GIS ENABLED E-GOVERNANCE

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Abstract

E-Governance has broader areas of implications. It can be used in various aspects of the oveall governance system. With the advancement in the sector of Information and Communication Technologies (ICT), the Governments of developed economies have moved forward to adopt e-governance in different service sectors. The growing application of information and communication technologies and their subsequent use on strengthening interactions with citizens has led to a new governance paradigm - E-Governance.

The Government of Mongolia declared ICT as one of the key economically important sectors. Approved in 2005, the E-Mongolia National Program mission is "enhancing people's life quality by establishing new economic environment, improving country's competitiveness and providing sustainable development". Three frameworks within the program are government-legislation; business-economy; and human development; and four policies of government-to-citizens, government-to-business, government-to-government and infrastructure.

This paper reviews the E-Governance initiative, actions and challenges faced in the case of Mongolia and develop recommendations.

Keywords: e-governance, mongolia, information and communication technologies

1. INTRODUCTION

Governance at any level - urban, regional, or national - can be conceptualized as "the interactions between actors in three distinct but interrelated spheres: the political, the public administration, and the society spheres" (Grönlund 2004, 2005). When governance becomes e-governance, in other words, when the full range of government activities - internal processes, policy development and decision making, and services to citizens - are made available digitally, then the domains of control and the transaction zones may change dramatically (Margetts and Dunleavy 2002).

E-governance research goes back at least to the 1970s (Danzinger and Andersen 2002), with the older literature concerned mainly with information system implementation within a government, while more recent studies are concerned with the external use and a problematic trend because of its excessive emphasis on online services to citizens (Grönlund 2004, Petricek et al. 2006, Zouridis and Thaens 2005).

Governments all over the world are facing one major challenge in promoting e-government initiatives. They strive for reaching an acceptable level of adoption, where many factors play a role in making the accessibility of the Internet more difficult. Governments are encouraging their citizens to access and use their public services through the Internet. To successfully do that, the Internet should be available for all categories of people and businesses. Such view is related to the digital divide.

The adoption process of online systems is researched extensively and many theories and models were proposed to understand this issue. The major obstacle that prevents citizens from adopting this technology is the availability of such technology. The digital divide is viewed by researchers from three major sides: the accessibility divides, the knowledge and skill divide, and the perceptions of citizens divide (Orbicom, 2005). The continuous improvements in information and communication technologies (ICTs) is expected to increase the number of people who benefit from a wide range of services provided by governments through their e-government portals.

Governments try to reach citizens and civil society institutions through their open government initiatives. It is important to understand the role of e-government in society development, where governments try to provide their services in a convenient and accessible ways. Reaching citizens is a tough job in a world full of differences and diverse challenges. In order to develop the successful e-government initiatives, governments will face several challenges like the provision of required infrastructure, legal and political barriers, people's computer literacy and ICT use, the level of trust people have in their government and its new way of performing activities, security problems and the digital divide problem (Almarabeh & AbuAli, 2010; Abu-Shanab, 2012).

All types of data are needed in e-government, among which spatial data are perhaps the most important information, reflecting the distribution rules of spatial entities (e.g., property boundaries, roads, etc.).

Geographical Information Systems (GIS) are one kind of information system that handles spatial data. The complete definition of GIS is "a set of tools for collecting, storing, retrieving at will, transforming, and displaying spatial data from the real world for a particular set of purposes" (Burrough, 1986). GIS first appeared around

the 1960s in the Canadian government, to manage some of its resources, led by Roger Tomlinson, a pioneer in GIS (Foresman 1998). Since then, GIS has become a standard included in the technology toolbox of almost every level of government worldwide (Longley, Goodchild, Maguire and Rhind 2010). With the advantage of handling spatial data, GIS can provide many services concerning spatial analysis, such as geographical location information, location-based services, route tracing and the analysis of spatial structures. This can be especially valuable when incorporating social and economic attribute data.

Generally, with the functions like measurements, attribute queries, buffering, map overlay, spatial interpolation, analysis of surfaces, and analysis of networks, GIS can provide mapping, spatial data management, and many other functions.

The principles of GIS enabled e-governance are laid down for adoption by all the Departments of the Government, developers, system integrators and organizations using the GIS assets.

