scope of the study

The scope of this research involves on the evaluations, assessing and examinations of the ongoing challenges and opportunity of cadastral surveying and mapping practice through the techniques of primary and secondary data capture in the study area. In addition to this the study rotates on observations of survey control point establishment, structure of boundary demarcation and related disputes, integrity of stakeholders in cadastral surveying and mapping work. Data capturing techniques, essential requirements of cadastral mapping component factors which bargaining the appropriate cadastral surveying and mapping work for secure land ownership rights and assessing the provide services of cadastral surveying and mapping practice for the land holders.

1.7 Limitations of the study

The researcher faces some limitations. Some of the limitations are: lack of cadastral surveying instruments and demand of long period of time make unable the researcher to check survey control points by the researcher but the survey control point accuracy was checked by Bahir Dar University Land Administration institute surveying experts. Due to work burdens, cadastral surveyor experts were not available and it makes the researcher, going to their office continuously for questionnaires, interview and field observations. Some land holders were not voluntary to give information about their holding and some data access.

1.8 Organization of the Paper

This research paper is divided into five chapter:

chapter one: introduction this chapter contains back ground of the study, the rationales of the study and the problem of the statement, objective of the study, research questions, significance of the study, scope and limitations of the study.

chapter two literature review –explain the theoretical and empirical frame work used to inform data collections, present a critical review of relevant literatures articles and research books related to cadastral surveying, mapping works and related fields.

chapter three: research design –present the methodological frame works in which the whole procedures (research approaches, research design, population, sampling, data collection, tools, and methods of data analysis) are briefed.

Chapter four: results and discussions –presents data collected by field observation, interviews, survey questionnaires and document analysis, discussions the result of in light of the literatures and other research findings.

Chapter five: conclusion and recommendations are the structures of the paper.

CHAPTER TWO

2. Literature reviews and conceptual frame works

2. 1. Land Administration System

Land is the ultimate resource, without it, life on earth cannot be sustained. Land is both a physical commodity and an abstract concept in that the rights to own or use it are as much a part of the land as the objects rooted in its soil. Good stewardship of the land is essential for present and future generations. Land administration refers to the processes of recording and disseminating information about the ownership, value and use of land and its associated resources (Economic Commission for Europe, 1996).

According to the UN Guidelines (1996) Land Administration concerns the processes of recording and disseminating information about the ownership, value and use of land and its associated resources. There are three important elements to manage land, the first is to count with information about land; second to have clear policies on how land should be managed; and third is to motivate the participation of everyone with an interest on stake in the land to provide with source information. The information technology revolution with the technological development such as digital cadastral databases and the WWW are vital tools for land administration and planning both now and into the future(Ting and Williamson , 1999).

2.2 Land Information Management System

A Land Information system is a combination of human and technical resources together with a set of organizing procedures that produces information in support of some managerial requirement (McLaughlin, 1999). A land information system gives support to land management by providing information about the land, the resources upon it and the improvements made to it for the purpose of land administration while implementing land management.

A Land Information Management System [LIMS] in the context of Land Administration Systems consists of a number of broad dimensions, firstly an institutional element, which includes a corporate structure in terms of policies, legal framework etc. Secondly, it consists of a set of organizing procedures, which structure the relationship among the functional components and thirdly, a technological dimension that includes hardware and software. Fourthly, it includes a platform or a resource-base, on which data are stored and from which meaningful land information can be produced, analyzed and disseminated. Finally, it includes an explicit, or implicit, policy towards users, transparency, information dissemination etc.

Generally, the process of land administration needs complete, accurate and reliable information about the ownership, use and value of existing land and its resources. So, for complete, accurate and reliable land information, Cadasters play the 'book-keeping' and a "land auditor" role for the land information within the wider land administration and land management systems. The cadaster is considered to be the core of a land administration system (Steudler, 2004).

2. 3 History of cadaster in Ethiopia

As indicated by Pankhurst (1966) Menilik II who issued, the country's first Proclamation related to urban lands at the end of 1907, which brought legislation stating a change in ownership of the city's land. This decree with 32 articles provided, among others, procedures for the sale and registration of land with all the necessary legal and technical aspects to be fulfilled for the sale and registration of land holdings, procedures of taxation by the government, issuance of a certificate for purchase, fixing transfer tax; system of land purchase by foreigners, etc.

It was decreed at the same time that on providing the proof/evidence that the land was 'rist' or private property, a contract of acquisition from the former ('rist owner)

or a decree of gift from the Emperor or the church, the land owner was to be provided a certificate referred to as "yerist waraqet" or "rist" paper to be written in Amharic and French, with a map showing the boundaries of the land. At the beginning, even though the decree ordered everybody to register his land and receive a certificate, the majority did not respond positively. Therefore, by late October 1921, the government issued a notice calling on those who had not registered their lands to do so, otherwise without a certificate they cannot sell, change, and mortgage their lands (Baheru, 1986).

As a result, by 1935 the registrations have been more or less completed and a total of 45,000 certificates were issued (Baheru, 1986). Among the incentives to owners of land to register, Pankhurst (1961), cited the policy of the Bank of Abyssinia, which had given priority of mortgages only for a unit of land that is registered or with title. During the reign of Haile-Selassie I the Ministry of Land Reform and Administration was engaged in registering and measurement of rural land in collaboration with the Ethiopian Mapping Agency, until 1974. The purpose of the registration was to: practice cadastral survey, create the system of free hold tenure, register individual title to land and institute land sale (Hoben, 1973).

Around 1995 decided to launch a cadastral project initially intended to register all property owners liable for property taxation and collect data that would enable the city administration to assess a value of a property more realistically. However, latter on the primary objective of establishing "a fiscal cadaster" enhanced and the objective of the project was changed aiming at establishing a "multipurpose cadaster". The non-existence or the non-functioning cadastral system is believed to be the general problems which lead to the initiation of the project in Addis Ababa. But, even if lack of proper land information system is common to most developing

countries, the problems associated with it and the reasons to establish an information system may differ from country to country (Daniel. 2006).

Accordingly, the four main problems and reasons, which initiated the establishment of a cadastral or land information system apart from the general problems, are:(1)Poor service delivery in land management & administration, especially in services related to: Registration of transactions, Building permits (maintenance & construction), Application for title deed & title book, Resolution of land disputes, Land use change application, and Property taxation and Land supply.(2) The alarming increase of squatter settlement or illegal construction. (3) Due to lack of sufficient information it was impossible to plan and implement development projects. (4) Inadequate collection of property tax. As a result of inappropriate cadastral system, the city lacks the technical means to collect revenue from property taxes efficiently (Daniel.2006).

2.4 Cadastral system

However, the concept of Cadaster is difficult to identify. It may be designed in many different ways, depending on the origin, history and cultural development of the region or country. Basically, a cadaster as such is just a record that identifies the individual land parcels/properties. The purpose of this identification may be taxation (as was the reason for establishing the European cadasters) or it may be security of land rights (as was the case when establishing the Torrens systems in the new world such as Australia). Today, most cadastral registers around the world are linked to both the land value/taxation area and the area of securing legal rights in land.

The International Federation of Surveyors (FIG, 1995) defines a cadaster as a "parcel based and up-to-date land information system containing a record of interests in land (e.g. rights, restrictions and responsibilities). It usually includes a geometric description of land parcels linked to other records describing the nature of the

interests, ownership or control of those interests, and often the value of the parcel and its improvements. It may be established for fiscal purposes (valuation and taxation), legal purposes (conveyancing), to assist in the management of land and land-use control (planning and administration), and enables sustainable development and environmental improvement". Therefore, it makes sense to talk about Cadastral Systems or Cadastral Infrastructures rather than just Cadaster. These systems or infrastructures include the interaction between the identification of land parcels, the registration of land rights, the valuation and taxation of land and property, and the control of present and possible future use of land (Enemark et al, 2005).

2.5 Cadastral System and Its Classification

The cadastral systems comprise a land registration system and a cadastral survey and/or mapping system as key components. The cadastral survey comprises processes such as the control of geodetic data, parcel demarcation and surveying, cadastral mapping, cadastral mutation and map updating. As Zevenbergen and Bogart's (2001) mentioned, Land registration is the process by which the documentation affecting interests in land are recorded in a public register. This is the official legal registration of properties and legal rights.

A cadaster is similar to a land register in that it contains a set of records about land. Cadasters are based either on 1) the proprietary land parcel, which is the area defined by ownership. 2) the taxable area of land which may be different from the extent of what is owned 3) areas defined by land use rather than by land ownership. Cadasters may support either records of property rights, or the taxation of land, the recording of land use (Economic Commission for Europe, 1996)

The cadaster is at the core of any LAS providing spatial integrity and unique identification of every land parcel. Cadasters are large scale representations of how the community breaks up its land into useable pieces, usually called parcels. Most

cadasters provide security of tenure by recording land rights in a land registry. The spatial integrity within the cadaster is usually provided by a cadastral map that is updated by cadastral surveys. The unique parcel identification provides the link between the cadastral map and the land registry, and serves as the basis of any LAS and the land information it generates, especially when it is digital and geocoded. The cadaster should ideally include all land in a jurisdiction: public, private, communal, and open space (Williamson.et al., 2010).

2.6 Cadaster and land registration

Cadastral System and Registration Cadasters as the engine of land administration systems while integrated with spatial data infrastructures (SDI) are required to help manage interests in land and its resources (Aien, 2012).The land registration processes is modeled, both by a static and dynamic model these includes the technical, legal and organizational aspects, and their interrelation, of such processes (Zevenbergen, 2004).

According to Tuladhar (1998) the term Cadaster includes different types of purposes such as Juridical: a register of ownership of the proprietary land parcel; Fiscal: a register of properties recording their value to support taxation; Land use: a register of land use; and when a cadaster serves as a supplier of up-to-date and reliable land information at an affordable cost, it is then termed as Multipurpose Cadaster. The objective of the multipurpose cadaster is to provide a service through which the dynamics of the land parcel may be studied and also meet the demands of the evolution of LAS which means the needs of the users.

Generally in a short pattern, depending on their use, type and quality and quantity of data cadasters can be divided in to three: Legal Cadaster: is a register identifying the legal owner and precise boundaries of each land parcel .Establishing a legal cadaster requires both fixing parcel boundaries through surveying and mapping and fixing

legal rights which may involve negotiations among involved parties and a judicial determination of ownership (adjudication) .In other words the legal cadaster deal with rights to use land.

