

Adopting Geo-ICT for Land Administration: Problems and Solutions

Babu Ram ACHARYA

SUMMARY

Geo-information users are seeking more accurate and highly detailed information on spatial and temporal dimensions promptly and aspiring to support their ever-changing needs for decision-making. Therefore, any scientific research and the technological innovation need to be focus in the public interest and should address the land management, land governance and good governance issues. Cadastre Vision 2014 (ink and paper-less system) as promoted by FIG Commission 7 as a driving force for cadastre and land information management. Geo-spatial revolution led to high-end research resulting Geo-ICT (Geo-information and Communication Technology) synergy to meet these requirements and sustain the rapid pace of development. The wise use of Geo-ICT could be prime instrument to support the overall objective of the envisaged Land Administration System (LAS) of the nation. Adopting Geo-ICT in land administration is a problem and a solution in itself. This is not a simple problem and there is no easy solution. A commitment and an initiation is the starting point. We need to be learning and improving from our own experience. This is a long-term and a huge investment in terms of technology, human resource, infrastructure and mind-set of all stake holders. The system designed in such a way that once a service model is available it can be reused and/or sustainable. However, the appropriate technology must be encouraged and pitched with on-going national support. Case of Nepal is analyzed to look into the adoption of Geo-ICT in land administration as a challenge. Potential problems and some points for their solution are recommended.

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INTRODUCTION

This is an age of Technological Development for optimizing resources in order to making society free from poverty and injustice for the benefit of all. All these developments keep concern on food, security, employment, improving access to infrastructure, responding new technologies, sustainable civil society and improving livelihood of the people. Not only the governments and IT-industries but also general-public have to improve the access to technical options and knowledge for their business. To support that fact, all concerned need to work with them to influence social, economic and institutional systems using modern technology. It is imperative that public involvement in democratic decision-making affect their lives. It is therefore necessary to ensure effective social control of scientific research and the technological innovation in the public interest. People should drive their own development and all need to work hand-in hand, respect their rights and support the efforts to improve their well-being. But they should be aware of any negative impact on their environment from the technological change or adoption, and rather possibly need to protect them from harmful impacts.

GEO-INFORMATION AND COMMUNICATION TECHNOLOGY

It is obvious that, geo-spatial revolution led to acquire and update knowledge towards high-end research resulting Geo-ICT (Geo-information and Communication Technology) synergy. This innovative development has paved the way to focus the challenges and address the problems on geo-spatial data management. Also, the growing world population is seeking accurate and highly detailed information on spatial and temporal dimensions, concerning virtually every square meter of land, sea area of the earth and also in the space. To meet this requirement and to maintain the rapid pace of development, time has pushed to adopt ICT and has no choice on the demand for highly qualified managers, application specialists and Geomatics researchers. It has been evolved as *Geomatics Industry* which primarily focuses on customer-oriented services, end-to end solutions and fast adoption to user needs. The role of Geo-ICT has become vital for local level geo-spatial planning and governance i.e. micro-planning and governance in India, for example. Geo-ICT as the synergic instrument with respect to spatial data management includes: data acquisition, data assimilation, data analysis, information extraction, decisions support and data/ information dissemination. GIS, GPS, RS, Satellite Communication Systems and Web Systems are the main technologies under Geo-ICT. The application areas among others include forestry, environment, urban development, land administration, hydrology, topography, police, emergency response, tax assessment, education, utility services and other economic development sectors.

Government and private sectors are increasingly relying on Geo-ICT but need to help them to become more accurate and cost effective. The market is certainly evolving and we are likely to see Geo-ICT (instant access through wireless network and mobile phones, digital camera GPS, RS, photogrammetry, on line mapping and record services etc.) solutions in land administration, as well, for data acquisition, processing and dissemination.