- Principle of Sharing: The GIS assets shall be made accessible to all the departments, irrespective of which department or agency has created them.
- Open General License: The use of Open GIS Assets, made accessible to the public, shall be subject to terms and conditions similar to the Open Source Software under the Open General License.
- Openness of GIS Assets: All the shareable GIS assets of the Government except those which are confidential or secret in nature, shall be hosted in the public domain for free and non-discriminatory access by the citizens, developers and technology companies.

Currently, the framework for the optimization of the creation, maintenance and distribution of public geographic information is provided by Spatial Data Infrastructures (SDIs). SDIs can be considered part of e-government frameworks, dealing with the geographic aspects of e-government services (de Vries, 2007; Georgiadou et al., 2006). SDIs provide a platform for the distribution of geographic information, at different organizational levels (local, national, regional and global) involving both public and private institutions (Nebert, 2004; Nogueras-Iso et al., 2004).

The United Nations E-Government Survey helps Governments, through e-Governance initiatives, to provide their citizens efficient, effective and transparent access to public service and also helps in citizen participation. This survey measures the e-governance development status in its member countries through EGDI (E-Government Development Index). EGDI has 3 components - Online Service Index, Telecommunication Infrastructure Index and Human Capital Index. Online Service Index measures the online presence of the Government and online services available to the citizens. Telecommunication Infrastructure Index

measures the status or availability of various Telecommunication Infrastructures in the country through which citizens can access online services. Similarly, Human Capital Index measures the education level of the citizens that will help them in accessing the online services.

According to the 2014 United Nations E-government Survey, the Republic of Korea is ranked the world leader (0.9462) followed by the Australia (0.9103), Singapore (0.9076) and France (0.8938), with the Netherlands, Japan, United States of America, United Kingdom, New Zealand and Finland close behind. The steady improvement in all the indicators of the e-government development index has led to a world average of 0.4712 as compared to 0.4406 in 2010. This reflects that countries in general have improved their online service delivery to cater to citizens' needs.

2. E-GOVENRMENT IN MONGOLIA

Mongolia is a very special country with a total land area of 1,564 million sq. km and a population of 3 million people (NSO, 2015). A large proportion of the population live outside the capital city Ulaanbaatar and have settled in about 350 provincial regions and towns known as soums and aimags. Mongolia is a vast country with a widely dispersed population and as a result early communications were difficult, with people relying on travellers passing through to deliver news or receiving news via mail once a month. Even having meetings was difficult with Mongolians regularly using the central square in the capital as a meeting place.

The progress toward implementation of E-Government in Mongolia has recently received the interest of the authorities and policy makers. The requirement for an adaptive approach in its development and relevance as a recommended framework was recently realized. Providing an obvious explanation for E-Government in Mongolia to cover its cultural, social, political characteristics, and also its actual prospective position considering access to science and technology, will be an important measure in ensuring its success.

As evidence that Mongolia is fully aware of the importance of ICT, the mission of the ICT Development concept of Mongolia was adopted by the Government in 1996. The key strategic goal to Information Technology (IT) development has been defined as "introduction of worldwide and nationwide IT into production, services and public life, organization of new software and IT industry, and establishment of scientific and technological information network".

The Internet was first introduced to Mongolia in 1996. The use of ICT has been a remarkable success, driving economic scale and increasing efficiencies across the country. With 25,909 kilometres of fiber optic backbone and access networks being extended nation-wide, over 200,000 Internet connected points are on the

map of Mongolia bringing ICT closer to its people. According to 2015 statistics of the Communications Regulatory Commission, Mongolia's number of Internet subscribers doubled between 2014 and 2015, reaching 1,962,000 Internet subscribers in 2015. The most popular technologies used to connect to the Internet are GPRS, EDGE, 3G and EVDO (ICTPA, 2015). The Government of Mongolia's policy objective towards development of the ICT sector is to promote universal access of the Internet and make Internet services affordable and cheaper.

According to the last report of E-government index of the world that was made by the UN once every 2 years, Mongolia moved forward from 76th of 193 states for e-Government in 2012 to the 65th in 2014 (UN, 2014).