Fiscal cadaster: is a record of information necessary for levying property taxes which includes location and value of parcels. Frequently the occupant of the parcel is identified for tax purpose and no effort is made to determine the legal owner governments need income which greatly is generated though some sort of taxes. One major resource in a country that can be taxed is land and land related properties. Thus official cadaster must include enough information to calculate a value using certain valuation method.

Multi-purpose cadaster a relatively new development that incorporates at one source the data concerning the legal and fiscal cadaster along with information on land use, infrastructure, buildings, soil and other factors. Each parcel must be assigned a unique identifier so, that all the information can be related to the same plot. The basic information need for development planning can be found from the legal or fiscal cadasters where they are kept up to date by concerned organization. The modern cadaster is primarily concerned with detailed information at the individual land parcel level. As such, it should service the needs both of the individual and of the community at large. Benefits arise its application to: asset management, convincing, credit security, demographic analysis, development control emergency planning and management, environmental impact assessment, housing transactions and land market analysis, land and property ownership, land and property taxation, land reform, monitoring statistical data, physical planning, property portfolio management, public communication, site location, site management and protection (Dale and McLaughlin, 1999).

According to (Guoab et al., 2013), the system of land registration processes is important for the management and administration of cadastral system. Ethiopian land administration system has textual and spatial components. Textual Component includes, but not limited to, the description of the land holder, family members, and address. The property will be authorized through a process of registration in which its ownership, land usufruct, location, and area are recorded and authorized.

2.7 Benefits of cadastral surveying and mapping

Appropriate investments in establishing a Cadaster and/or improving one (e.g. through computerization) provide both short and long term benefits. Such cadastral reforms should be based on a good understanding of user requirements and system constraints and on an achievable system design. Investigations show that cadastral reforms often have a higher cost-benefit ratio than is usual for governmental investments in general. Some of the benefits include: more security of land tenure, better access to long-term credit, increased productivity of land, lower transaction costs on the real property market, cheaper information for land administration, more equitable and cost-effective collection of land taxes, improved opportunities to implement land policies, improved opportunities to plan for sustainable development of land and other natural resources (Williamson, 2000).

A cadastral system is an information system of land holdings and land use. Therefore, it provides excellent opportunities for identifying problems associated with the development and implementation of land policies. The Cadaster can assist in monitoring and controlling matters regarding: the size of parcels, both maximum and minimum, for instance to prevent excessive fragmentation, the shape of parcels, to avoid uneconomical subdivision design or inefficient road and water systems etc. Reallocation of land rights to improve social and economic policies through subdivision, land consolidation, land allotment etc., land use, for instance agriculture

or to ensure that low-cost public buildings are allocated to the right group of people, control and measures taken to implement social programs to improve access to land ownership by women and minority groups, valuation of land for the collection of government taxes and rates, collection of contributions to improve common facilities, such as water systems etc. The value of land as a result of development, acquisition of land for public or common purposes (Tuladhar, 2004).

2.8 Cadastral map Elements or contents

Notes, Legends, Scales, Meridian arrows and title blocks are essential elements included in all maps. Notes cover special features preparing specifically a particular map. They must be put in their appropriate location and their best location is near the title block because the user of a map will find and identify a specific plot by its title, presumably also check any special notes besides the title before examining the drawing. Cartographic Symbols and different line types are commonly used to represent and portray different topographic features on maps and legends are used to explain the meaning of those symbols and lines. The symbols shown in the legend should be replicas of those used on the map (Ghilan D., 2012).

The map scale should preferably be presented as both, a representative fraction and a graphical element. when designing a bar scale, it should be a narrow bar because if it becomes too wide, it will draw undue attention. Every map must display a meridian arrow for orientation purpose. Geodetic Grid or magnetic north may be shown. The title block should state the type of map, name of property or project and its owner or user, location or area, date completed, scale, contour interval, datum used (vertical and horizontal reference system) etc. The title block may be placed whenever it will best balance the sheet, but it always should keep outside of the subject area. Lettering in the title block should be simple in style rather than ornate and confirm in site with the individual map sheet.

2.9 Cadastral surveying and mapping

Surveying represents a long term investment for which the advantages though real, are not immediate. A geometrically frame work provides a basis for producing maps which can assist in the administration of the land for planning and controlling its development redefining disputed or uncertain boundaries and for structuring geographical or land information system (Jeyanandan & Willianson,1990).

Cadastral surveying deal with the definition, identification, demarcation, mapping of new or changed legal parcel boundaries. It usually includes the process of re-establishing lost boundaries and sometimes resolving disputes over boundaries or other interest in real property. A cadastral map is a map that shows the boundaries and ownership of land parcels. Some cadastral maps show additional details, such as survey district names, unique identifying numbers for parcels, certificate of title numbers, positions of existing structures, section or lot numbers and their respective areas, adjoining and adjacent street names, selected boundary dimensions and references to prior maps.

2.10 Boundary monumentation

The oldest types of surveys in recorded history are boundary surveys, which date back to about 1400 B.C. when plots of ground, were subdivided in Egypt for taxation purposes. Boundary surveys still are one of the main areas of surveying practice. As property increased in value and owners disputed rights to land, the importance of more accurate surveys, monumentation of the boundaries, and written records became necessary. The objective of cadastral surveying are primarily concerned with the determination of definitions of property boundaries, locations and area through their marking descriptions on the ground and plans or maps respectively for the purpose alienation, subdivision, partition, amalgamation and convincing. The system as practiced is one fixed and defined boundary where by parcel definitions is

by the officially emplaned and mathematically coordinated boundary marks (Nordin, 2005).

The responsibility of a professional surveyor is to weigh all evidence and try to establish the originally intended boundary between the parties involved in any property-line dispute, although without legal authority to force a compromise or settlement. Fixing title boundaries must be done by agreement of adjacent owners or court action. Surveyors are often called upon to serve as expert witnesses in proceedings to establish boundaries, but to do so they should be registered. Boundary survey measurements and analysis follow basic plane surveying principles. But a land surveyor needs years of experience in a given state to become familiar with local conditions, basic reference points, and legal interpretations of complicated boundary problem (Charles D.Ghilan, 2012).

Generally, boundaries are appropriate where the development of the land scope is mature for example where in urban area the pattern of use is well established. They are also participatory useful when the owner ship of the land can be ascertained which it being necessary to consult the owners of adjoining, and the clear marking of parcel boundaries helps assure that owners and their neighbors have common understanding of the location of each parcels (smith and Holstein 1987).

While land surveyor tends to argue about the advantages either fixed or general boundaries, in reality each approach depend on good monomentation on the ground. This is essential so that the land owner can recognized the limit their properties. The monomenetation of a parcel boundary generally achieved in one of two ways the employment of corner beacons and pegs in the ground or the construction of a linear feature such as walls and fence or the growing of hedges. The advantage of pegs are that they are cheap ,how a low maintain ace cost , are easily to emplace and they indicate the precise location of the corner point of property boundaries .Boundaries

makes should be visible at all time so that land owner and their neighbors can be known instantly the limit of their properties pegs buried flush with the ground soon became hidden by registration or soil and can be expensive to fined , especially if it is necessary to call in a surveyor to locate them .In urban area the most permanent movement is often the building itself and the actual boundaries can be referred to it (smith and Holstein 1987)

For Cadastral survey as a solution to land problems, (Monteath ,1990) has observed that, since time immemorial ,the determination of boundary has been crucial to the orderly development of society and man's peaceful coexistence with his neighbors .To this end cadastral survey may be looked at as the basis for solving land problems when they are used for ascertaining the positions of boundary during demarcations(where boundary cleared and created),adjudications(e.g. when neighbors walk common boundaries) and boundary definitions (when numerical values and graphical representations are made).where every neighbors know and accepts the positions of his boundaries through the existence of recognized boundary marks ,land dispute may be considerably minimized . On this aspect, (Monmonier ,1985) observes, good boundaries not only make good neighbor but also help prevent dispute ranging from bitterness among home owners arguing about a hedge to war among countries contesting an international boundary.

2.11 Inputs and cost of cadastral surveying and mapping

The inputs required to undertakes the surveying and mapping process comprise the typical needs any fields surveying exercise. Most importantly appropriate personnel must be identified in most because additional training will be required to formalize project personnel with requirements with the requirements of the project and to make them proficient in the surveying and mapping techniques to be used. The cadaster is an information system consisting of two parts: a series of maps or plans showing the

size and locations of all land parcels together with records that describe the attributes of the land. The cadaster includes: geometric data (coordinates, maps) property address, land size and appropriate land right. It is distinguishing from a land registration system in that the cadaster is exclusively concerned with ownership, cadastral surveys concerned with setting out and recording the turning points or concerns along property boundaries.

Ensuring adequate resources are available to support computerization and ongoing maintenance is critical_this also requires systems be in place to integrate decentralized operations whether they are manual or automated. The cost of this reform strategy should ensure that those costs passed on to the consumer are not overly onerous. Accessible and easily adaptable information will increase demand for its use in decision making. As with first registration, during the early stages of computerization and publicly accessible data, costs should be minimized to encourage participation and increase demand for the formal system and services provided (Burns and Dalrymple, 2008).

The Technical aspect, legal and organizational aspects also play an essential role and cannot be ignore or separated from the cadaster main body therefore, all of these aspects should work together and concurrently Chon. The absence of a systematic, well-defined and public documentation system about these additional rights and restrictions creates an increasing legal insecurity (T.L. and Hussein, K.B. 2010).

2.12 Geodetic Framework

A geometrically frame work provides a basis for producing maps which can assist in the administration of the land for planning and controlling its development redefining disputed or uncertain boundaries and for structuring geographical or land information system (Jeyanandan & Willianson,1990).

