

An Overview of the Cadastral System in Tanzania

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SUMMARY

In Tanzania cadastral survey is done in both urban and rural areas. The approach and methodology are quiet similar with slight exceptions where in urban areas the execution of cadastral survey requires a prepared physical Town Plan (TP) drawing(s). The Land Survey Act permits only licenced surveyor to carry out cadastral survey and their certification is done by the National Council of the Profession Surveyor (NCPS) established in 1977. The origin of cadastral survey in Tanzania is traced back in the 1890's years under the German Colonial Administration. After the First World War, the British followed the footsteps of the German administration until 1961 when Tanganyika got her independence. From the start up today, cadastral survey have been used to produce important information's for supporting land ownership system. Tanzania uses title registrations system with two forms of occupancy which are; granted right of occupancy which is given to the general and the customary right of occupancy which is given to the village lands. The cadastral surveying is administered by the government under the Ministry of Lands, Housing and Human Settlements Development (MLHHD).

This paper presents an overview of cadastral system and its historical development in Tanzania Mainland. Also, it provides an overview of the land ownership system and the institutional structure that deals with land surveying, planning and the administration system. Finally it presents some findings on the cadastral strengths and weakness/challenges with their suggested improvements, threats and opportunities.

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1. HISTORICAL BACKGROUND

Tanzania is located on the east coast of Africa between longitude 29° - 41° east and latitude 1° - 12° south of the equator. It frontiers to Kenya and Uganda to the North, Rwanda, Burundi and Democratic Republic of Congo to the West, Zambia and Malawi to the Southwest, Mozambique at the South, and the Indian Ocean to the East (NBS¹, 2013). Tanzania has an area of 933,611 km² of which 886,000 km² is occupied by land and the rest is water bodies including rivers, lakes and the Indian Ocean (Silayo 2003). The 2012 Population and Housing Census (PHC) which was the fifth Census after the Union of Tanganyika and Zanzibar in 1964 shows that, Tanzania has a population of 44,928,923 of which 43,625,354 is in Tanzania Mainland (Tanganyika) and 1,303,569 is in Tanzania Zanzibar (island). It also records 29.6% live in urban and 70.4% live in rural areas (NBS², 2013).

The history of cadastral survey in Tanzania is grouped into two phases; that is before and after independence in 1961. Before independence during the colonial rule, Tanganyika was under the German in the years between 1890 and 1914 and after the 1st World War was under the British in the years between 1919 and 1961. In 1893 the department of surveying and agriculture led by Dr. Franz Stuhlman (URL-1) conducted the first mainland survey for the European farmers, mainly the Germans who lived in Pangani, Usambara, Tanga-Mombo, Kilimanjaro, Meru, Meru, Kilosa and Morogoro. The survey conducted was based on the isolated triangulated networks that initially were established for the purpose of boundary survey.

There were a number of triangulation networks established in different time. For example in the years between 1894 and 1911, the 1st triangulation network near Lushoto in Tanga with a local astronomical origin was established to cover Usambara Mountains and later on was extended to Pare areas, Moshi, Arusha. The 2nd triangulation network was established in 1898 with a local latitude origin covering Mbeya and Rukwa region. Another triangulation network was established in the years between 1902 and 1906 with the geodetic longitude origin of Zanzibar. Also in 1907 a triangulation network with a local astronomical origin was established in the south west of the country (Mbamba bay). In the years between 1912 and 1914 a triangulation network in Morogoro area was established purely for cadastral purposes of the Europeans plantation (Caillard, 2003).

In 1919, British administration took over from German and established the Surveying Department under the Ministry of Land and Mine in 1920. Among others, the British decided to unify and coordinate all the survey of the past which were sporadic and unrelated. They used a triangulation network along the Arc of 30th Meridian: From North Cape in Norway to

the Cape of Good Hope in South Africa to establish and connect all existing isolated networks. It should be noted that, this network system had already been done in the other nearby countries like the southern Rhodesia now Zimbabwe and Uganda. In 1933 Tanganyika had three main east-west chains attached to the 30th Arc and four north – south chains between the others (Smith, 2006; Rowe, 1933). In 1944, the colonial survey and geophysical committee put forward the argument that a geodetic survey was essentially a matter that had to be planned for the whole geographical region. This made the Arc and its attached networks of triangulation to be the foundation of whole mapping system in the whole East and Central Africa.

