

ADOPTION OF GEOSPATIAL GOVERNANCE IN THE CONTEXT OF E-GOVERNMENT IN TANZANIA: ADDRESSING BOTTLENECKS IN SPATIAL DATA INFRASTRUCTURE DEVELOPMENT

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ABSTRACT:

This study has developed a framework for adoption of geospatial governance in the context of e-government in Tanzania. After examining the governance of geospatial data, identify factors affecting governance of geospatial data, and proposed a framework that integrates e-governance and e-government. The research was undertaken to examine the understandings of geospatial governance, its challenges and to develop an institutional framework to guide the management of geospatial resources. Using documentary analysis, strategically designed interviews and questionnaire, and Focus Group Discussions, data was collected from a range of spatial data user community. Upon simple analysis of the data the following were the findings: First, the findings revealed that spatial data is not well managed, reused and shared. Second, geospatial data it is not easily and readily available and accessible. Third, there is lack of coordination and collaboration among spatial data users and custodian. The study revealed that coordination and collaboration is very important if a nation wants to utilize effectively the massive amount of data scattered in various organizations. There is an urgent need of having common gateway for spatial data discovery and sharing, and to have a mechanism that ensures spatial data is collected, processed and analyzed with acceptable standards and having metadata. In view of the findings, the study recommends that geospatial governance integration with e-Government is indispensable. The study has come out with the SPOTES framework for geospatial governance in the context of e-government; the Government should adopt the framework and establish the National Spatial Data Infrastructure. This will ensure the institutional set-up for the governance of geospatial data in the country and key players, i.e. the private sector, government institutions, and NGOs should collaborate in data sharing to benefit the country's sustainable development.

1. BACKGROUND

E-Government, one of the most popular terminology today, involves use of Information Technology (IT), Information and Communication Technology (ICT) to improve and/or enhance on the efficiency and effectiveness of service delivery in the public sector. Thus, e-government is defined as "the electronic handling of administration and democracy processes in the context of governmental activities by means of information and communication technologies to support public duties efficiently and effectively" (Wirtz and Daiser, 2015). Increasingly, and parallel with e-government operations, geospatial technology is becoming the core to many e-government programs; from public utilities to land records to internal security, geospatial technology is being deployed and used. With increased use of geospatial technology, governance processes are maturing from e-governance to geospatial governance (g-governance). g-Governance can, therefore, be defined as the use of geospatial technology to spatially enable policy-makers take informed decisions (Thakur, 2013).

The Government of the United Republic of Tanzania has been implementing the Information Technology policy and e-Government program as a means to enhance efficiency in government operations as well as service delivery to citizens. In the implementation of e-Government program, a new agency "Tanzania e-Government Agency (eGA)" was established under the executive agencies Act, Cap. 245 of 2010 as a semi-autonomous institution. The eGA became operational on 1st April 2012 with the mandate of coordination, oversight and provision of e-Government services and enforcement of e-Government standards to all Government Ministries, Departments, and Agencies (MDAs) as well as to Local Government Authorities (LGAs). It also spearheads Government's determination in the use of information technology to increase efficiency in public service delivery and enhance adoption of e-Government by all government institutions in the country. The e-Government Agency has already built its capacity by putting in place the relevant policies and strategies in line with the ICT policy of 2013, and will continue to side with the new ICT policy of 2016 together with other government directives.

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For the past twenty years the Government has been implementing several programs and strategies focused on poverty reduction, these programs are: the National Strategy for Growth and Reduction of Poverty I & II of 2005/6-2009/10 and 2010/11-2014/15 respectively (NSGRP I & II), in Kiswahili it is acronymic as “MKUKUTA” (Makati wa Kupunguza Umasikini) in Tanzania Mainland and “MKUZA” (Mkakati wa Kupunguza Umasikini Zanzibar), Property and Business Formalization Program (PBFP) in Kiswahili “MKURABITA”, Business Environment Strengthening in Tanzania (BEST), and Tanzania Mini-Tiger Plan 2020 (TMTP 2020) as a vehicle for realizing Tanzania’s Development Vision 2025, and the Millennium Development Goals (MDGs) and other sectoral and multi-sector national development frameworks. Ease availability and access of government data coupled with quick service delivery is of paramount important for efficient implementation of these programs. Ease and quick availability of geospatial data is also inevitable. However, there are gaps in both eGA strategy and the national ICT policy, these gaps need to be addressed; these are issues of geospatial information management and geospatial governance.