A geodetic framework forms the geo-spatial foundation for the creation of a MPC (Panel on a Multipurpose Cadaster, 1983). A geodetic framework would consist of monumental points that have been accurately determined by one or more precise surveying methods. The geodetic framework should also be carefully designed to fit the specific needs of the particular maps created. The Panel on a Multipurpose Cadaster suggested that for a multipurpose application, if the maps are to be effective planning and management tools, it is essential that the framework satisfies two basic criteria. These criteria include: First, the framework must allow for the correlation of cadastral boundary-line data with topographic, natural resources and other land related data. Secondly, the framework must also be permanently monumental on the ground so that the lines on the maps may be reproduced in the field when land-use development and management projects reach the regulatory or construction stage

2.13 Geospatial positioning accuracy standards and national geodetic survey

The required accuracy for a control survey depends primarily on its purpose. Some major factors that affect accuracy are type and condition of equipment used, field procedures adopted, and the experience and capabilities of personnel employed. In 1984 and again in 1998, the Federal Geodetic Control Subcommittee (FGCS) published different sets of detailed standards of accuracy and specifications for geodetic surveys. The rationale for both sets of standards is twofold: (1) to provide a uniform set of standards specifying minimum acceptable accuracies of control surveys for various purposes and (2) to establish specifications for instrumentation, field procedures, and misclosure checks to ensure that the intended level of accuracy

is achieved. A minimally constrained least-squares adjustment of the survey observations is analyzed to guarantee that the observations are free from blunders and have been correctly weighted. The accuracy of control points in the local existing network to which the survey is tied is computed by random error propagation and weighted accordingly in the least-squares adjustment of the survey network (FGCS, 1998).

2.14 Least square error adjustment

Although the theory of least squares was developed in the late 1700s, because of the lengthy calculations involved, the method was not used commonly prior to the availability of computers. Instead, arbitrary, or "rule of thumb, "methods such as the compass (Bowditch) rule were applied. Now least-squares calculations are handled routinely and making adjustments by this method is rapidly becoming indispensable in modern surveying geometrics (Charles D.Ghilan, 2012).

The method of least squares is currently being used to adjust all kinds of observations, including differences in elevation, horizontal distances, and horizontal and vertical angles. It has become essential in the adjustment of GNSS observations and is also widely used in adjusting photogrammetric data. Adjustments by the least-squares method have taken on added importance with the most recent surveying accuracy standards. These standards include the use of statistical quantities that result from least squares adjustment. Thus in order to evaluate a survey for compliance with the standards, least-squares adjustments must first be performed. Least-squares adjustments provide several advantages over other arbitrary methods (Charles D.Ghilan, 2012).

First of all, because the method is based upon the mathematical theory of probability, it is the most rigorous of adjustment procedures. It enables all observations to be simultaneously included in an adjustment, and each observation

can be weighted according to its estimated precision. Furthermore, the least squares method is applicable to any observational problem regardless of its nature or geometric configuration. In addition to these advantages, the least-squares method enables rigorous statistical analyses to be made of the results of the adjustment, that is, the precisions of all adjusted quantities can be estimated, and other factors investigated. The least-squares method even enables resurvey planning to be done so as to ensure that required precisions of adjusted quantities are obtained in the most economical manner. (Charles D.Ghilani, 2012)

2.15 GPS and Its Importance for Cadastral System

GPS has gradually been replacing traditional procedures for conducting precise horizontal survey post processed GPS surveying with high accuracy and reliable result with a standard error of some millimeters has been well known and used quite a lot since many years. The observation times varies from minute to hours or days depending on the base line length and the condition of or the GPS observations. To reach this high accuracy it is required to use relative carries phase measurements and ITRF coordinates of the reference stations as accurate as possible. National GPS network is to provide the reference data for geodetic survey as a new type of geodetic control points.

GPS consists of a constellation of 28 satellites that provide continuous instantaneous position and time information to users around the world. GPS is suitable for a broad range of surveying applications including: cadastral/engineering set out, topographic mapping, and geodetic control. It is a system for fixing positions on the surface of the Earth by measuring the ranges to a special set of satellites orbiting the Earth. The effectiveness of any surveying and mapping technique is influenced to a large extent by the conditions in the field and the capacity of existing

institutions to deal with the vast amount of information that typically flows from cadastral and registration (Barnes.et al., 1998).

2.16 Total station and it's important for cadastral system

A total station is a combination of theodolite and electronic distance measuring device (EDM). With this device, as with a transit and tape, one may determine angles and distances from the instrument to points to be surveyed. With the aid of trigonometry, the angles and distances may be used to calculate the actual positions (x, y, and z or northing, easting and elevation) of surveyed points in absolute terms (Charles D.Ghilani, 2012).The electronic transit provides a digital read-out of those angles instead of a scale; it is both more accurate and less prone to errors arising from interpolating between marks on the scale or from miss-recording. The readout is also continuous; so angles can be checked at any time (If the source is the same with the preceding (ibid).

The other part of a total station, the electronic distance measuring device or EDM, measures the distance from the instrument to its target. The EDM sends out an infrared beam which is reflected back to the unit, and the unit uses timing measurements to calculate the distance traveled by the beam. With few exceptions, the EDM requires that the target be highly reflective, and a reflecting prism is normally used as the target. The reflecting prism is a cylindrical device about the diameter of a soft-drink can and about 10 cm in height; at one end is a glass covering plate and at the other is a truncated cone with a threaded extension. It is normally screwed into a target/bracket on the top of a pole; the pointed tip of the pole is placed on the points to be surveyed. (ibid)

The total station also includes a simple calculator to figure the locations of points sighted. The calculator can perform the trigonometric functions needed, staring with the angles and distance, to calculate the location of any point sighted. Many total

stations also include data recorders. The raw data (angles and distances) and/or the coordinates of points sighted are recorded, along with some additional information (usually codes to aid in relating the coordinates to the points surveyed). The data thus recorded can be directly downloaded to a computer at a later time. The use of a data recorder further reduces the potential for error and eliminates the need for a person to record the data in the field. (ibid)

CHAPTER 3

3. Methodology of the study

3.1 Back ground of the study area

3.1.1. Description of the study area

Bahir Dar is located in the north western part of Ethiopia with a total area of about 625km2 including its nearest satellite city. Geographically it is located at 11º36' 00"N and 37º23' 00" E. It incorporates the core city of Bahir Dar with three small urban centers as satellite towns; namely Zegie, Tis Abay and Meshenti with their rural vicinities as the council of Amhara National Regional State has named under the revised proclamation No. 91/2003. In relative terms, Bahir Dar is found at a distance of 567 km from the capital city of Ethiopia (Addis Ababa) along the road Addis Ababa - Gondar. It is one of the leading tourist destinations in Ethiopia, with variety attractions in the nearby Lake Tana and Blue Nile River (Haimanot, 2009). Fasilo is one of the sub city which includes five kebele and it is the area in which the modern Cadteral system were commencement in Bahir Dar city.

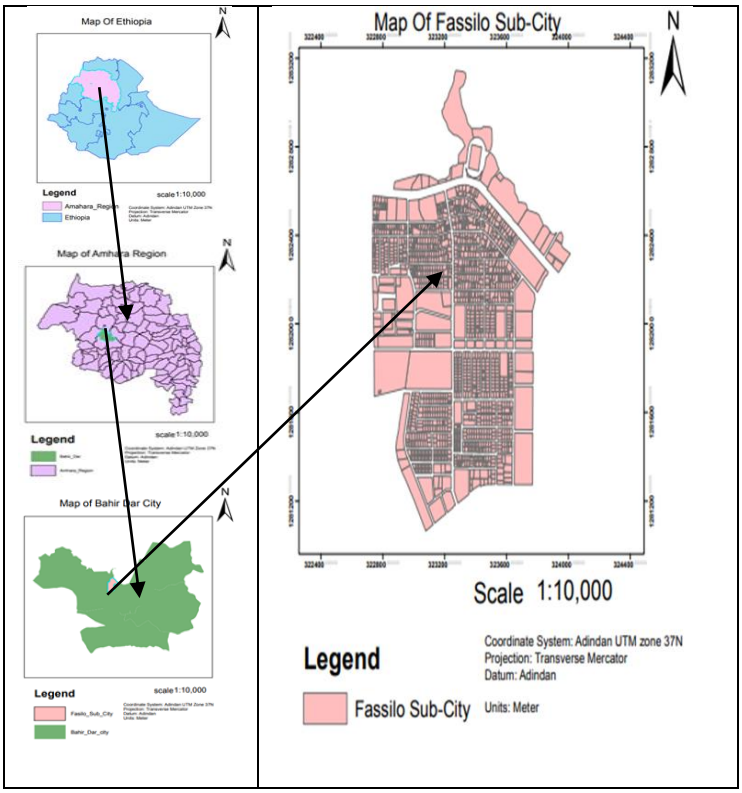


Fig 3. 1 Map of study area

3.2 Research Methodology

The researcher mainly used interpretative and in-depth inquiry rather than a broad survey. It complemented from both the primary and secondary data sources though un-structured face to face interview, questionnaires, field survey, and telephones way of data capture techniques. During the un-structured face to face interviews, questionnaires and telephoning the collected subsequent data where triangulated and crosschecked from purposively selected practicing cadastral surveyors, graduate surveyors, Geomantic academicians and government employed graduate surveyors.

The collected data were analyzed in both qualitative and quantitative data analysis and presentation approaches. The data were presented by frequency tables, diagrams, graphs and descriptive words with in their data resources, features of data and easiness of data representations.

3. 2.1 Sample Determinations

While carrying out a research on a large population is not feasible to consider the whole population in the study area so, to generalize some specific attributes about populationIneed to take samples, which selected for investigations in the study area. For examining the ongoing challenges and opportunities of cadastral surveying and mapping practice in Fasilo sub-city the researcher have select 20 land owners(block A,B,C,D in kebele 3) out of 113 parceled and none parceled blocks in Fasilo sub city for questionnaires and 15 cadastral surveying and mapping experts and managers target group stake holders from ANRS urban land holding registration and information agency, Bahir Dar city administration urban land holding registration and information office ,Fasilo sub-city urban land holding and administration office and control point densification surveyor organized team.

Procedures to select samples for investigation the researcher follow the following steps. FirstIlist very relevant stake holders for cadastral surveying and mapping works and to research objectives. Second identify large (land holders), small and target group teams (control point establisher surveyors, cadastral surveying map makers) for cadastral surveying and mapping works. Third for small and targeted Fasilo sub-city cadastral surveying and mapping experts and managers as a whole since their number is small and there was a key informant for the current cadastral surveying and mapping work in Fasilo sub city. Fourth for large number of Facilo sub-city cadastral surveying and mapping stake holders the researcher takes a sample to represent the whole populations. To represent a sample from the whole population first, the researcher identifies the total (competence and non-competence land certificates) population and blocks in selected kebele, then the researcher uses random selection to questionnaire and interview land owners.