In 1961 after independence, the Native Administration System (NAS) started by adopting the same existing survey system and kept changing by time so as to meet the current national and people's demands. As it has been observed before independence cadastral survey was done for the purpose of alienating land to colonial settlers (Lugoe, 2008). After independence the primary objective was to provide geometric descriptions, size and the location of the land parcels for equitable access of land and the registration of land rights. Recently, cadastral surveys have evolved into economical business (fiscal purposes) such as collection of land rent, property tax and the collateral property. Also is used in property valuation, land allocation and many others to support land market (Silayo, 2003).

2. CADASTRAL SYSTEM IN TANZANIA

A basic unit of cadastral survey is a land parcel. Surveying and mapping of land parcel provides the basic foundation of the cadastral survey system. The chapter 324 of the Land Survey Act of Tanzania, Part I (2) states “cadastral survey means any survey the purpose of which is to obtain information for recording the position of the boundaries of lands in separate ownership or intended to be the subject of any disposition or partition, or re-establishing such boundaries on the ground or setting out new boundaries on the ground”. The survey description can be in textual, numerical and graphical forms if not in combination of these. The basic information provided by cadastral survey is the geometric descriptions for the measured land which are the spatial location, size and shape. Such information is prerequisite to successful land registration in Tanzania (URT, 1999).

Boundary lines for the adjacent parcels are defined by a set of beacons or Iron Pins in Concrete (IPC). Also general boundaries comprising physical features such as hedges, walls and streams on the ground may be used subject to written permission from the Director of Surveys and Mapping. Cadastral surveys in Tanzania are based on two existing situations;

- For the urban areas where approved Town Plan (TP) Drawing are prepared, surveyor obtains and set out parcels in according to those TP Drawing information.
- For all the areas found in rural or informal urban settlements, surveyor sets out parcels from the sketch plans that show approximate locations and sizes of the land earmarked for survey (Silayo, 2005).

There are several mandatory steps to be followed when conducting cadastral survey in Tanzania. The steps can be examined in three major groups of; 1. When requesting to conduct the survey, 2. Executing the survey and 3. The submission of the cadastral survey work for the recognition of approval at Survey and Mapping Division. Details of these steps together with the Survey Registration System (SRS) and the Cadastral Legal Arrangements (CLA) are explained as follows;

2.1 Request of Cadastral Survey

Request of the cadastral survey is done after some initial steps are taken. These prerequisites are intended to check and determine the existence of TP drawing(s) that will guide survey execution and the need for the survey. A satisfaction for these requirements leads to the request of survey to the District or Municipal/Urban authority as section 9 of the Government Notice No. 72 of 2001 directs (URT, 2001). Successful requests will be issued *survey instructions* and *data access* by the Director of Surveys and Mapping Division.

2.2 Cadastral Survey Execution

These are the medium steps for actual execution of cadastral surveys. They include; methods, techniques and the logistics on how to conduct the survey. Key functions in this step consider; Reconnaissance, planning and costing, establishment of the control network to be used, demarcation and coordination of the block, subdivisions of parcels, taking survey details, signing the boundary certificates, processing, preparing a draft cadastral plan and compiling the cadastral file ready the submission for approval. As the fact of project based, it is clear for how long it will take to complete these tasks contrary to the others that are dependent to unpredictable factors.

2.3 Submission of the Cadastral Survey Work

Compiled cadastral file and the draft of the cadastral plan in hardcopy format are to be checked by a licenced surveyor and once it passes, it will be submitted to the office of the Director of Surveys and Mapping (SMD) for further scrutiny and approval. Figure 1 shows an example of a cadastral plan and table 1 is the cadastral file contents to be submitted for approval.