Furthermore, in April 2005, the Ministry of Lands, Housing and Human Settlements Development unveiled a plan titled ‘Strategic Plan for the Implementation of the Land Laws’ (SPILL), which was reviewed in 2013 and one of the key recommendation was:

“that Government establish a viable land administration infrastructure by setting up land, geographic, and management information systems (LIS, GIS and MIS) in land offices, registries and labs; preparing land-use maps, strategic urban development plans (SUDP), and schemes; establishing a solid geodetic and topographic framework and data; preparing base and land cover maps and images; computerizing cadastral survey data and plans; preparing valuation and other operational manuals; building offices, labs and registries; and providing adequate transport and communication systems for land administration (URT, 2005).

This recommendation can literally be understood as an appeal for establishment of National Spatial Data Infrastructure (NSDI) in the land sector. This is true, because the Ministry of Lands, Housing and Human Settlements Development (MLHSD) has embarked on a project to develop an Integrated Land Management Information system (ILMIS) which is one of the core elements of NSDI. Nevertheless, a national wide geospatial governance mechanism is required to accommodate all sectors that produce, use and or depends on geospatial data. The National Bureau of Statistics (NBS) in Tanzania Mainland in collaboration with the Office of Chief Government Statistician (OCGS) Zanzibar prepared and implemented the Tanzania Statistical Master Plan (TSMP) 2009/10- 2013/14, a five year implementation strategy to implements a National Statistical System (NSS). Effective implementation of these strategies requires the use of modern technologies in particular Geographical Information Systems (GIS) and spatial data usage for improved evidence-based planning and decision making (URT, 2010). One of the main targets in the implementation of TSMS was to improve statistical infrastructure by establishing a National Geographical Information System database and finalize the National Spatial Data Infrastructure (NSDI) Policy by 2014. It is unfortunate that this goal has not been achieved, though there is a draft NSDI policy proposal

which has not been circulated to stakeholders for comments and discussion.

NBS has, and it collect massive amount of both non-spatial and geospatial data, however they are not harmonized with those collected by other government institutions. This creates many problems like data interoperability, inconsistency in data accuracy and metadata creation. This causes confusion and unreliability in its usefulness. Our own findings and interpretation of the TSMP is that there is an urgent need for coordinated effort and collaboration of geospatial governance countrywide in the e-government framework. With these facts, it is time to see the government of Tanzania and all its institutions are geo-spatially enabled. The society (citizens) especially in urban areas in Tanzania are currently using the advantage of current technological advancement and convergence in ICT to be spatially aware and enabled.

2. THE DIGITAL GOVERNMENT

The digital government notion is not new, it comprises of three related concepts which are e-Government, e-Governance, and g-governance. In most cases, the terms ‘e-Government’ and ‘e-Governance’ are used interchangeably, however, the two are different but related. There are several definitions of e-government which can be found in literature, see some of these definitions in WB (2011), (Wirtz and Daiser, 2015); InforDev/WorldBank (2009); Palvia and S.Sharma (2007); Bhattacharya and Goswami (2011); Athmay and Abdul Rahim A. (2013); Shame (2009), and Yonazi (2010). Generally, all definitions underscore the use of ICT in delivering government services. On the other hand, e-Governance is a composite of institutions, systems, structures, processes, procedures, practices, relationships, and leadership behaviour in the exercise of social, political, economic, and managerial/administrative authority in the running of public or private affairs’ (Misuraca, 2007). More details about on e-Governance are provided in (Keohane and Nye, 2000 as cited by Saxena, 2005 and Sharma & Palvia, 2007), (Godse and Garg, 2007), (Bhattacharya and Goswami, 2011), (Saxena, 2005), and (Kaushal and Ravan, 2003). The typology of digital government involved the two elements depicted in (Schellong, 2010) as Figure 1 below.

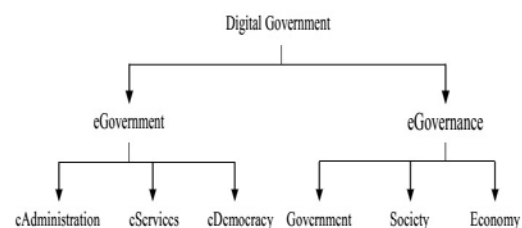


Figure 1: Typology of digital government. Adopted from (Schellong, 2010)

g-governance also abbreviated as “geo-gov” or “g-gov” is another concept that is part of the digital government today, it is defined as “the governance process, which involves the use of geo-information and communication technologies (geo-ICTs)” (Singh, 2009). It was also defined by Thakur (2013) as the use of geospatial technology to spatially enable policy-makers take informed decisions.