3.2.2 Research data sources

In this research paper, both primary and secondary data were used, to present and conclude the final out puts of the research. Field survey and observations were primary sources of data whereas reference book, cadastral surveying and mapping standard directives and regulations, relevant data for this thesis in puts from internet and different research papers were secondary sources of data. Mostly the data were collected from ANRS urban land holding registrations and information agency, Bir Dar city administration urban land holding registration and information office, Fasilo sub-city urban land holding and administration office and Keble 3 urban land holding and administration offices.

3.2.3. Methods of Data collection procedures

The procedures to collect relevant data for this research starts at, the selection of stake holders for cadastral surveying and mapping work such as, 2nd and 3rd order cadastral surveying and mapping control point densification surveyor team, cadastral surveying and mapping work experts, Fasilo sub city urban land holding and land administrators, kebele 03 land holders and other cadastral surveying and mapping professionals and academician etc.

After selecting the relevant stakeholder, the researcher have prepare questionnaire, interviews and ready us to field survey to observe the coordination of cadastral surveying and mapping team, produced cadastral surveying and mapping outputs, location of demolished control points, number of land holder disputers result in inappropriate cadastral surveying and mapping performance, cadastral surveying and mapping output land certificate storages and other input to cadastral surveying and mapping works. Then after interviews and questionnaires were addressed to each relevant stake holders and observations were takes place at each explained data sources situated. Even though there were difficulty to capture the relevant data, this were the procedures to collect necessary data for this research.

3.2.4 Instruments and software used

In this thesis I used some cadastral surveying and mapping work instruments and GIS software to spatial analysis.

3.2.5 Method of data analysis and presentation

Since the data is collected from both primary and secondary source using direct observation, organized questionnaires, un-structure interviews and review of related research paper and documents data were analyzed and presented both qualitatively and quantitatively. Qualitative data is concerned with understanding human behavior from the informant's perspective, based upon the analysis of the data and the conclusions drawn from the research firmly rooted in the data (i.e. grounding all analysis and conclusions directly in the evidence that has been collected) and to analysis qualitative data we follow a certain stage.

The stages ,researcher used to analyze quantitative data includes: At the first stage the researcher have organized the qualitative data since were collected in different formats such as field observation, interviews, photographs texts etc. at the second stage I have identified appropriate codes for each cause by reading and re-reading texts or looking and re-looking the collected images and I have cross checked collected qualitative data from different sources .at third stage I have tried to coded and categorized the collected data to identify themes and relationships among the codes and categories which enable us to arrive at some generalized statements at the fourth stage I have to try verified the data with respect to accuracy, precision and generalization of the collected data. Finally concerned with proper documentation of the data during the whole process from raw data to conclusions I presented collected qualitative data as much as possible.

The collected quantitative data were concerned with discovering facts about social phenomena, assumes a fixed and measurable reality, data are collected through

measuring things, data are analyzed through numerical comparisons and statistical inferences and data are analyzed through statistical analysis such as numbers of established and demolished cadastral surveying and mapping control point densifications ,number of available and non-available cadastral surveying instruments ,number of professional in the study area and number of blocks and parcels in which cadastral surveying and mapping work is computed etc. were categorized and presented under the quantitative data analysis. Generally collected data were presented in the form of, table, charts, map and other form of data presentation were employed as necessary

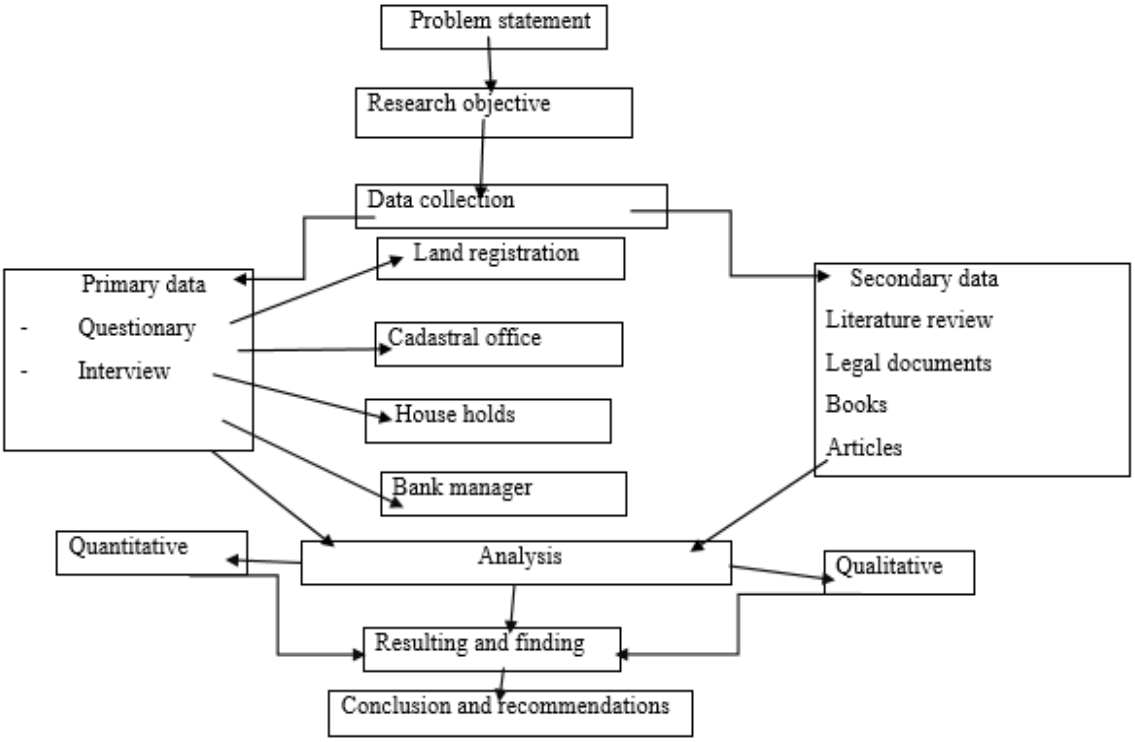


Fig 3. 2 Research method flow chart

CHAPTER FOUR

4. Results and Discussion

Introduction

This chapter mainly concentrated on the data analysis and discussions of finding and presenting the collected data from questionnaires, interviews and field survey results. The qualitative and quantitative approaches have been used to present and analyze the response obtained from questionnaires, interviews and field surveys.

4.1 General characteristics and back ground information of respondents

The general information of the respondents (households, targeted cadastral surveying and mapping experts and land administrators) social and economic characteristics such as age group, marital status, level of education of respondents have been gathered quantitatively and analyzed as follows.

i. Sex composition of the household respondents

Table 4. 1 Sex composition of the respondents

No.	Sex	Frequency	Percentage
1	Male	14	70%
2	Female	6	30%
Total		20	100%

Source: researcher questionnaires and respondents answer

As table 4.1 demonstrate most of respondents in the study area were males which composes 70% from the total landholder samples and the rest 30% of the respondents are females.

ii. Age distribution of the landholder respondents

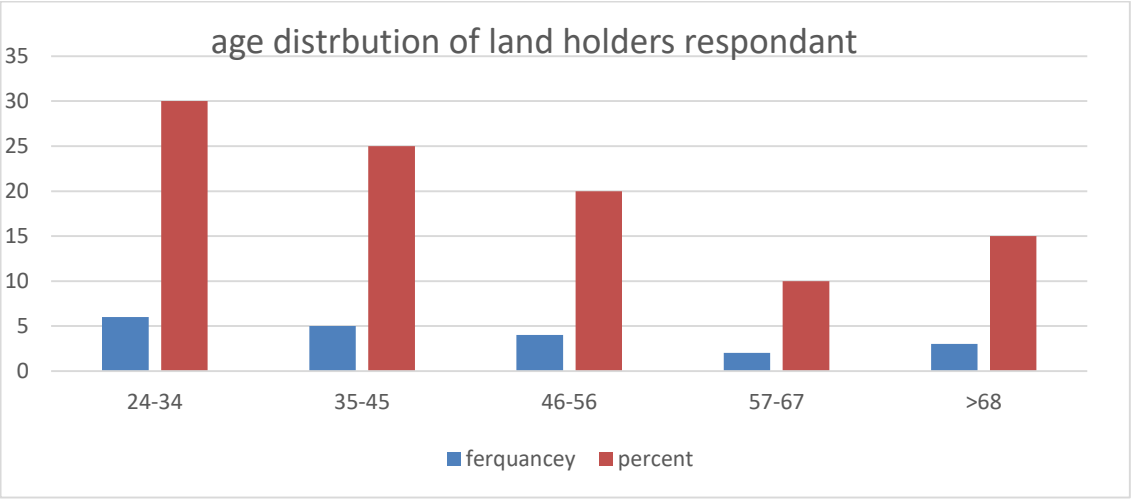
Table 4. 2 Sex composition of the respondents

No.	Age	Frequency of respondent	Percentage %
1	24-34	6	30
2	35-45	5	25
3	46-56	4	20
4	57-67	2	10
5	Above 68	3	15
Total		20	100

Source: researcher questionnaires and respondents answer

As table 4.2 shows that the majority of the household respondent's age founds in the range of 24-34 which is 30% out of the total house hold respondents (100%) and the rest of the household respondent's age 25%,20%,10% and 15% were found within the range of 35-45,46-56,57-67 and above respectively.

Graphical representation of age distributions



Graph 4. 1 age distribution of landholder respondent

iii. Education background of landholder respondents

Table 4. 3 Education level of landholder respondents

No.	Education level	Frequency	Percentage (%)
1	Illiterate	1	5
2	Read and write	1	5
3	Attained education from 1-4 grade	2	10
4	Attained education from 5-8 grade	3	15
5	Attained education from 9-12 grade	6	30
6	Diploma	3	15
7	Degree	3	15
8	Master	1	5
Total		20	100

Source: researcher questionnaires and respondents answer

As table 4.3 or graph 4.1 shows about 30%of the respondents accomplished their educations from 11-12 grade, 15% of the respondents were attained their regular education from 5-8 grade, 15% diploma level, 15%-degree level respondents and 10% of the respondents were attained their education from 1-4 grade, one illiterate (5%), one who can read and write (5%) out of the respondents and one who attained his masters were participate in the questionnaires.