Table 1: Mongolia's e-government performance

UN E-Government Survey	2014		2012		2010		2008	
	Rank (n=193)	Index	Rank (n=193)	Index	Rank (n=192)	Index	Rank (n=192)	Index
Overall Performance	65	0.5581	76	0.5443	53	0.5243	82	0.4735
Online Service Index	48	0.6142	47	0.5882	20	0.5556	73	0.4214
Telecommunica-tion infrastructure Index	113	0.2714	125	0.1758	122	0.1036	116	0.0911
Human Capital Index	58	0.7887	52	0.8688	56	0.9127	61	0.9096
E-participation	30	0.6863	24	0.6053	28	0.4286	45	0.2727

While Mongolia's overall index score had increased from 0.4735 in 2008 to 0.5581 in 2014, the main area of concern for Mongolia is Human Capital, which registered a declining index from 0.9096 in 2008 to 0.7887 in 2014. In the Telecommunication Infrastructure Index, though it has improved, Mongolia only achieved an index score of 0.2714 compared to Republic of Korea, the top country, which achieved an index of 0.6636.

The Government of Mongolia declared ICT as one of the key economically important sectors. Approved in 2005, E-Mongolia National Program missions are "enhancing people's life quality by establishing new economic environments, improving country's competitiveness and providing sustainable development" (GOM, 2005).

To fulfil implementation of objectives on national programs. relative to ICT policy, such as "Millennium Development Goals-Based Comprehensive National Development Strategy of Mongolia", has been confirmed during the 12th

Resolution of the State Great Hural (Parliament) of Mongolia - In February of 2008. National program "E-Mongolia" was confirmed by the government in 2008, National program on registration and information system on 2008-2012, National program on information security on 2010-2015, National program on high speed broadband on 2011-2015.

National Data Centre has been identified as one of the important element of the core infrastructure for supporting e-Governance initiatives of National e-Governance Plan. Under National e-Governance Plan, it is proposed to create National Data Centers to consolidate services, applications and infrastructure to provide efficient electronic delivery of government-to citizens, government-to-business and government-to-government services.

The objectives of the previously mentioned national programs are:

- Designing and implementing new businesses such as e-Commerce, e-Tax, e-Custom, e-Payments, e Procurement, e-Health, and e-Learning;
- Establishment of an electronic system to expand civil society participation;
- Establishment of a unified Information exchange network among Government agencies;
- Transferring government service to online and making them transparent and open;
- Improving laws and regulations on ICT;
- Developing the infrastructure for information technology throughout Mongolia;
- Establishment of nation-wide Digital Community Centers for business;
- Reduction of the Internet connection fees.

Mongolia's first one-stop shops were set up in 2007 as part of the Government's democratization and decentralization reforms which aimed to bring public services closer to the people in a more equitable, efficient, and transparent manner. Today there are a total of 194 one-stop shops at all levels. Citizens can now access services such as civil registration; land registration; banking and notary; social insurance and social welfare under one roof. Systems are also in place to gather citizens' suggestions and complaints relating to public services. Gathering representatives from different government agencies (including social insurance, social welfare, and employment departments), the OSS has offered the Government an opportunity to enhance the legal framework of public service provision and improve accessibility, awareness, and transparency of services provided. Now commonly used by the population, the OSS provides an opportunity for local administrations to improve coordination and the quality of public services provided to their population.

Mongolia's tax ePayment system was launched in May 2014. The National Tax Administration office of Mongolia, introduced electronic filing system (http://e-tax.mta.mn), its average hits in one second are estimated as 20-30 during the tax return submission period (Uyanga 2014). Another initiative (2009) is setup at the National Data Centre of Mongolia that stores all digital databases created within the Government organizations for safety and security of databases and to ensure secure functioning, ensure data exchange and flow, and to support timely service to citizens from one window.

The 'Smart Ulaanbaatar' program was approved at the regular assembly of City Council on 27 March 2014. The program describes work, principles, operations, management and financing for building smart governance and smart city from 2014 to 2020 in Ulaanbaatar city. The 'Smart Ulaanbaatar' program involves all sectors of activities, bringing all business sectors up to a new level and reflecting many services and technologies for creation of fair competition and a corruption free environment in the city's everyday life.

3. GIS ENABLES E-GOVERNANCE

Most of the government departments in Mongolia today understand the importance of GIS. Many other supporting initiatives have started formulation and approval such as MNS 5774:2007 Spatial information - metadata standard, and MNS ISO/TS 19104:2012, Spatial information - terminology standard, and mapping and geodetic engineering norms.