We consider g-government as an essential component of digital government and propose to modify the typology provide in Figure 1 to include g-governance as demonstrated in Figure 2 below.

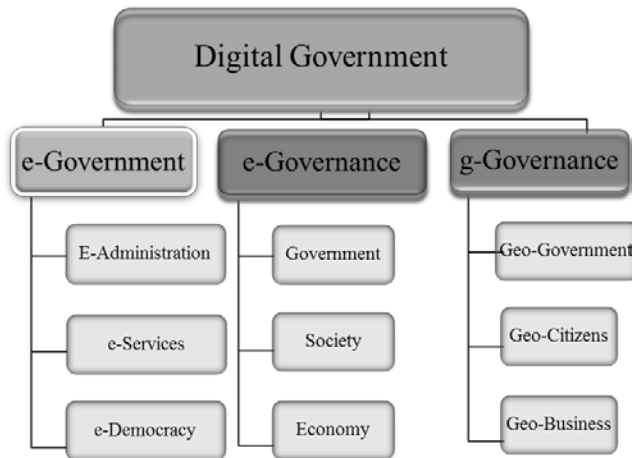


Figure 2: A new typology of digital government. Modified after (Schellong, 2010)

2.1 Previous Studies

There has been researches in the area of Geographic Information & Spatial Data Infrastructure in Tanzania, which can be found in Johansson (2005) and Matthijs (2005). These studies looked at the way of improving availability and accessibility of geographic data, and proposed the establishment of NSDI, and Shirima (2008) looked at policy and legal issues impeding the SDI implementation. The current ongoing researches in Tanzania on issues of Spatial Data Infrastructure (SDI) do not deal with the issue of framework development and geospatial governance in the context of e-government. One research focused on geospatial health (spatial data infrastructure in the health sector); another research was about awareness of SDI and development of a model for data costing, another research is on how system dynamics and agent based models can be used to develop SDI; the last finished research addressed the customized land administration domain model for Tanzania. Therefore, a research on geospatial governance in the context of e-government becomes necessary and very important. There are also previous commissioned reports that proposed the establishment of SDI in Tanzania, see (Lugoe, 2003, URT, 2005, URT, 2010, Lugoe, 2008).

There are also several published researches that has documented various issues on the use of e-Government in Tanzania, the recent one are those of Yonazi (2013) on *Adoption of Transactional Level e-Government Initiatives in Tanzania*; Yonazi (2012) on *Exploring Facilitators and Challenges Facing ICT4D in Tanzania*; Yonazi (2010) who explored *the enhancing adoption of e-Government Initiatives in Tanzania*; Karokola (2012) who researched on *a framework for securing e-Government services*; Meyaki (2010) which reported on *strengthening e-Governance in the North-South Local Government Co-operation Program inclusive of Tanzania*; Nfuka (2012) reported on IT governance in Tanzanian public sector organizations; Wicander (2011) who wrote on *Mobile Supported e-Government Systems specific to the education management systems in Tanzania*. Further, a paper on the status of e-Government in Tanzania by Sæbø (2012) has highlighted the current status and future challenges.

2.2 The Problem

Making governments spatially enabled is becoming a necessity in the modern digital age and the rapidly changing world (Rajabifard, 2009). Sustainable development can be achieved through the development of products and services centered on geospatial information collected by all levels of government. This can be expedited through a spatially enabled government and society, where location and geospatial information are regarded as common goods made available to citizens and businesses to encourage creativeness and product development. This requires data and services to be easily accessible and accurate, well-maintained and sufficiently reliable for use by the majority of society which is not spatially aware (Rajabifard, 2009, Georgiadou et al., 2006).

Ready and timely availability of digital geospatial data is essential to progressive development in Tanzania; it is also a critical tool for making informed decisions on key economic, environmental and societal issues. The growing populations, changing landscapes, social economic, physical planning, infrastructural development, energy (oil and gas exploration), disaster response, public health, environmental planning, land registration, and agricultural marketing to mention just few are heavily dependent on geospatial data. All stakeholders including the government, private sectors and individuals require multi-source geospatial data for various undertakings. Hence, availability, management and governance of geospatial information are becoming indispensable for the country's sustainable development.