Table 4. 4 Marital status of the landholder respondents

No.	Marital status	Frequency	Percentage (%)
1	Unmarried	1	5
2	Married	18	90
3	Divorced	1	5
4	Widowed	0	0
Total		20	100

Source: Researcher's questionnaire' and respondents answer

As indicated in table 4.4 above 90% of the households were married, one unmarried (5%) out of the respondents and the rest one respondents (5%) were divorced.

iv. Major Sources of income landholder respondents

Table 4. 5 Marital status of the land holder respondents

No.	Sources of income	Number of respondents	Percentage (%)
1	Government employed	5	25
2	Self-employed	15	75
Total		20	100

Source: researcher questionnaires and respondents answer

As table 4.5 shows the majority of the society in the study area were trades which cover 55% of the total sample taken, next to the commercial activities of income generation methods 25% of the respondents lead their livelihoods through government wages that is employed in governmental institutions, the rest of the respondents 15% and 5% generate their incomes from self-employed and cattle products respectively.

4.2 Mode of land acquisition of the landholders and Current land uses of landholder respondents

4.2.1 Mode of land acquisitions

In Fasilo sub-city as the respondent's response, all have a landing but the mechanism of land acquisition is different inheritance from their families and other relatives, through donations, purchasing, lease and other ways of land acquisition.

Table 4. 6 Mode of land acquisition in the study area

No	Mode of land acquisition	Number of respondents	Percentage %
1	From family through donation	2	10
2	Through inheritance from family	3	25
3	By purchasing	12	60
4	Through lease	1	5
5	From government by redistribution	None	None
6	Though rent	None	None
Total		20	100

Source: Researcher's questionnaire' and respondents answer

As shown table 4.6 above 60 % of the responders have got their land through the mechanisms of purchasing ,25% of the sample respondents got land from their families through inheritances, 10%of the respondents got the land by the ways of donation and the rest 5% of the respondents have got the land through the mechanisms of lease.

4.2.2 Current land use activities (respondents)

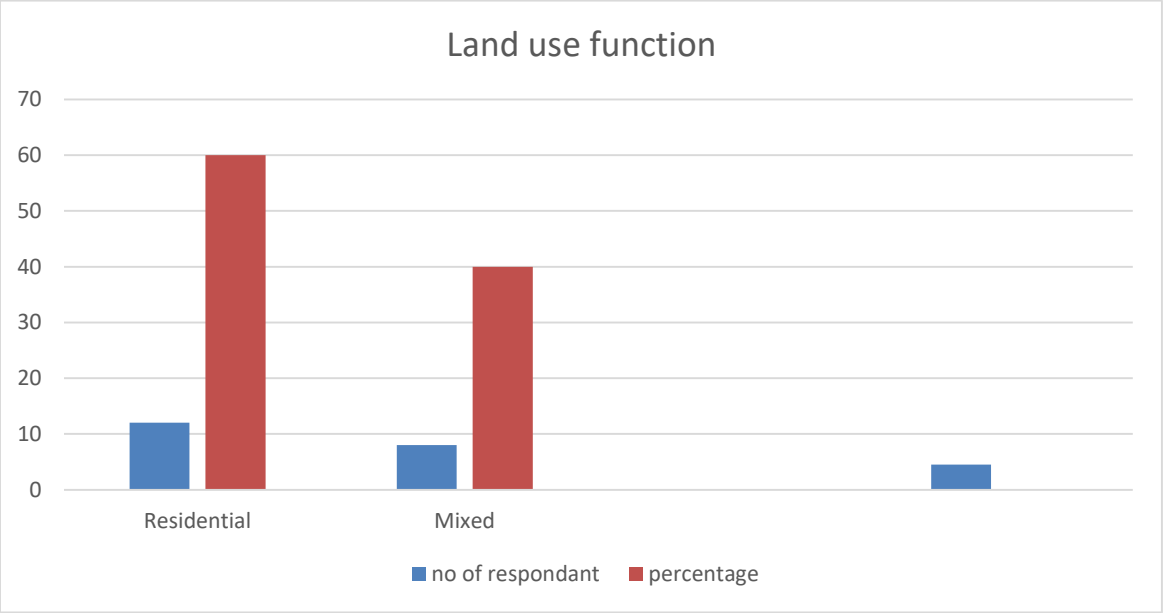
Table 4. 7 Current land use activities (respondents)

No.	Land use function	Number of respondents	Percentage (%)
1	Residential	12	60
2	Mixed	8	40
3	Commercial	None	None
4	Other	None	None
	Total	20	100

Source: researcher questionnaires and respondents answer

As you have seen from table 4.7 60% of the land holder use their land for the purpose of residence and the residual 40% of the land holder which found near the cross section of roads use their land for mixed residential Purpose.

Land use function in the study area are represented the Graph below.



Graph 4. 2 land use function in the study area

4.3 Sex status of focus group cadastral surveying and mapping experts, surveyors and map makers.

Table 4. 8 Sex status of focus group cadastral surveying and mapping experts, surveyors and map makers.

No.	Sex	Number of respondents	Percentage (%)
1	Male	13	86.67
2	Female	2	13.33
Total		15	100

Source: researcher questionnaires (target group) respondents answer.

As shown table 4.8, 86.67% of the target group cadastral surveyors and mapping work respondents were a male and the rest 13.33% female cadastral surveying and mapping work target group managers, surveyors and map makers were participated in the questionnaires and interviews parts.

1. Age distribution of the target group cadastral surveying and mapping works

Table 4. 9 Age distribution of the target group cadastral surveying and mapping works

No.	Age	Frequency	Percentage (%)
1	24-34	9	60
2	35-45	4	26.67
3	46-56	2	13.33
4	Above 56	None	None
		15	100

Source: Researchers questionnaire and respondents result

As the above table shows that the majority of the respondents (60%) are within the age range between 24-34 years, 26.67% of the respondents were found in the range between 35-45 years and the residual 13.33% respondents found in the range 45-56years.

2. Education status of focused group cadastral surveying and mapping works

Table 4. 10 Age distribution of the target group cadastral surveying and mapping works

No.	Education status	Frequency	Percentage (%)
1	Diploma	4	26.67
2	Degree	8	53.33
3	Master	3	20
Total		15	100

Source: researcher questionnaires and respondents answer

Table 4.10 demonstrate that 53.33 % of the selected managers, surveyor and map maker respondents were found in degree levels, and out of the total taken sample cadastral surveyors and map maker respondents 26.67% were diploma level and 20% master level managers, surveyor and map maker were participating in the questionnaires and interviews.

4.4 The status of established cadastral survey control points and their physical existence

4.4.1 Status of control point in the study area

Table 4. 11 Status of control point in the study area

NO.	Status of BHR 3^{rd} order CP	Frequency	Percentage %
1	Not demolished	24	60
2	Demolished	16	40
Total		40	100

Source: Field survey in the study area

As you observe from table 4.11 60% from taken sample established 3rd order control points were not demolished, even if their continuity founds on risky conditions. The rest 40% 3rd order control point densification was demolished due to different reasons.

4.4.2 Cause of 3rd order control points densification demolishment

Table 4. 12 Cause of 3rd order control points densification demolished

No.	Cause to demolish 3rd order CP.	Frequency	Percentage (%)
Land development activities	Road construction	10	62.5
	Due to water utilities activities	2	12.5
	Building construction	1	6.25
	Total	13	81.25
By other activities	Due to lack of awareness by society	3	18.75
Total		16	100

Source: surveyor response and field observations

As indicated in the table 4.12 above the majority causes to the demolishment of 3rd order cadastral surveying and mapping work survey control point about 81.25% were due to land development activities such as road construction, water utilities, house constructions and other land use plan implementation activities. The residual 18.75% 3rd order survey control point densification was demolished by society result in lack of awareness about the functions of survey control point and their extensive cost, time and man powers need for reestablishment.

4.4.3 Sample demolished 3rd order control point coordinates

Table 4. 13 Sample demolished 3rd order cadastral surveying and mapping work control points.

No.	3rd order CP name	Location	Coordinate	Remark
1	BHR 3rd 42	Not defined	323220.888, 1282560.006, 1790.698	Re-established
2	BHR 3rd 43	At the back of wereda courts	323331.915, 1282577.578, 1790.294	Lost
3	BHR 3rd 44	In front of Kistel	323430.985, 1282516.808, 1790.019	Lost

Source: cadastral surveyor interview and field observation

4.4.4 Estimated cost of 3rd order control point to establish

Table 4.13 Estimated cost of 3rd order control point to establish

No.	item	Single price in EB	Total cost for each item in EB	Total cost for CP in EB
1	Demolished	2800-3500	3150*15=74250	75500
2	Re-established	1000-1500	1250*1=1250	

As demonstrated in table 4.14 the total cost of the cadastral survey control points was 75500 EB in Fasilo sub-city from taken sample survey control point. This also a high cost to the institute to establish control points in nationally.

As the interview result shows from ANRS urban land holding registration and information agency surveyors, to densify 3rd order survey control points as they use 2nd order survey control point which established by Ethiopian geospatial information agency (EGIA) and the mandate is given for the agency as the whole country level. Related to the establishment of cadastral surveying and mapping control points, the surveyor explain the existence lack of awareness make survey control points to demolish, shortage of finance, transportation, surveyors and the non-existence of

potential success of cadastral system physical secure with arrangements in the place for duplicate storage of records in case of disaster and control points secure unauthorized person changes information.

4.5 situations on the current cadastral surveying and mapping works in the study area

4.5.1 Situations on cadastral surveying control points in line with literature's views and stated provisions

The federal urban landholding registration proclamation No.818/2014 article 23(3) cadastral survey control points shall get protection in accordance with regulations to be issued for the implementation of the federal urban land holding registration proclamation No.818/2014. In addition to this proclamation Protection suitable for safe guarding survey control points shall be built and guarding shall be under taken based on the standard get by authorized body and shall have legal backing as per article 22(1) of the federal urban cadastral surveying Re.No.323/2014.