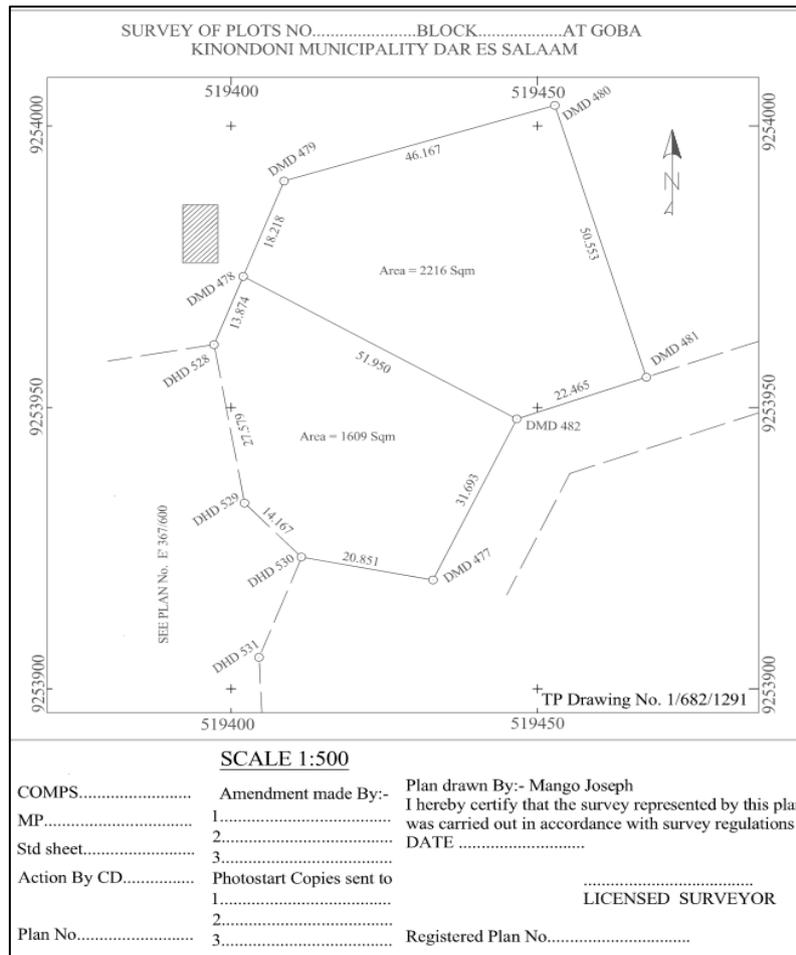


Fig. 1. Cadastral survey draft plan for approval

Table 1. Cadastral file contents

Contents	Explanation
SF 37	Survey form No 37 this is signed by authorized land officer and authorized land surveyor to instruct surveyor who will do the work
SF 92	Survey form No. 92 is the form that shows signatures of neighbours to prove that there is no land conflicts in the surveyed area
SF 93	Survey form No. 93 this form is filled and signed by regional land surveyor to prove that the survey done have been checked by government surveyor to so that if any case arise it will be easily to solve
Covering letter	This letter is either written by regional/municipal land surveyor for the government project or licensed surveyor for private projects this introduces the survey done and all computation that have been done.
Survey instruction	A permit to conduct survey

TP drawing	Town Plan Drawing
Report (SF 16)	Survey report which show demarcations process and coordination methods
BC 1	Beacons certificates for signed by land surveyor
BC 2	Beacons certificates signed by Authorized land officer after inspect that all beacons and Iron pin have been erected for each plot
Coordinate list	List of all coordinated points for the survey
Area computation sheet	Computed area sheet for the plots/parcels surveyed.
Traverse computation sheet	Shows computation for all point coordinated by travers method
Double bearing and distances sheet	Coordinated points done by double bearing and distances
Single bearing and distances sheet	Coordinated points done by single bearing and distances
Online sheet computation	Coordinated points done by Online method
Working diagram	A diagram showing the way survey point has been coordinated
Field diagram	A diagram showing how survey methods has been used.
Join computation & check distance (datum)	Check reliability for the control/tied survey between that compared measured and computed distances
Other field sheets if applicable includes; Summary sheet (SF4), Details sheet (DS1), Measuring sheet (MS1) and angle sheets (AS1)	