However, there exist serious problems in the availability and access of geospatial data from both government institutions and the private sector. This is caused by nonexistence of framework and guidelines on how geospatial data and information should be shared and managed among spatial data custodians and users. Geospatial information management issues have not been addressed in both the national ICT policy and in the e-government strategy; for example, the National ICT policy – has ten core pillars, two pillars shows the importance of ICT infrastructure and ICT industry (URT, 2003) but the policy is completely silent on issues of geospatial governance, this is an oversight in the ICT policy that need to be reviewed. The revision of the policy started many years ago and to-date nothing has been reported about the revised ICT policy.

2.3 The objective

The objective of this paper was to develop a framework for geospatial governance in Tanzania, which constitutes the following elements: 1). an institutional geospatial framework of governance, and, 2). a mechanism to make the government spatially enabled through e-government. In order to do this, we need to ask few questions which can guide in the development of the framework. We are therefore, seeking to understand the following situation in Tanzania.

- i.) What is the current situation of geospatial governance in Tanzania?

- ii.) What issues trigger the adoption of geospatial governance in Tanzania?
- iii.) Are geospatial data custodians ready and set to share data among themselves, and make it available to the public?
- iv.) What are the barriers in adopting Spatial Data Infrastructure in Tanzania?
- v.) How can geospatial governance be integrated into e-Government strategies to spatially-enable the government and society?

We seek to find out users and producers perceptions regarding these questions, their view points are of highly important in order to understand the need of stakeholders in the geospatial community in Tanzania.

3. APPROACH AND METHODS

3.1 Approach

In order to find out the perception of users based on questions stated in section 1.4, we used the qualitative and descriptive research approach as defined by (Leavy, 2014) which is a way of learning about social reality. Qualitative research as explained by (Dawson, 2009) explores attitudes, behaviour and experiences through such methods as interviews or focus groups. It attempts to get an in-depth opinion from participants. Qualitative research concern the practical purpose with a study, as well as generating results and developing fundamental knowledge that is needed to be able to solve problems within a specific context (Mack et al., 2005). It was advantageous to adopt a qualitative approach, to study the geospatial governance in the context of e-Government in Tanzania to explore the experiences of geospatial data users and producers.

3.2 Methods

Data was collected through the processes of interviews, questionnaires, document analysis, observations and Focus Group Discussions. The applied methods enabled revelation of required data and information so as to develop the framework for spatial governance in the context of e-Government in Tanzania.

3.2.1 Documentary analysis

We used documentary analysis with the intention of collecting information about patterns and perceptions of the issues related to geospatial governance, SDI and e-Governance as practiced in Tanzania. It provided a means of tracking history, change and development of geospatial governance and e-government. Documents studies and reviewed were research reports, published papers, and government reports and documents from within and outside Tanzania.

3.2.2 Interview

Interview is an important method of generating information in qualitative research. In this study, combination of face-to-face interviews and written questionnaire were carried out to gather relevant information relating to geospatial governance in Tanzania. In the face-to-face interviews questions were orally presented to interviewees. A number of individuals from government institutions and other experts from the private sector were selected to participate in the interview. Guided questions were

used to gather information from respondents. Questionnaires included questions which were presented either on paper or online using online survey tool called “Survey Planet”.

All methods gathered information from selected people who work in the private companies and government institutions. These techniques of information gathering were not aimed at getting quantitative data for analytical analysis but to get insights and explore information from respondents which have been very useful for the study. Research questionnaire was prepared and designed for online distribution to anonymous respondents. The questionnaire was prepared in such a way that each of the four questions was aligned to one or more of questions on the questionnaire as shown in Table 1.

Table 1 Alignment of questions to the questionnaires

Research question	Aligned research questionnaires
i. What is the current situation of geospatial governance in Tanzania?	8) The status of Geospatial data in Tanzania is in shambles, highly fragmented, disorganized, without standards and no metadata. (a). Agree (b). Highly agree (c). Do not agree (d). Not certain hIf you agree or highly agree what are the reasons? 9) If you do not agree or not certain what are the reasons? 10) Are you aware of Spatial Data Infrastructure (SDI) as a means of geospatial data sharing and effective use of geospatial information? 16) Does your organization sell or share freely geospatial data with other users for their internal consumption?
ii. Are geospatial data custodians willing to collaborate and share data among themselves and make data available to the public?	12) Is your organization willing to collaborate in geospatial data collection and make it available to the public under open data policy? 13) If your answer is Yes, but with some restrictions or No, briefly explain why?
iii. How can geospatial governance be integrated into e-Government strategies?	17) Do you think there is a need to have geospatial framework for geospatial governance in Tanzania through e-Government services, functions and tools? 18) Give any reason in support of your answer 14) If Tanzania is to establish the National Spatial Data Infrastructure (Tanzania National