Now-a-days, most of the industries and users have moved from conventional analogue to digital. Many new players have entered the market and it is agreed that the digital equipment business has been growing. Almost all development or construction projects are aware of setting digital infrastructure. The application areas are also growing and that has encouraged government and private sector to contribute this growth. Since the geo-technology is evolving continuously, constant efforts are made in its diverse applications. This acceptance comes from a growing understanding about the technology and its benefits. Most of the users are convinced that though digital technology is highly technical its ease use and the power of extracting detailed information definitely helped to improve their work process. The interaction and discussions with the procedures, dealers and users have to be focused on getting a deeper perspective on its application and sustainability.

In many developing countries there is a lack of university education in Geomatics. Indeed low levels of technology, less skilled staff and lethargic processes are the critical issues in geospatial field. Therefore it is perceived that lack of access to technology lies at the heart of land administration (LA) problems, where as superficially conceived and adopted technology is likely to be a problem rather than solution. The core functions of LA are the accurate boundary survey of the land parcel and the registration of rights over that parcel. That is why focus need to be given on improving the data quality, efficiency of services, and accuracy of the geometry of the parcel and land register (Cadastré). GPS makes it possible to, quickly coordinate data points to centimeter accuracy, and computer technology will allow millimeter precision for coordinates. GIS can hold master datasets for information with engineering, modeling and design systems. As the cadastral dataset is a fundamental layer for many other themes too, it is important that it must be as accurate and complete as possible. Cadastré is the central component in spatially enabling government. Modern computer-based land information is a pre-requisite for an effective land reform and land management. In this respect, the vision of Cadastré 2014 (ink and paper-less system) as promoted by FIG Commission 7 is a driving force.

LAND ADMINISTRATION IN SUSTAINABLE DEVELOPMENT

The UN defines Land Administration as the process of determining, recording and disseminating information on ownership, value and use of land when implementing land management policies. 'Ownership' is to be seen in a broad sense: land tenure in which rights to land are held, based on statutory law, common law, customary traditions and informal use. That is why Land Administration relates to norms and values in society. Land Administration

is not a purpose in itself but aims at serving society when implementing land policy through land management activities. LA has important role in supporting sustainable development.

Since the Rio Conference in 1992, sustainability has been the central principle of international development. In August 2002 the World Summit on Sustainable Development (WSSD) was held in Johannesburg and geomatics was unconditionally recognized as a significant part of the solution to making world more sustainable. In the final WSSD Plan for implementation there are many references, which will need geomatics input, including the need for land reform, land management, monitoring of the environment and planning for sustainable new developments. Also the specific references to the wider use of earth observation technologies are mentioned even more clearly. The International Steering Committee for Global Mapping (ISCGM) has input the following text into the world implementation plan document:

‘Promote the development and wider use of earth observation technologies, including satellite remote sensing, global mapping and geographic information systems, to collect quality data on environmental impacts, land use and land-use changes.’

Appropriate ICT investment and capacity building are necessary conditions establishing accurate land administration and core geodata management for sustainable development. The core data/ information can help governments to determine how they deal with land in policies designed to combat poverty, to achieve sustainable settlement goals and to manage natural resources. Education, training and research on geoinformation science are the fundamental factors for sustainable Geo-ICT use. Land Administration is strongly influenced by social, cultural and bureaucratic environment, and overlooking of the existing practices and capacity would make failure in adopting such new technology. In this context, Geo-ICT has the vital role to play and has to be looked upon the overall objective of the envisaged Land Administration System (LAS). The system should be designed in such a way that once a service model is available it can be reused or cope with ever-changing requirements of the geo-information users. However, the appropriate technology must be pitched with on-going national support so that it is sustainable. The success of efficient land administration so heavily depends on the capacity building, institutional reforms, devolution or location based services, education and continuous training, and ultimately the commitment of the government. Participation also needs to be encouraged by generating ongoing support through stakeholders for their benefits.

In Nepal, land and its management has been considered as one of the important conditions for the economic growth and a means of providing social justice and thereby resolving the ongoing conflict in the country. Clause f(5) of the Common Minimum Program (CMP) of the present government states “Having implemented scientific land reform and consolidated land-use policy, access to land of the local landless and tenant shall be established. Trust-land problem will be solved. Emphasis will be laid on the development of cooperative sector in agriculture. Special attention shall be given to the economic and social upliftment of agricultural labour, freed-*kamaiya*, landless and *sukumbasi* (squatters). Long-term plans shall be implemented by giving high priority to the development of agricultural sector and

industrialization. State shall make more investment in the under-developed areas and communities on the basis of geo-information system.” This is obvious that development of Geo-ICT is a condition for an effective and sustainable land reform and land management.