2.4 Cadastral Survey Registration System

Complete cadastral survey work is submitted at SMD where a re-check is done and thereafter the process of survey approval and registration begins. Survey Registration System (SRS) is used for approving and registering all surveys in Tanzania. As a system programs, SRS include; 1). Cad- pro software for Survey Computations. 2) Survey-info for Survey data storage, (3) SR- Manager for processing approval of new surveys and Data entry and (4) Smart Deeds for drawing deed plans and retrieval of scanned survey plans images. Among other specific activities during the examination and approval of new surveys are: Plot and block numbering, Locating a new survey on TP drawing or Topographic Map, Retrieving a drawing in GIS software and Importing survey data from other programs (Katambi, 2009). The approved records of cadastral surveys contained into survey-info of the SRS are; scanned survey plans, scanned town planning layout plans, coordinates, geodetic control points and street names.

2.5 Cadastral Survey Legal Arrangements

Cadastral survey in Tanzania is carried out under the legal arrangements that are specified in various documents. “The first land survey and surveyors ordinance was enacted into law in 1923 to control the state of affairs at that time. In 1957 it was reviewed and the current Land Survey Ordinance (Cap 390) was signed into law to regulate all survey work in the country. This Ordinance is in consonance with the Land Registration Ordinance, Cap 334 of 1953, of which Section 88(1) states: ‘No estate shall be registered except in accordance with an approved cadastral survey plan’” (Lugoe 2008). Apart from it, the Land Act No. 4 of 1999 section 22(1c) which states that a granted right of occupancy shall be issued on land that has been surveyed (URT, 1999).

In addition to the above, the Land Survey Act of 1977 establishes the National Council of Professional Surveyors (NCPS) whose main tasks include, the certification of the competence of practising surveyors and enforcement of professional code of conduct and ethics, regulating standards of conduct and the activities of professional surveyors, regulating the practice of the professions of land surveying & land economy surveying and promoting the profession of surveying. The law provides that both government and private licensed surveyors to can carry out cadastral surveys in Tanzania (URT, 1977).

3. LAND OWNERSHIP SYSTEM

Land tenure describes land ownership system in Tanzania. As derived from a Latin term tenure stands for “holding” or “possessing,” land tenure means the terms on which something is held: the rights and obligations of the holder. It is a legal term that means the right to hold land rather than the simple fact of holding land and therefore, one may have tenure but may not have taken possession (Bruce, 1998). In Tanzania, the Land Ordinance Act, Cap 113, of 1923 (Revised in 1957), all land, whether occupied or unoccupied, belongs to the Republic of Tanzania and is Public Land. This means that land is under the control of the President and is held and administered "for the use and for the common benefit, direct or indirect, of the natives of Tanzania (Kauzeni, Kikula, Mohamed, Lyimo, & Dalal-Clayton, 1993).

The National Land Policy (NLP) of 1995 revised in 1997 promotes land tenure system to encourage the optimal use of land resources and to facilitate transport based social economic development. The policy led to the enactment of the Land and Village Land Act in 1999 which establishes three categories of land; **Reserve Land** as land set aside for special purposes, such as forest reserves, games parks, and land reserved as a land set for public utilities. **General Land** is the land which is outside the reserved and the **Village land**. The Village Land constitutes 70% of the total land in Tanzania followed by the reserved land that accounts for 28% and 2% for general land (Dinh & Monga, 2013).

Tanzania uses title registration system as the occupancy rights on land. Citizens can obtain occupancy rights on land issued by the President. Occupancy right is defined as a title to the use and occupation of land and includes the title of a native community lawfully using or occupying land in accordance with native law and custom (Tenga, 1992). The right of occupancy has two forms namely: the Granted Right and the Customary Right of Occupancy.