		<p>Spatial Data Infrastructure – TanSDI, or Tanzania Geospatial One Stop – TanGeo One-Stop), which government Ministry, Agency, or Department do you think should be fully responsible for it?</p> <p>15) In your opinion, which is the best Institutional set-up for Tanzania Spatial Data Infrastructure? (Department within a government ministry/Government semi-autonomous agency/Full Government Autonomous Authority)</p>
iv.	What are the barriers in adopting Spatial Data Infrastructure in Tanzania?	19) In your opinion, what are the barriers for the Tanzanian Government to initiate and implement a National Spatial Data Infrastructure? (list at least three barriers)

3.2.3 Focus Group Discussions

Focus group discussion (FGD) method of data collection was carried out by convening a small group of people having similar attributes, experiences, or “focus” and leads the group in a non-directive manner. The objective was to get insights and perspectives of the people in the group with as minimal influence by the researcher (Yin, 2009). This method is widely used in qualitative data collection, it was selected because of its strength in allowing participants to agree or disagree with each other so that it provides an intuition into how a group thinks about an issue under discussion.

One FGD meeting comprising of ten participants was organized; participants were drawn from the following institutions; the National Bureau of Statistics (NBS), Surveys and Mapping Division (SMD), Tanzania Communication Regulatory Authority (TCRA), and Local Government Authority, private companies and the academia. The four research questions listed on the first columns of Table 1 were the discussed topics and were debated in detail where each member of the FGD had an opportunity to air his/her views. Apart from the listed questions, other pertinent issues related to geospatial data governance were also discussed.

4. RESULTS AND ANALYSIS

4.1 Data analysis

A mixture of methods was used to collect data both primary and secondary data, analysis was done based on the type of method used to collect it. Content analysis method was used to analyze textual data by applying open coding which is done by disassembling texts and differentiating dissimilar themes and concepts found in the data. Data collected from online survey tool was analyzed by the tool itself, especially the closed-based questions. *SurveyPlanet* web tool offers the means to create online questionnaire, collect the responses and analyze the results. The open-ended questions were analyzed by filtering multiple responses

with similar answers. Answers to open-ended questions were collected and grouped according to the similarity and were filtered in such a way that similar answers were merged into one responses representing views of the respondents.

4.2 Results

The total response count was 50 to the online questionnaires, 30 responses from paper-based questionnaire and 20 face-to-face interviews. Response came from respondents who work in government MDAs, private companies and NGOs. The information collected from question 1 through 4 was intended to know who are respondents, the type of organizations, the type of work they are doing and the designation. Respondents name and designations was optional because, some of people do not want to reveal their personal information. Responses from MDAs were 64%, private companies 14% and NGOs 22%. Majority of respondents work in organization that produce or collect geospatial data and this account to 89% of all respondents while 11% worked in organization not related to either spatial data collection or its use.

Question five in the questionnaire was meant to know the type of data collected or worked for by respondents, while question six just wanted to know users of geospatial data. 97% of respondents are users of spatial data, while those who work on or with spatial data are working in the following areas of their fields or support services; transportation, hydrographic, marine and oceanographic, administrative boundary, health, environment, climate, forestry, fisheries, land cover, wildlife, cadaster, topographic data, 3D Data, mineral resources, satellite image and DTM, facilitating the collection of spatial data.

4.2.1 Specific areas of concerns

Specific areas of concerns are those that were directly involved in the research questions of this study. One of the issues was the sources of spatial data as captured in question eight of the questionnaire. This aimed at providing an understanding of where users get their data for their internal use. It has been shown that 32% spatial data users obtain data through internal arrangements. They themselves collect geospatial data for their internal use; 21% of data users outsource and or purchase data from data collectors, producers, and vendors/sellers. Outsourcing is commonly used in government, private and NGOs due to the fact that there is limited capability in terms of equipment and techno-know-how to collect geospatial data; therefore, data producers are usually contracted to do the tasks or purchase the already collected from data archives.