E-initiatives in land administration are supported by legal texts stipulated in the Constitution of Mongolia, Geodesy and Cartography law, Land law, Cadastral Mapping and Land Cadastre law, Land Fee law, and Land Ownership by Citizens of Mongolia law, etc.

In Mongolia, there are several institutions in charge of certain parts of land administration services. Although the main aspects of land administration are dealt with by the Agency of Land Administration, Cartography and Geodesy (ALAGaC), the Environmental Information Centre (EIC) covers digital data related to protected areas, while the Mineral Resources Authority Mongolia (MRAM) is in charge of licensing of areas under mining and mineral resources. Many attempts and successful actions were taken at all three organizations with some donor assistances.

A spatial data infrastructure can be conceived as the geo-information technology realm of e-governance. ALAGaC oversees the National Spatial Data Infrastructure (NSDI) upon creation of spatial data bases. It is to organize the data management system and form the national spatial data infrastructure. Since 2004, ALAGaC is working on creation of national spatial databases, including Asian Development Bank (ADB) funded projects on Cadastral mapping and property projects; creation of 1024 topo sheets at 1:100 000 of Mongolia; successful implementation of a pilot

project on NSDI in Sukhbaatar district; aerial tech supported 1:5000 mapping of Ulaanbaatar with Japan International Cooperation agency (JICA) fund; Korean International cooperation agency (KOICA) project on mapping of the UB built up area in the city center; project on Aerial topo mapping at 1:25 000 of area along railroad covering 45% of Mongolia; and current efforts on set up Internet communication system with all soums (within NSDI project). Clearing house establishment activity has been commenced in 2014 [Report 2014].

The Environmental Information Centre (www.eic.mn) of the Ministry of Environment, Green Development and Tourism has available data on the protected areas network and the different land uses within the protected areas. This centre became operational as the result of the successful outcome of the Dutch funded project on National Geo-Information Centre (NGIC) for natural resources management (2006-2009). Many aspects related to data creation, standards, data flow, processing, and use for transparent decision-making were addressed by the project. At present, this is the only centre that provides up to date data to the National Data centre on a regular basis. Also successful is addressing of vertical interactions, e.g. between central Government and provincial and sub-provincial Government were resolved through VSAT weather forecasting system by the Meteorology centre. NGIC made possible an operational metadata base with Geo-network open source and upon its interpretation into Mongolia got approval of MNS 5774:2007 metadata standard.

The Computerized Mining Cadastre System (CMCS) (http://cmcs.mram.gov.mn) was successfully implemented at the Cadastre Division of the Mineral Resources Authority of Mongolia in 2010. The project achievements cover substantial improvement of the quality and speed of license transaction processing, reduced discretionary actions within the cadastre office and prevented licenses from overlapping other licenses or protected areas. Currently the system is in operation without any failure or disruption.

In 2014, the system was extended to include a dedicated web portal with real-time connection to the operational database. The purpose is to enhance transparency in the mining sector by providing information to the general public and to governmental and private authorities and organizations about the mineral licensing activities in Mongolia, via the Internet. The services provided by the web portal enable visitors to obtain real-time access to mineral licensing information, retrieve information about present activities in the mineral sector, such as the tendering of areas for mineral licenses, access forms, documents and key information required to file applications. For registered users, the web portal offers additional possibilities to further optimize the processing of applications for mineral licenses, as well as enhancing customer relations.

Challenges:

- However, the road towards national and local GIS is not an easy one. Data sharing is a major problem. Unless it is made mandatory, individuals and organizations are highly possessive of their data.
- The next challenge is capacity building. If national GIS has to be successful, we need to have geospatial literacy so that we can maintain geospatial data through informed and controlled crowdsourcing. Many of the products would require dynamic information such as weather and traffic, besides static changes due to fast development of both rural and urban areas.
- Consumer complaints should be linked to the infrastructure shown in the GIS. This will create a record of infrastructure failures and help in the annual assessment of condition and resultant definition of a refurbishment program including the budget. Every service delivery point therefore needs to be linked into the system to facilitate the capture of these complaints. Complaints are then routed directly to the appropriate department or person to ensure rapid response.