- Granted right of occupancy is held outside village lands and it may be granted for up to 99 years. Land has to be surveyed before a certificate of occupancy issued.
- Customary right of occupancy is held in rural areas indefinitely. The relevant certificates are issued to village councils after the land has being surveyed.

4. INSTITUTIONAL STRUCTURE

The Ministry of Lands, Housing and Human Settlements Development (MLHHS) administers all concerns about land. It has four divisions; Survey and Mapping, Physical Planning, Land Administration and the Housing Division. All divisions are headed by a director except the Land Administration Division (LAD) which is led by the commissioner.

Survey and Mapping Division (SMD) is responsible for conducting and overseeing all surveys of the country and to provide expertise and services in the provision of survey charts, plans and maps. Out of five sections at SMD two are the Urban and Rural Cadastral Surveys sections. Figure 2 illustrates an organisation structure of the MLHHS.

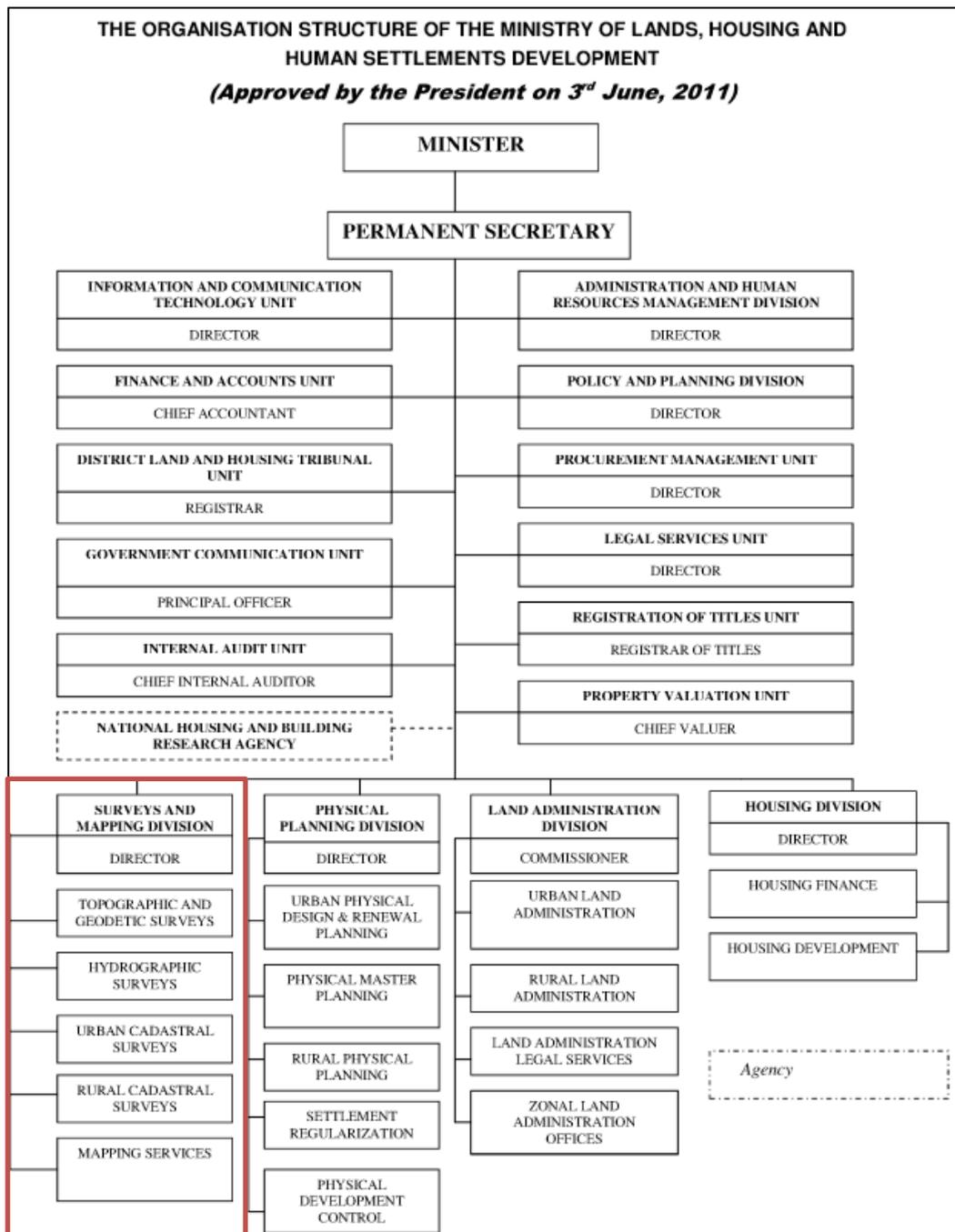


Fig 2. Organisational structure of the MLHHS (URL-2)

5. SWOT ANALYSIS

Cadastral surveys in Tanzania as one component of the other systems such as valuation system, settlement system, tax collection system and many more has various strengths, weakness/challenges, opportunities and threats.

Here, a SWOT analysis is used to examine internal strengths and weaknesses, external opportunities and threats faced in cadastral surveys. SWOT stands for strengths, weaknesses, opportunities, and threats.

5.1 Cadastral Survey Strengths

- a) **Datum:** Cadastral survey in Tanzania uses a standard three dimensional Euclidean coordinate system with a metric unit of measurements. Arc Datum 1960 of a modified Clarke 1880 ellipsoid is used as a local datum. The National Coordinate System (NCS) is based on the Universal Transverse Mercator system.
- b) **Control points:** Classification of the control points is based on their overall positional accuracy and the derived method. Primary control points which were established by triangulation methods have positional accuracies of 1:20,000 or better and secondary control points which were established by traverse with positional accuracies between 1: 10,000 and 1: 20,000. In the implementation of African Reference Frame (AFREF) agenda and strengthening its old installed network, Tanzania has established a new geodetic control consisting of zero order, first order and second order control Points. The network is tied to ITRF reference frame with WGS 1984 as Datum. Tanzania has five CORS that have been installed in Dar Es Salaam, Moshi, Tukuyu, Morogoro and Dodoma (Mayunga, 2011). Figure 3 shows CORS, zero and first order control points in Tanzania.