4.2.2 Status of Geospatial Governance in Tanzania

From respondents’ perspectives, the status of geospatial data in Tanzania is characterized by the following factors:

(i). Very little is known about who own what and where, (ii). Spatial data is fragmented and disorganized, (iii). No standards exist on how to collect and document spatial data, (iv). No information related to the collected data (metadata), and; (v). Available data is not inaccessible from data custodian and where the there is a possibility of accessing the data there is unnecessarily long bureaucratic procedures to obtain the data.

The results from the study has revealed that 61% of all respondents agree on the above stated facts, while 36% do highly agree, and only 31% do not agree with the given facts. It is important to note that, getting reasons from respondents was the main aim of

the research, so that an understanding of users' perceptions can be captured and reflected when developing a plan or framework for geo-governance. The reasons given by respondents do agree or highly agree with the statement that "the status of geospatial data in Tanzania is in shambles, highly fragmented, disorganized, without standards and no metadata" are following: (i). there is no vibrant unit to oversee the matter and lack of policy and legal framework to countercheck on quality issues and data interoperability (ii). Lack of coordination among spatial data users and the ministry responsible for geospatial data collection (It should be noted that there is no single ministry that collect every type of geospatial data, several ministry collect data under their jurisdictions), (iii). Lack of technological know-how (iv). Absence of clearinghouse system, (v). Difficulties to access the available spatial data and where available, data are in different formats and different datum and or coordinate systems

4.2.3 Geospatial data Sharing and Collaboration

One of the most challenging and impeding issue in geo-governance in Tanzania is data sharing and collaboration, we have seen an example from respondents that departments under the same ministry cannot share data within themselves, this is strange. The responses from surveys shows that 48% of data collectors are willing to share what they collect with other users, 45% are willing, but with some restrictions or conditions, and 7% are not ready to share data with other users. It is our keen interest to know what the reasons are advanced by those who are willing, but with restrictions. Most respondents have the opinion that there should be some restrictions to access data for security reasons and to avoid misuse and abuse of data depending on the sensitivity of data. The fact that some organizations are doing business with data is another factor, that not all data can be freely available 100%; instead, there should mechanism for cost recovery to compensate for the incurred cost during data collection, processing and dissemination. The issues of copyright and intellectual property right were also mentioned by respondents that they should be adhered to. Majority of the respondents had the opinion that all data collected through donors or government funded projects should be shared free of charge. This will promote the use of geospatial data and related technology to become a catalyst to the development and other projects.

The analysis of all responses signifies the importance of having a framework of geo-governance at national level. The reasons are very genuine; there are issues of national security, protection of endangered animals/species for the case of wildlife, cost recovery, profit for business, copyright issues and intellectual property. All these are legal issue that can only be dealt with if there is an institution overseeing the matter at national level. It is a fact that not every data has to be shared freely, some data can be made available to whomever in need after paying the cost of data collection plus a small profit to the company that collected and processed that data. It all depends on the legal and policy frameworks which are non-existent but urgently needed.

4.2.4 Geospatial governance and e-Government integration

Governance of geospatial data is as important as it is for governance of other resources. There is a common understanding among all stakeholders that there is a need to have geospatial governance framework in Tanzania not as a separate initiative but as one of e-Government services. According to (Rajabifard, 2012) SDI and e-Government must go together, he continues on to say;

"...e-Government, along with the concept of a spatially enabled government, builds on the NSDI initiatives of

a country ...This includes all institutional, legal, governance, and political arrangements that facilitate the integration of built and natural environmental data together ... to support sustainable development. e-Government and by extension, Spatially Enabled Government is about using NSDI as an enabling platform to improve the operation and processes of government, and deliver better policy implementation and decision making by extending the use of spatial information to the whole of government and society. This in return would improve the efficiency and effectiveness of government services and activities and improve the quality of life".