In Fasilo sub city the cadastral surveying control points, as the researcher demonstrated from table 4.11, from the total taken 40 3rd order established cadastral surveying control points, 40% of established 3rd order control points were demolished by different causes. As the questionnaire and interview result shows in table 4.12 the majority causes to the demolishment of 3rd order cadastral surveying and mapping work survey control point about 81.25% were due to land development activities such as road construction, water utilities, house constructions and other land use plan implementation activities. The residual 18.75% 3rd order survey control point densification was demolished by society resulted in lack of awareness about the functions of survey control point and their extensive cost, time and man power need requirements.

Look it the current cadastral surveying 3rd order control point, situation from the following figures.

Fig 3. 3 Image of second order survey control point during field observation

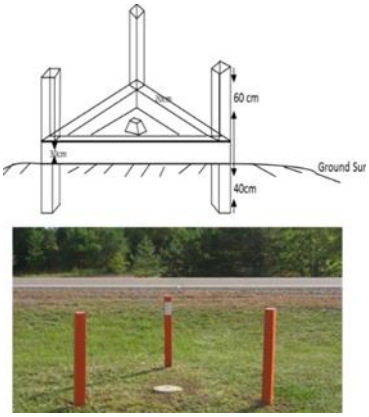


Fig 3. 4 standards of survey control points and its protection

4.5.2 Evaluation of cadastral surveying control point markers status in line with provisions and literature's view.

Control point provides that a framework of survey points, whose relative positions, in two or three dimensions, are known to prescribe degrees of accuracy in order to determine the positions of features on the topographical part of the earth, in cause of cadastral surveying and mapping it used as a reference to capture a relevant cadastral data.

Although, The federal urban landholding registration proclamation No.818/2014 critically provided that cadastral survey control points shall get protection in accordance with regulations to be issued for the implementation of the federal urban land holding registration proclamation No.818/2014, In addition to this proclamation Protection suitable for safe guarding survey control points shall be built and guarding shall be under taken based on the standard get by authorized body and shall have legal backing as per article 22(1) of the federal urban cadastral surveying, Re.No.323/2014 and cadastral survey control points are a very crucial ,cost effective ,require experienced and extensive trained cadastral surveying experts ,it provide excellent opportunities not only to cadastral surveying observation but also to other construction survey works and it have a great factors on the overall cadastral surveying performance .

In fasilo sub city, the cadastral surveying control point markers were found in a risky condition. Some survey control points were established near to constructing buildings which will be causes to multipath errors. Generally, as the cadastral control point observation, interviews from cadastral surveying team, captured demolished survey control point marker photo and coordinates shows, the established second and third order survey control point markers have not given appropriate protections by the ANRS urban landholding registration and information agency, Bahir Dar

urban city urban landholding and registration office and by Fasilo urban land administration office as well as by the society.

Therefore, regarding to cadastral survey control point markers, there is a challenge, in which the cadastral survey team as well as the other cadastral surveying stakeholders not considered.

4.5.3 Measurements should be taken to survey control points

The second and third order cadastral survey control points should be incorporate with the urban land use planning proposals. In addition to this, first when cadastral survey control points established, there should be exist the urban water and sewerage utility experts, urban electric installation professionals, road constructor and other relevant stake holders. Because most of the cadastral survey control points were demolished by the urban land use developments. Second, there should be a protection layers to save it from unexpected external damages.

Third, there should be a deepest awareness about the applications, expensiveness cadastral survey control points both in financial and manpower to the society.

4.6 perception of the land holders on land dispute before, during and after cadastral surveying and mapping activities

1. Perception of land holder on land dispute, before, during and after cadastral surveying and mapping.

Table 4. 14 Perception of land holder, before, during and after cadastral surveying and mapping works

No.	Whether faced land related conflicts	Res.	Frequency	Percentage (%)
1	Before cadastral surveying and mapping	Yes	13	65
		No	7	35
	Total		20	100
2	During cadastral surveying and mapping	Yes	15	75
		No	5	25
	Total		20	100
3	After cadastral surveying and mapping	Yes	12	60
		No	8	40
	Total		20	100

Source: Perception of land holder response

As you have seen from the table 4.14, shows that ,there is conflict before cadastral surveying and mapping was conducted 65% of the respondents were addressed,75% of the respondents were answered the questionnaires there was conflicts during cadastral surveying and mapping works due to different reasons but after cadastral surveying and mapping work 5% of the respondents were get solutions, After cadastral surveying and mapping also there is unsolved conflicts as indicated table 4.14 ,60% of the respondents answered until now their land conflict issues are not solved. Generally, before, during and after cadastral surveying and mapping work

the feeling of respondents related to land conflict no response is below half out of one hundred percent.

2. Cause to land conflicts from landholder respondents

Table 4. 15 Cause of land conflicts from landholder respondents perspective

No	What were the causes to land disputes?	Frequency	Percentage (%)
1	Boundary	15	75
2	Other(inheritance, purchase issues)	5	25
Total		20	100

Source: Researchers' questionnaires and respondents result

According to the respondent's response, from table 4.15 the major cause to land holder's disputes were the issues of boundary. 75% of the respondent's attitude faced on boundary demarcations. The rest 25% out of the total land dispute cause were belongs to non -sizable legal land holders exclusive and inclusive issues in the cadastral systems such as disputes related to landholdings and possession, in a sense to "whom the parcel belongs" e.g. Inheritance.

2. Parcel size change before and after cadastral surveying and mapping work

Table 4. 16 parcel size change before and after cadastral surveying and mapping work

No.	Is there a parcel size change before and after cadastral surveying and mapping work	Number of respondents	Percentage (%)
1	Yes	15	75
2	No	5	25
Total		20	100

Source: interview result of household

As you have observed in table 4.16, 75% from the total respondents of the land holder explain the parcel size of their holding have been changed after the cadastral surveying and mapping works were takes place. The rest 25% of the respondents explain that there was no a parcel size change after the cadastral surveying and mapping work were done.

3. Parcel size change after the cadastral surveying and mapping work were done

Table 4. 17 Parcel size change after the cadastral surveying and mapping work were done

No	Difference	Parcel size change	frequency	Percentage (%)
1	Change	Increase	7	35
		Decrease	8	40
2	No Difference	No change	5	25
Total			20	100

Source: Researchers questionnaire and respondents result

As indicated table 4.17, 40% of the respondent's parcel size were decrease after the performance of cadastral surveying and mapping from their previous parcel size and from the total respondent's parcel size 35% of land holder parcel size were increases and the rest 25% respondents parcel size were not change.

4. Expanse of parcel size change/difference between previous and after cadastral surveying and mapping work.

Table 4. 18 Expanse of parcel size change between previous and after surveying and mapping work.

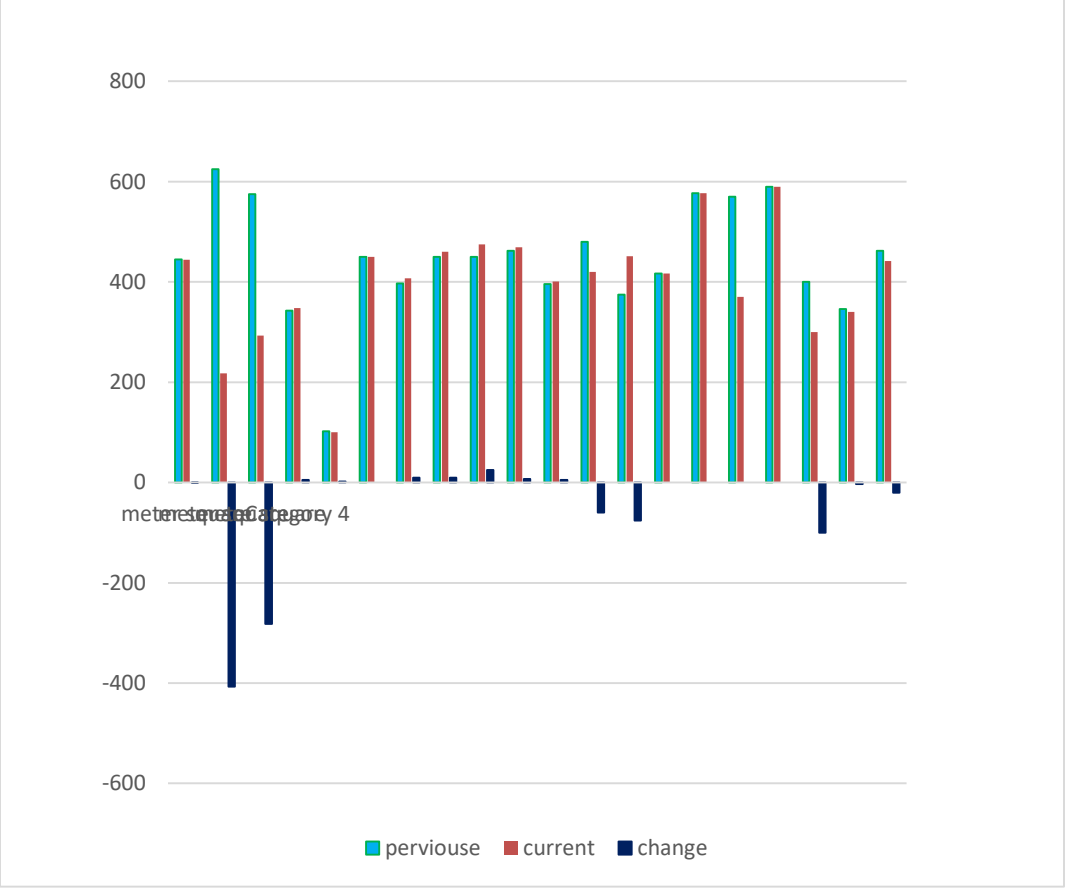
No.	Landholder N.	Former parcel size (in m^2)	Current parcel size(in m^2)	Changes(in m^2)
1	B. M.	445	444.5	-0.5
2	T.Y	625	218	-407
3	Y.	575	293	-282
4	T.A	343	348	+5
5	Z.	480	511.98	31.98
6	Y.	450	450	0
7	K.	397	407	+10
8	A.	450	460	+10
9	G.	450	475	+25
10	H.	462	469	+7
11	T.	396	401	+5
12	A.	480	420	-60
13	B.	375	451	-76
14	Z.	417	417	0
15	Y.	577	577	0
16	S.	370	370	0
17	M.	590	590	0
18	K.	375	345.51	-29
19	U.	346	340	-3
20	U.	462	442	-20

Source: researcher questionnaire and landholder response result

As the above table 4.18 shows, the major parcel size were changed from previously, even though it is difficult to identify whether the previous parcel size measurement is correct or not from the current cadastral surveying and mapping work parcel size

measurements, the deviation between previous parcel size and the current parcel size make the landholder perception on cadastral surveying and mapping work less and it results boundary conflicts with their neighbor.