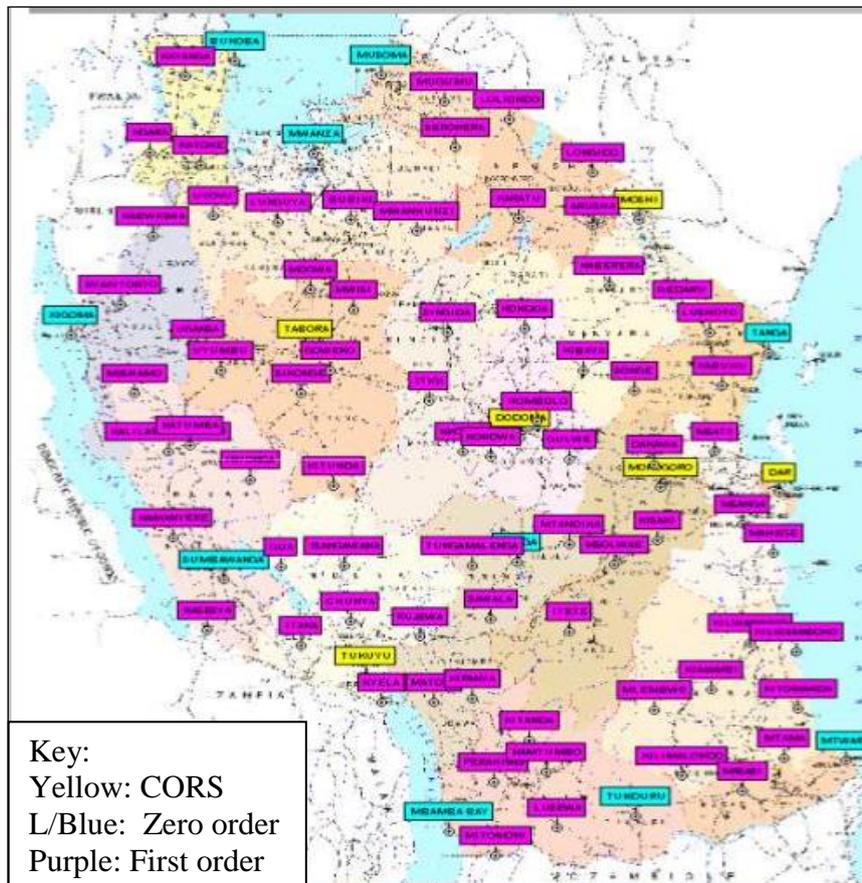


Fig. 3. Control networks in Tanzania (Mayunga, 2011)

- c) **Cadastral survey accuracy:** Cadastral survey in Tanzania is done with a given set of accuracy standards. In general, the cadastral surveys in urban areas are done with the acceptable linear misclosure 1: 6000 or better. For the individual parcels of the sizes less than 400 square metres linear misclosure may be lessened to 1:1000.

5.2 Cadastral Weakness/Challenges and the Suggested Improvements

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, competitiveness, clearly defined professional development path, and adaptability to technological advancement and public needs (Chileshe & Shamaoma, 2014). However, the management of cadastral surveying in Tanzania has been criticised by various authors for being inefficient, expensive, stagnant and also not commissioned in a transparent manner (Magigi & Majani, 2006; Huber, Mithöfer et al 2008). This could be partly attributed to the following weakness and challenges discussed below.

5.2.1 Cadastral weaknesses/Challenges

- a) *Absence of the physical plans and the TP drawings.* It is the fact that, many cadastral surveys are done in urban than in rural areas (Msuya, 2009). Some of the areas either physical plans and/or TP Drawings are not yet prepared. In this circumstances, individuals who wants to survey land has to incur some extra costs for the preparation of TP drawing or has to wait until the District / Municipal of authority prepares them. This is a challenge that makes cadastral survey to be lavish and slowly undertaking.
- b) *Local coordinate system and the changes made on the cadastral survey.* Existence of surveys made on local coordinate system and the changes made on old cadastral survey plans gives challenges in juxtaposing them into one system such an Environmental Management Information System (EMIS) and Land Information System (LIS). Transformation of these coordinates are too difficult and some of the existing paper are not in good condition for digitization. These separate coordinates systems confers unnecessary data redundancies and overlaps with other plans in the neighbourhood (Mugerezi, 2002).
- c) *Decentralization of Cadastral Survey Works for Approval.* In line with the existing regulations and standards all cadastral records are lodged at the SMD in hard copy format. In spite of the digital or electronic execution of the works, land surveyors still have to produce hard copies for the examination and approval of the survey. This process increases survey's costs in terms of time and finance. With the opened up land market, cadastral surveys should be executed quickly but also efficiently.
- d) *Absence of a Well-functioning Digital Cadastral Survey Registration System.* SMD is missing a well-defined digital cadastral survey registration system that could speed up an examination and approval of the cadastral works (Katambi, 2009). A well-defined digital system helps to provide for instance plot and block numbering system, data storage and retrieval and henceforward to ensure the availability of reliable cadastral data to users on time. The system avoids the possibilities of having overlaps and repetitions with the earlier survey.
- e) *Unpredictable cadastral delivery period.* When a surveyor receives an assignment of doing cadastral survey, it is difficult to give the client a guarantee on delivery period because it is dependent on a number of unpredictable factors such as: how long it will take to find reference cadastral survey information, how long it will take to receive instructions to survey a property and how long the survey examination process for both check and re-check will be done. This challenge causes dissatisfaction of clients who apply for cadastral survey services. The quality of the work process should not only be focused on the accuracy or certainty of results but also on the delivery period

5.2.2 Suggested improvements

The outlined **a** and **b** weaknesses/challenges require the government plans to allocate enough funds henceforward to make sure all urban areas have physical plans and TP drawings to support not only a good pace of cadastral survey but also the proliferation of informal settlements. Local coordinate systems require some field observations in UTM system in order to transform coordinates to enable harmonization of surveys into a unified system.