Respondents advocating of for geospatial governance have provided several reasons as to why geospatial framework is inevitable in Tanzania. Some of the reasons are:

- i. Governance framework will provide sustainable development of spatial data infrastructure,
- ii. To make possible sharing of data and information: Data can only be shared among organizations if there are common standards in, among other, data collection and presentation,
- iii. To ensure standards and provide a better avenue for sharing data and information,
- iv. To enhance decision making and enable organizations to better serve its users,
- v. Governance is all about planning, decision making, monitoring and evaluation by a government on the cause of service delivery of services. The Geospatial framework is vital as this will facilitate quick data acquisition, fast processing of the data to get information and quick means of dissemination of data & or information for the four mentioned functionalities,
- vi. There is a great need because currently everything is in shamble we need a framework which can act as a base map for geospatial governance. This will help in minimizing geospatial data inaccuracies reliable data records,
- vii. To avoid misuse of fund through duplication. If everyone will be buying satellite images which are expensive, the rest of money could be used to do other development activities.
- viii. Geospatial framework is important because it will help in organizing data and it will be easier to share data among different organizations
- ix. There is a need of having geospatial framework for geospatial governance in Tanzania through e-Government services as there is problem of knowing where a certain data is available within the country or not. In this case we end up having data redundancy, spending a lot of time creating the same data which might be available somewhere and cost where we buy the data while is available within the country

In summary, it is concluded that geospatial framework is needed in order to:

- i. Provide sustainable development of data for economic sustainability and informed decision making,
- ii. To have a common platform for sharing (for free or for buying) spatial data this will be in the harmonized standards, consistency, and reliable data, through e-Government services,
- iii. To have geo-spatial data collected once and re-used many times and get rid of data duplication and save costs in data collection and processing,
- iv. To make geo-spatial data easily available and accessible when needed electronically.

Geospatial data governance requires an institutionalization which has to be established through formal government channels, the initial step being to have geospatial data governance policy, prepared action plan, feasible implementation plan and ultimately the requisite law. All these require organizations that will be the lead ministry and lead agency respectively to spearhead the entire process.

In order to understand stakeholders' insights on which organization should be the lead agency, a multiple choice question was set with a list of selected Government Ministries, Department and Agencies (MDAs) that can be considered fit and able to be at the vanguard of spatial governance initiatives. Many viewpoints consider the Ministry of Lands, Housing and Human Settlements Developments (MLHSD) as appropriate Ministry to be the lead Ministry, followed by the National Bureau of Statistics (NBS). The last preferred were the Ministry of Tourism and Natural Resources (MTNR), Ministry of Communication, Science and Technology (MCST), and the national planning commission. Others were Commission for Science and Technology (COSTECH) and Ministry of Energy and Minerals. No reasons were required for one's choice.

As for the institutional set-up, the study wanted to know the type of institutions and its level of power. The options were either, to be department in one of the existing ministries, a semi-autonomous agency or a full government autonomous authority. Majority about 46% preferred a full autonomous government agency or authority, 39% think it is needed a semi-autonomous agency and 15% suggested a new department within government ministries.

4.2.5 Barriers to SDI Implementation in Tanzania

Initiating and implementing geospatial governance framework (SDI) is not an easy task; there are challenges that have always been impeding the success of SDI implementation in many countries. In this study, we wanted to know from users and producers perspectives the barriers for Tanzania in instigating and implementing SDI. We found the following reasons from respondents:

- i. Lack of awareness, knowledge on spatial data and appreciation of geospatial technologies at the higher decision making level;
- ii. Lack government commitment: SDI has to be initiated and finally hosted by the government, unless there is political will, SDI cannot be initiated and realized;
- iii. Lack of financial resources, since the initial investment costs in SDI is enormous;
- iv. Unwillingness for the government to invest on spatial data acquisition, this is probably because the government does not see it as important;
- v. It is not a government priority;

- vi. Political will and Lack of openness in government operations and activities.

As evidenced from the study, there is no coordination within the government in terms of data sharing, there is no mechanism for other data collectors to share their spatial data with the public, and it has been revealed that every MDAs implements its own spatial data strategy, this creates duplication of data and unsynchronized datasets. The Ministry of Lands Housing and Human Settlements Developments (MLHSD) is developing an Integrated Land Information System (ILIS) which is a vital component of SDI, see (Mwaikambo and Hagai, 2013). But, this is without having put in place other aspects of SDI such as various standards, which can be a problem in future.

5. CONCLUSION

Geospatial governance is as important as other infrastructure for the national benefits. Measures must be urgently taken to facilitate the establishment of governance framework that will involve all stakeholders. Spatial data should be added to all information that has been collected by the government and other organization in order to make the government and the society a spatially enabled community. International advocacy measures are required to sensitize decision makers on the benefits of geospatial governance and the drawbacks on not having it. In as much as some government departments and Ministries have their own internal geospatial governance mechanisms, this could be starting points for other departments and ministry to collaborate. But the wider geospatial community must be part of geospatial governance, which is why a NSDI is proposed.

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