Almost 60 percent of the population of Mongolia's sprawling capital, Ulaanbaatar, lives in informal settlements, known as ger areas (NSO, 2015). In 1989, 26.8 percent of Mongolia's population lived in Ulaanbaatar; by 2006 that number had risen to 38.1 percent; and by the 2010 census, 45 percent of Mongolia's population lived in the capital.

As cities like Ulaanbaatar grow more complex and dynamic, so do the challenges of managing a city's economic, social, and structural development. Such rapid growth has severely challenged the city's ability to deliver quality services such as solid waste management and public transportation to residents. Particularly since most these ger areas are unplanned settlements.

Cities have always needed sound data to make smart policy decisions. With citizen services analytics, public sector agency or department can deliver citizen services when and where they are most needed.

The Ulaanbaatar development master plan goes up to 2030, based on GIS systems for the local governments, developing integrated planning for the region, based on three processes; spatial planning, delineating boundaries and producing knowledge products to be used in the regional planning network. The Master plan documents are prepared collectively by the regional government, working together with the line departments of its government, as well as those of the local governments, non-government organizations and knowledge institutes in a concertation process. Reports are prepared using extensive data and mapping as a basis for decision-making; these are available to the public through an open-access website.

The "Smart Ulaanbaatar" initiative, launched in March 2014, envisages a range of government services managed through databases and portals designed for handling everything from vehicle tax collection to the settlement of land disputes. It will be implemented in three stages going till 2020.

Other initiatives under way include the creation of a community mapping website and an integrated database containing more than 48,000 key decisions and city legislation implemented by the Capital City Citizens' Khural, the governor's office and the city's nine districts.

Through the E-Government Project, over 80 ATM-like machines have been installed so far in Ulaanbaatar and one in each provincial centre, with many more to come. This allows citizens to access all types of government services using just their fingerprints. Through the centralization of data from across ministries and agencies, we are able to deliver services much more quickly and cheaper. At the moment citizens can make a number of enquiries about various issues on the platform, including personal credit and debt levels, customs information, real estate holdings, board regulations, national identification acquisition, residential addresses, marital statuses, lost identification cards, legal entity registrations, tax submissions, truck permissions, mineral license applications, electricity and utility bills, newspaper subscriptions, and submissions of complaints and proposals for government entities.

More than 485,800 people have already used the system, which has only been in service since June 2013. It greatly reduces the amount of time and effort needed to submit these sorts of requests.

4. CONCLUSIONS AND RECOMMENDATIONS

ICT policies are extremely important for developing countries like Mongolia. For the country to further build upon its existing mapping/imaging and IT strengths and position, a national GIS brings wide-ranging benefits. There is a strong motivation within the country for the realization of NSDI as the next technology paradigm for effective governance; thereby enabling better planning processes, delivery systems, and increasing transparency and efficiency in the national-level decision-making and reaching developmental benefits to citizens in a unique manner.

The Government of Mongolia considers that e-Government improves the quality of civil service and provides transparent and efficient administration services with an expansion of ICT infrastructure and integration of information systems.

The Government of Mongolia is facing many difficulties implementing e-government applications. In this regard, it is essential to establish proper cooperation between government and non-government enterprises to make government service delivery more effective, transparent and business-oriented.

The success of the E-Governance dream needs to be founded in the reality of creating proper data foundations and effectively integrating all the component technologies, namely GIS, Databases, Document and Records management, and Process Automation in a Web environment. With the infrastructure and service now in place across the country, many more rural residents can communicate more easily and benefit from educational and commercial access to the Internet. It also opens a range of opportunities for the government, private sector firms, civil society organizations and development partners to enhance service delivery by using new technologies.

It is essential in support of green development and the economy to make e-governance accelerate to all sectors of society. To smoothen its further development, the following recommendations are made. These include:

- Necessity of formulating and approval of law/regulation on Spatial Data Infrastructure in the case of Mongolia;
- Need to develop and approve standards on e.g. data modeling standard, database standard, data exchange/sharing, data quality standard, interoperability standard, etc.;
- Introduction of one-time creation and multiple use of data system for data management;
- A simple and user friendly Clearing House allowing single click use;
- Strengthening human capacity in IT and system administration fields;
- Promotion of national training programs at local University for IT personnel preparation;
- Technical capacity strengthening;
- Political will and support to expand and extend ICT in all sectors.

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