LAND ADMINISTRATION IN NEPAL

Land Administration in Nepal is based on Parcel-Based Deeds Registration System since 1965. Land records prepared before 1965 were in verbal description in a defined area (*Mauja* or *Ilaka*). The system was sporadic and was not uniform throughout the country. After the systematic and compulsory land registration system introduced in 1965, land registration and administration is based on cadastral maps with unique real estate identifier (parcel number) and landownership certificate are distributed to the owners. Those basic cadastral data became very much useful and gradually indispensable for civil administration, judiciary, planning, valuation and taxation, local governance and banking or economic activities. The reason of using these land data or information significantly was because there were no other better information bases. Although the cadastre system was focused to fiscal purpose in the beginning, it was gradually used as legal and multipurpose cadastre. It is felt that the system looks forward towards improved deeds registration system but is dedicated only for land registration and land transfers.



Figure 1: Conventional record-keeping system



Figure 2: Unplanned land management

Computerization of existing land records and cadastral maps to develop land information system and provide computer-based land administration services is under progress. As a first step priority is given to digitalization of survey field books and land records (*shresta*). So far out of 83 district land revenue offices, land records of 11 offices have been computerized, land records of 27 offices are under computerization and the rest are planned to be completed within few years. Digitization of few map sheets, and building land information based on primary numerical survey is under piloting.

Following are some of the characteristics of the land administration system in Nepal:

- Existing deed registration system and users' expectation of title registration
 - Based on conventional cadastral maps of lower accuracy than desired
 - Heavy wear and tear of maps, field-books and record-books
 - Generally paper-ink based and oriented towards computerized information system
 - Majority of under-qualified non land professionals in land administration, also most of the staff computer illiterate
 - Lack of integrated land administration service
 - Inefficient institutional and organizational setup
 - Inadequate physical infrastructure including office buildings and premises
 - Insufficient budgeting
 - One-way digitalization of land records and ad-hoc LIS development
 - Centralized land administration system
 - Complain of petty-corruption in land administration
- Etc.

INSTITUTIONAL ARRANGEMENTS

Survey Department under Ministry of Land Reform and Management is responsible for cadastral survey and preparing land records or establishing Cadastre. Updating of the cadastral maps is undertaken by district Survey Offices of Survey Department, whereas Land Registers are updated by district Land Revenue offices of Department of Land Reform and Management under the same Ministry, The Ministry of Land Reform and Management. The Department of Land Information and Archive, which is also under the same Ministry, is responsible for the automation of land records and cadastral maps. Beside this, Trust Corporation exists to handle the administration of Trust land. Therefore, there exists some kind of institutional duplication or overlap for similar work nature. Private sector consulting firms seldom perform cadastral mapping, however the documents have to be legalized after checking and inspection from Survey Department. So the private sectors feel uneasy and are not motivated in this field. Land (Survey and Measurement) Act revised in 1999 has made a provision of licensing to qualified surveyors, but is not fully implemented yet due to lack of adequate regulations, insufficient number of qualified surveyors and few other reasons. It is expected that the system will start soon. There are three professional associations namely Nepal Surveyor Society, Nepal Surveyor's Association and the Nepal Association of Chartered Surveyors. However, their activities in the professional development in the country lag very far behind.

There is one Land Management Training Centre under the same Ministry. Surveyors are trained in three levels namely: Basic Survey Training (after school for one year), Junior Survey Training (I. Sc. candidates for one year) and Senior Survey Training (B.Sc. candidates for 16 months). Land Management Training Center has commenced academic under graduate course of B.E. in Geomatics Engineering since August 2007 in collaboration with Kathmandu University. There is slow promotion of education in this sector, may cause this profession to face crisis in human resources. GIS, is introduced as one of the courses generally at an

introductory level at different level of studies in different faculties in several universities. There are many private training institutes who provide GIS trainings. However such courses and trainings concentrate more on use of one or other GIS software package rather than developing and managing computer based Geo-ICT projects.