In table 4.18 the parcel size indicated in number 2, 3, 12, and 13 were incompetence due to disagreements between neighbors their previous acquisitions, high difference between previous landholdings size and the Cadastral surveying measurements.



Graph 4. 3 Expanse of parcel size change between former and after cadastral surveying

The feeling of land holder on the advantages of cadastral surveying and mapping practice:

In general, the feeling of land holders' respondents to the advantage of cadastral surveying and mapping work in terms of use the land wisely and better management, to tenure security, to transfer their holding, to property tax and in terms of mortgages.

Table 4. 19 Advantage of cadastral surveying from respondents outlook

No.	Do you expect that cadastral system give:	Response	Number of respondents	Percentage (%)
1	Help to use the land wisely and better management	Yes	16	80
		No	4	20
Total			20	100
2	It gives tenure security	Yes	18	90
		No	2	10
Total			30	100
3	Help to transfer land rights legally through donation rent, inheritance	Yes	17	85
		No	3	15
Total			20	85
4	Help to pay proper tax with the proportion of land size	Yes	16	80
		No	4	20
5	Help to mortgage	Yes	14	70
		No	6	30
Total			20	100

Source: from land holder response

As you have seen in table 4.19, 80% from the total respondents of land holders explain the opportunities of cadastral surveying and mapping helps to them use the land wisely and better managements, but the res 20%of the land holder disagree with cadastral surveying and mapping works.

Regarding to tenure security most of respondents 90% were believed cadaster have good advantages, but the rest 10%disagree with cadastral surveying and mapping on their tenure security, since during and after cadastral surveying and mapping there is conflict regarding to parcel bounders' demarcations.

85% of respondents explained that cadaster creates opportunities to transfer land legally from parents though inheritance, donation and to purchase their holdings rights. But the rest 20%of the respondents were not accepting the use of cadastral surveying and mapping works.

In the cause of tax payment 80% of the respondents were believed that cadastral surveying and mapping work advantageous, to allocate appropriate tax base on the land size but 20% of the respondents not satisfied on cadastral surveying and mapping work to pay appropriate tax proportional to their land sizes.

As the announcements of table 4.19 regarding to the importance of cadastral surveying and mapping for the purposes of mortgages 70%from the total respondents were agree even if the process is complex and time taken, and also out of the total land holder respondents 30% land holder respondent dis agree on the cadastral surveying and mapping work for mortgage purposes.

4.7 situation, evaluation and measurements should be taken to boundary demarcation and disputes in the study area

4.7 .1Situation on boundary demarcation and dispute in the study area

For Cadastral survey as a solution to land problems,(Monteath ,1990) has observed that, since time immemorial ,the determination of boundary has been crucial to the orderly development of society and man's peaceful coexistence with his neighbors .To this end cadastral survey may be looked at as the basis for solving land problems when they are used for ascertaining the positions of boundary during demarcations(where boundary cleared and created),adjudications(e.g. when neighbors walk common boundaries) and boundary definitions (when numerical values and graphical representations are made). where every neighbors know and accepts the positions of his boundaries through the existence of recognized boundary marks, land dispute may be considerably minimized.

On this aspect, (Monmonier ,1985) observes, good boundaries not only make good neighbor but also help prevent dispute ranging from bitterness among home owners arguing about a hedge to war among countries contesting an international boundary.

Boundaries are appropriate where the development of the land scope is mature for example where in urban area the pattern of use is well established. They are also participatory useful when the owner ship of the land can be ascertained which it being necessary to consult the owners of adjoining, and the clear marking of parcel boundaries helps assure that owners and their neighbors have common understanding of the location of each parcels (smith and Holstein 1987). In addition to this Williamson (1986) explain as, Dispute concern land and boundary can give rise to extensive litigations. The settlements of such dispute should be part of the process adjudication and will not only lead to greater productivity from the land but also reduce the money wasted on litigation and going to courts.

But in Fasilo sub city as the land holder response from the given questionnaires indicated from table 4.15, the major cause to landholder's disputes were the issues of boundary. 75% of the respondent's attitude faced on boundary demarcations. The rest 25% out of the total land dispute cause were belongs to non -sizable legal landholders exclusive and inclusive issues such as disputes related to parcel owners, in a sense to "whom the parcel belongs" example inheritance. As demonstrated in table 4.14 and from land holder interview results show, even though there were 65%of land conflicts before cadastral surveying and mapping work, after cadastral surveying and mapping also there is unsolved conflicts as indicated table 4.7 ,60% of the respondents answered until now their land related dispute issues are not solved.

4.7.2 Evaluation on boundary and land disputes in line with literature's views and the standards

Since boundary is the extreme limits of something, as for a land parcel, a boundary is the line, alone or together with others which encloses or defines the limits of the land parcel. Such boundary limits may be described in terms of numerical data (such as bearings and distance or coordinate values), in which cause this gives rise to fixed boundaries e.g. Boundaries that are numerically described. parcel boundary limits may also be described by the location of physical features, (such as a river, a ditch, a road, and a mountain range) on the ground. According to (smith and Holstein 1987), boundaries are appropriate where the development of the land scope is mature for example where in urban area the pattern of use and its boundary is well established. They are also participatory useful when the ownership of the land can be ascertained which it being necessary to consult the owners of adjoining, and the clear marking of parcel boundaries helps assure that owners and their neighbors have common understanding of the location of each parcel.

But in Fasilo sub-city, as the field observation and interview result indicate that, during boundary demarcation and after the delineation of parcel takes place, there is disputes related to parcel bounders between neighbors due to lack of appropriate existed parcel boundary information, such as parcel size variations before and after parcel boundary demarcations as demonstrated in table 4.18 questionnaires results , parcel boundary demarcation survey takes place in the absence of both adjacent land neighbors and lack of awareness about parcel boundary survey equipment and instruments deviations for their previous and current parcel size, weak involvement of dispute resolution mechanism (lack of integrity between right creator and cadastral survey team).

Generally, even though, as the interview and field observation results shows that the values of a pieces of land depends up on among other things, on the accurate descriptions of its boundaries, an owner needs to know the extent of the land he/she is buying and where he/she may erect a fence, the adjudication process try to minimize boundary claims and disputes as presented in table 4.14 by five percent. The fact indicate that 60% boundary demarcation issues were found the major cause to land dispute between land holders.

4.7.3 Measurements should be taken on boundary and related disputes

First there should be affirmance awareness on the boundary demarcation survey equipment and instruments accuracy used to measure the parcel boundary were differing. Second, check the previous parcel detail information about each side boundary.

Third, there should be present all neighbor land holders during boundary demarcation. Fourth, there should be geographically linked coordinate-based reference during tape measurements, not should be only dimension based. Fifth, if surveyors use tape there should be error minimization computation techniques on tape measurement factors, which indicated appendix 6 in this paper. Six, establish visible boundary markers on the center of adjacent parcels in the presence of both neighbors.

4.8 situation and evaluation on institution integrity and other Cadteral system stakeholders.

4.8,1 Situations on institutional integrity and other stake holders

To the effective implementation of a cadaster operations the establishing of a functional system of relationship among several institutions for the establishment, maintenance use and future refinements of the cadaster is required. No part of the system is entirely independents of the others (institutions), and if one part fails, the system breaks down (UNECA, 2003).

In Fasilo sub city, as the field observation, interview result from Fasilo sub city urban land holding and administration office, interviews from land holders in kebele 3 and related to boundary disputes as indicated in table 4.15, the urban land holding and administration office and the cadastral surveying and mapping team from Bahir Dar city administration urban land holding registration and information office, have data variations related to dispute resolutions, parcel size determinations. And as the cadastral surveyor explain when they come to survey boundaries of parcels, to

collect topographical data they have not got legal documents which shows the land belongs to the current land users or not (kebele house) from right creator institute .The far apart of the institutions also make the experts unable to get an up to date, day to day available information exchanges (e.g. When boundary dispute rise between neighbors in Fasilo sub city) in addition to that the cadaster surveyor explain as they have not sufficient transportation services due to less commitment of governments to cadastral surveying and mapping works. By limiting annual budget allocation, due to weak interaction between cadaster office and stake holders, weak institutional organization, insufficient experts and absence of competitive cadastral project works, make the cadastral activity not completed at planned time.

4.8.2. Evaluation of institutional integrity and other stake holders in line with literature's views

As UNECA (2003), explain no part of the system (cadastral) is entirely independent of others and if one part fails the system break down. So, Integrated cadastral surveying and mapping stake holders is crucial issues in the effective implementation of cadaster operations, which involves the establishments of a functional system of relationship among several institutions for the formation, maintenance use and refinements of the cadaster.

But as the field observation and interview from Fasilo sub city urban land holding and administration office, interviews from land holders in the kebele and related to boundary disputes as indicated in table 4.14, the urban land holding and administration office and the cadastral surveying and mapping team from Bahir Dar city administration urban land holding registration and information office shows that, 60% of the land holder respondent's attitude faced on boundary demarcations disputes (table 4.14). Due to absence of quick land dispute resolutions during demarcation of parcels, give two parcel identification no. for single

parcels(AM001010205011 and AM0010102050 12, AM001010205020 and AM001010205021), causes to give two parcel assignation were ,landholder have two doors for his holding fence ,it implies during parcel identification assignation the land holder not present this results in data duplication, require more man powers, survey instruments and cost due to parcel number increments. Existence of parcel size variations and leads to land holder's further money, time and labor lost for litigations (interview from land dispute claimant), Less commitment of governments to cadastral surveying and mapping works, by limiting annual budget allocation (interview result from managers).