Decentralization of the cadastral survey works for approval could be solved through delegation of power to all Regional Land Surveyors. According to the Land Survey Act CAP 324 part I, Section 3, The Director of Surveys and Mapping can delegate powers to any government Surveyor in writing (URT, 1977). Therefore, the regional Land Surveyors in Regional Administrative Secretaries Offices (RAS) and their Assistant RAS title can be empowered to approve survey jobs in their areas of authority. This will minimize time cost of all surveys having to be sent at SMD in Dar es Salaam.

Absence of a well-functioning Digital Cadastral Survey Registration Systems (DC-SRS) starts from the beginning by lacking digital lodgement of data flow from the survey process into the SMD. It is logical that, a compiled complete cadastral work should be submitted in both hardcopy and softcopy to allow digital flow of data and its preservation. In addition to this, the proposed approaches and methodology presented at FIG Working Week 2009, “Development of the New Cadastral Survey System in Tanzania” can provide a useful guidance to enhance DC-SRS in Tanzania (Katambi, 2009).

5.3 Cadastral Survey Threats

Due to the fact that cadastral survey is one among the sources of land and resource property rights, it is supposed to be simple, quick and affordable to speed up official access to secure land tenure by many citizens and thus propel motivation for equitable land allocation and purposeful urban land development. In Tanzania as it has been argued by (Silayo, 2005) for the quotation of Kironde (2000), that “The cost of surveying is very high and the productivity of land surveyors, in terms of plots surveyed, especially in public services is low.’ Also the regulatory framework, technical standards, and methods as well as the administrative procedures that go with operations of cadastral surveys have often been cited as culprits of high costs and delays in the delivery of land to the needy. These facts threaten many especially poorer to have no legal rights in possessing land and consequently incapable to use land as a collateral property in land market (Kironde, 1995).

5.4 Cadastral Opportunities

Cadastral survey as the source of land registry and title registration in Tanzania gives a true and exact description of the land parcel at any moment. The process of surveying land parcels cannot be done without assurance of the neighbour to recognise the owner and the land to be surveyed hence it resolves some minor conflicts in the society as also argued by (McEwen, 2001). Registered land provides adequate protection to all classes of right holder, including absentees, persons with reversionary or pre-emptive rights, or those with dormant rights of any kind. Connection of the land ownership with the law property has given cadastral surveys great roles in various applications such as property valuation, collection of land rent, property tax, land allocation and the collateral property.

CONCLUSION AND RECOMMENDATION

Cadastral survey system before and after the 1stWW established the basic control infrastructures that has been developed, improved and strengthened at this latter. The statistics at the time when Tanzania Mainland got her independence showed that, a total of 14,448 land titles were registered. By 2011 when celebrating 50 years of independence a total of 379,000 land titles were registered. The surveyed farms and land parcels were 20,883 and 900,000 respectively. The active numbers of professional Land Surveyors were 225 (MLHHD Minister's speech, 2011). However across the country, there are many non-cadastral areas, which are mostly found in rural areas. Furthermore, the population rate in urban areas has increased from 6.4 percent in 1967 to 30 percent in 2012 (NBS¹, 2013) whereas the corresponding figures for the cadastral survey are not certain because of being sporadic in nature. Currently, it is approximated 11% of Tanzania's land is surveyed (Dinh & Monga, 2013). This figure shows that, Tanzania has a long way to go to ensure cadastral survey is done for the majority to have equitable access of lands, the registration of land rights and other fiscal purposes. A serious financial backup is required to overhaul the cadastral system which is facing a lot of problem such as lack of skilled personnel particularly at the district levels and the modern equipment's that changes with technology.

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