There are few private consulting firms dedicated to GIS. However, their scientific competence is limited and most of them provide services like digitization, computerization of records and digital mapping.

ADOPTING GEO-ICT: PROBLEMS AND SOLUTIONS

In the foregoing, we discussed effective land administration as a condition for an equitable and sustainable land reform and land management. In this context, the terms land administration, land reform and land management are defined as following:

Land Administration: the process of determining, recording and disseminating information about the ownership, value and use of land when implementing land management policies.

Land Reform: the various processes involved in altering the pattern of land tenure and land use of a specified area.

Land Management: the activities associated with the management of land as a resource both from the environment and an economic perspective.

Cadastre 2014 is the model for the modern land administration from the technological as well as practical perspective. Efficient land administration supports good governance. Adoption of Geo-ICT is, therefore, indispensable. Considering the existing platform upon which Geo-ICT has to be built-up and a land information system has to be developed adoption of Geo-ICT is a problem as well as a solution in Nepal. All necessary conditions for the successful adoption of Geo-ICT are not fully matured but we do not have other options. Some of the issues which need to be considered for the adoption of Geo-ICT in land administration are:

- Adopting Geo-ICT is a long term commitment and therefore a national consensus at the political, policy, bureaucratic and technical level has to be made
- Policy statement for the use of Geo-ICT needs to be adopted in the umbrella land policy and the national planning document.
- Priority of the government needs to be defined for the development of necessary infrastructure for implementing this policy
- Necessary acts or laws need to be promulgated
- Development of human resource is a pre-requisite; a continuous system of education, training and technology transfer need to be devised

- Research and Development (R&D) for scientific and technological innovation need to be encouraged and necessary environment created
- Necessary investment need to be ensured
- Necessary incentives to the academic and technical staff need to be ensured to face brain-drain
- Organizational re-structuring need to be carefully made
- Institution-building and transforming the existing system is a challenge: resistance and/or non-cooperation from the existing staff need to be addressed effectively
- A strategy for the transformation from manual to Geo-ICT (re-engineering) has to be carefully planned and adopted
- Participation of the public and winning their faith in the new system is a pre-requisite: which can start by appropriate campaigning in the beginning but develop through improved service-delivery

Adopting Geo-ICT in land administration is a problem and a solution in itself. But this is not a simple problem and there is no easy solution. A commitment and an initiation is the starting point. We need to be learning and improving from own experience as well as long-term and a huge investment in terms of technology, human resource, infrastructure and mind-set of all stake-holders including not only the service-providers but the service-seekers (who are the common people).

CONCLUSIONS

Land Administration is indispensable for economic and social development. Appropriate land administration is a pre-requisite for an effective land reform, land management and good governance. It is on itself service-oriented and supports sustainable development if the system is designed to cope with ever-changing requirements of the geo-information users. However, the appropriate technology and the participation of the stakeholders must be encouraged and pitched with on-going national support for its sustainability. The wise use of Geo-ICT could be prime instrument to support the overall objective of the envisaged Land Administration System (LAS). The success heavily depends on the capacity building, institutional reforms, devolution of functions and services, education and continuous training, and ultimately the commitment of the government and other stake holders.

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BIOGRAPHICAL NOTES

Mr. Babu Ram Acharya has a Master of Science degree in Cadastre and Land Information System from ITC (Netherlands) and a Bachelor of Law degree from TU (Nepal). He has more than 32 years experience in the field of Surveying, Cadastre, and Land Administration. He worked as the Director General of Survey Department Nepal and as the Secretary of The Ministry of Land Reform and Management. He has published more than 20 papers in the national and international seminars. He is a nationally acclaimed expert in the field of land administration and is currently working as the Secretary in the Office of the Prime Minister and Council of Ministers.

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