Therefore, due to weak interaction between cadaster office and stake holders, weak institutional organization, insufficient experts and absence of competitive cadastral project works, make the cadastral activity not completed at planned time

Measurements should be taken from researcher point of views:

First, all relevant stake holders for cadastral surveying and mapping work should be identified for each cadastral surveying and mapping works steps. Second, create awareness give responsibility for each stakeholder. Third, addressed their responsibilities during the step were their responsibilities arrive.

4.9 situations and evaluation on the current cadastral system to security for mortgages

4.9.1 Situation on security for credits in line with literature's view

The land title can be used as security against any loans and appropriate investments in establishing a cadaster and improving one provide both short- and long-term benefits. Title with the ability to raise long term credit can give raise to sustainable increase in productivity from the land (Williamson, 1986).

In Fasilo sub city, as the announcements of table 4.19 regarding to the importance of cadastral surveying and mapping for the purposes of mortgages 70%from the total respondents were agree even if the process is complex and time taken, and also out of the total land holder respondents 30% land holder respondent disagree on the cadastral surveying and mapping work out put land certificates for mortgage purposes. But even if the majority of the respondents expect to the land certificate used as mortgages, due to lack of coordination between right creator and financial institutions, lack of awareness land holders fair a challenge during debts. As the Birhan international bank managers explain to collateral the land holding for credits, there should be necessary conditions to be full filed such as, paid the current tax, have no other debts by his/her land holding certificates etc…

4.9.2 Evaluation on the Situation on security for credit

The land title can be used as security against any loans. Appropriate investments in establishing a Cadaster and improving one (e.g. through computerization) provides both short- and long-term benefits. Such cadastral reforms should be based on a good understanding of user requirements and system constraints and on an achievable system design. Some of the benefits include: more security of land tenure, better access to long-term credit, increased productivity of land, lower transaction costs on the real property market, cheaper information for land administration, more equitable and cost-effective collection of land taxes (Williamson, 2000).

In Fasilo sub city the land owner who have the land certificate can use their land as security for credits from various business institutions such as government bank, private banks and credit association s. But the borrower business institutions necessary demands for the verifications of the legitimacy of the land holding certificate which is turn to be carried out by the land management office. The business institutions would be using the land holding certificates of the owners, who

are seeking for credits, only after they got a letter of conformations from the land management office. This implies the absence of efficient, effective and up to date land registration system is imposing significant limitations against land owners who are desired to use their immovable property as guarantee to get credit. Generally, even though 70% of the selected land holder respondents, believe that the land certificate secure credits, the complex process of business debts make them fair not get quick access from creditors.

Regarding to use land wisely and in better ways, land holding right transfers and paying tax as the respondents' expectations the cadastral system will be create a good opportunity for the land holders. Since, from the total taken sample respondents, 90% land holder respondents belies that cadastral work guarantee for their land holding, 85% of the respondents demonstrate that cadastral system work will be advantageous to transfer their holding to other (rent, inheritance, purchase), 80%of the respondent explain that the cadastral system will be help to them in the management, better use and to increase land productivities and the other opportunities regarding to the cadastral system,80% respondents justify that, it will used to pay appropriate tax. However, the land holder expects cadastral system coming with those opportunities the process of boundary demarcation, the weak land dispute resolution mechanism and kebele official's maladministration make them a great fair for their land holdings. So, to increase security for credits there should be interconnection between right creator and financial institutes.

4.10 Challenges and opportunities of cadastral surveying and mapping

As the field observation, questionnaires and interviews result shows, the cadastral surveying and mapping work is very essential to demarcate parcels and to produce coordinate based land holding certificates, however cadastral surveying and mapping work have multidimensional advantages ,due to different performance challenge such as insufficient budget to compute the proposed cadastral surveying and mapping work, complex forms and procedures of cadaster existed features were densify, ,lack of commitment from political to cadaster. Additionally, even though the rational justification for the commencement of cadastral surveying and mapping work is to properly manage limited urban land and related properties, increase revenue, enhance delivery services. There are different conditions which obstacles the performance of cadastral surveying and mapping works within the planned time. Among the challenge to cadastral surveying and mapping works are: less interaction between cadaster office and other stakeholders, due to weak institutional organizations, lack of finance, and cadastral surveying and mapping instruments and experts. Shifting of existed bench marks, lack of basic available instruments, computers and the cadastral surveying and mapping work not lead by project makes the processes of cadaster late and cause to incompetence land holding certificate. From the following table 4.20 lock it the produced cadastral system based landholding certificates.

Table 4. 20 Land holding certificate status

No.	Competence of land certificate	Frequency	Percentage (%)
1	Competent and taken	161	35.23
2	Competent and not taken	147	32.17
3	Incompetent	149	32.60
Total		457	100

Source: Fasilo landholding registration office

According to table 4.20 shows 35.23% out of the total 457 parcels of cadastral surveying and mapping work land certificates were taken by the land holders, 32.17% from the total 457 parcel holder, the land holder not take their certificate and the rest 32.6% were incompetent due to different reasons and have problem officially.

CHAPTER FIVE

5. Conclusion and Recommendation

5.1 General Conclusion about the study

Based on the investigation, cadastral surveying and mapping practice in Fasilo sub-city I conclude that even though cadastral surveying have great role in the management in land information systems and other land holder based services, the performance of cadastral surveying and mapping work challenged by different obstacles. Those challenges were observed on different cadastral surveying and mapping procedures from the investigation perspective the investigator would like to conclude that:

- The demolishment of cadastral surveying control point, by different reasons intentionally and unintentionally due to urban developments, lack of awareness and lack of protection layers make the cadastral surveying experts not get available information on time when they collect topographic data, this also make the cadastral system become let and mistaking reference points such BM.
- The disappearance of cadastral survey control points make the cadastral system institute fail in financial expenditures because the material which used to prepare monuments were very expensive, in addition to this it increases actual planned time for the overall cadastral surveying and mapping works.
- The variation between the existed documents and the cadastral surveying measurements make the land owner perceptions lower to boundary demarcations accuracy and lead them to disputes, this situation challenged the performance of cadastral surveying and mapping and results in increase the cost of landholders for courts litigations process.
- The weak integrity between municipality and cadastral surveying and mapping institute (existence of different files between the two institute,

consumptions of land owner's claimants time, money and make them her and there) and weak operational coordination between municipality survey and map preparation experts and the cadastral surveying team experts come with parcel size variations, boundary disputes and result in the cadastral surveying and mapping work to be late.

- Based on the investigations on the cadastral system service land owners believes that the cadastral system gives them tenure security, to pay proportional tax with the parcel size, to facilitate landholding acquisitions, in consideration with the cadastral system is modernized and computerized, but the land owner greatly fail on the increases and decrease of their land holding parcel size and make them less perceptions to cadastral surveying and mapping work in the study area. This less perceptions of landholders towards cadastral system, results in weak involvement of society participation and believes the Cadteral system.
- Regarding to the exchanges of collected data from cadastral survey team to cadastral map makers not that much obstacles the cadastral system, even though there were missing data they correct each other since they work in one office in the study area which is good for the cadastral system successfulness.
- Generally, the researcher tries to found challenges which obstacle the operations of cadastral surveying and mapping works that make the cadastral service and performance in the study area (urban) to late and time consume were:
  - The demolishment of Cadteral survey control points
  - The existence of weak society awareness for survey control points
  - The only existence of dimensional based parcel documentations in former holdings
  - Weak integrity between the municipality and cadastral survey team

- The variation between aforementioned documents and cadastral survey measurements
- Weak operational coordination between survey and map preparation experts, cadastral survey and mapping experts.

5.2 General Recommendation about the study

- Second and third order Cadastral survey control points should be incorporating in the proposed urban land use plan, if cadastral survey takes place in parallel with the proposed land use plan. But if the survey control points were established on existed land use plan which requires land developments, there should be integrity between land development experts (road construction experts, water and sewerage experts, especially high power tension electricians and others) and the cadastral surveying and mapping team experts. After survey control points were established there should be a protective layer to protect unintentionally activities.
- The regional urban land holding administration and registration as well as the federal urban land holding administration and registration agency, should be make adjustments on land owners parcel which were held without legal permition, minimum parcel size and formulate standards to shape this challenge and to continue the cadastral system by understanding the variation between existed documents and the current cadaster survey measurements.
- To effective cadastral surveying and mapping work, there should be cooperative coordination between right creator institution and the cadastral surveying and mapping teams, since document variations results in parcel re-survey and increment of actual performance than planned performance time
- On the land holding right certificate there is no indicated land rights, responsibilities and responsibilities, so it should be incorporate on the landholding certificates since, it will be one way of understanding land rights and duties by landholders.
- When linear and angular observations faced in misclosure, there should be appropriate error minimization or adjustment techniques, such as least squares for survey and map preparation stages and there should be coordinate based reference for tape measurements, since only dimension based(sketches) measurements fit everywhere and results to shift features from their locations.
- Awareness creation should be conducted or given to the society before cadastral surveying and mapping work is implemented.

- Since the shift of Cadteral surveying control point have a great factor on the overall cadastral surveying observations, there should be triangulation checks for each coordinate BM.
- Before the starting of cadastral surveying, there should be clearly defined agreements between two adjacent land holders.
- To facilitate land transactions such as mortgages the financial institutions should have an awareness and security for the land holder certificates.
- Finally, the researcher would like to recommend that, since in Bahir Dar University (land administration institute) there are a very talented and experienced surveyor team, so the researcher would like to recommend that the urban land holding and registration bureau should be work integrally and share experience and consultations from this institutes.

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Appendix 1

Correction	Sign	Formula
Absolute length (c_a)	±	$\frac{c}{l}L$
Temperature (c_t)	±	$\alpha(t_m - t_0)L$
Pull (c_p)	±	$\frac{(P - P_0)}{AE}L$
Sag (c_g)	–	$\frac{1}{24}\left(\frac{W}{P}\right)^2 L$
Slope (c_s)	–	$(1 - \cos\theta)L$ *(exact)*
Alignment (c_m)	–	$\frac{h^2}{2L}$ *(approximate)*
Mean sea level (c_{msl})	–	$\frac{d^2}{2L}$ *(approximate)*
		$\frac{HL}{R}$ *(approximate)*

Correction applied to tape misclosures