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Evaluation of Digital Land Information System (LIS) in Bangladesh: A Case Study on Savar Upazila, Dhaka

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Abstract: Land information system involves database containing, spatially referred land related data, which is used in an efficient manners through systematic collection, updating and distribution. But the manual system of the land information system requires more man power while collection, updating, distribution a management. On the other hand it also very complex system to continue this process in the context of Bangladesh where lands are splatted, developed and exchanges frequently. The emergence of the digital land information system reduces the complexity for the development and use change of land also. Savar is the first Upazila near Dhaka introducing the digital land information system, which represents all over Bangladesh with both urban and rural context. Nevertheless, practically the stakeholders of digital LIS are not well educated for practicing. This digital system with the proper evaluation and the proper implementation will reduced the systemic complexity of land in Bangladesh.

Keyword: Land, Administration, Management, Digitalization, Information

Introduction

Bangladesh is a South Asian developing country with a rapidly growing population and limited land resources. It results in haphazard and spontaneous land development both within cities and across the country. The country's landman ratio is decreasing due to fast population increase. As a result, there is a lot of land transfer and conversion. Rapid population increase, combined with the rapid transformation of land, necessitates the implementation of an efficient land administration and management system. The traditional land management system is unable to keep up with rising demand and changing market conditions. Unplanned growth and issues in community life are the result of an ineffective land administration and management system. Land records that are incomplete or incorrect make it more difficult to secure land tenure and transfer. For this reason, the most practicable systematic strategy for building an efficient land administration and management system in Bangladesh is the Land Information System (LIS) (Nahrin & Rahman, 2009). The foundation of LIS is a uniform referencing system, which could make it easier to integrate different types of data inside the system and with other land-related information. The quantity of data that can be handled, the speed with which these data can be processed, and the ways in which the data can be altered and evaluated are the most essential aspects of land information management. (Ali Shakir, 2012). The LIS is also a GIS system which provide a reliable and current information of land as a base for land markets, development, and other economic activity as well as land planning, infrastructure development and maintenance, environmental protection and resource management, emergency services, social service programs and so on (<en.wikipedia.org>, 2014 & <ncgia.ucsb.edu >, 2014). On the other hand, perfect IT environment's first requirement is the digital land mapping (Enemark, 1999). Moreover, It also allows for revenue generation to the government (taxation), maintenance of

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environmental quality, and provide security of tenure (Usman, 2010) in various countries. The LIS for the Environment can influence the planning at regional and local levels through, national planning directives and public information (Enemark, 1999). The sectoral land-use provisions are managed by the county and municipal authorities on the basis of sectoral land-use programmes that also form the basis for comprehensive planning at regional and local level (Enemark, 2008).

However, the traditional land management system is unable to keep up with rising demand and changing market conditions. Unplanned growth is the result of an ineffective land administration and management system, which eventually leads to issues in community life. Inadequate and incorrect land records make securing land tenure and transferring land more difficult. As a result, establishing an appropriate land administration and management system through a holistic approach becomes a requirement.

The last decade has seen moves towards establishment of fully digitized cadastral systems throughout the world. It is recognized that cadastral systems are not self-contained. It is also acknowledged that digital cadastral systems must be adapted to allow an efficient land market as well as effective land-use administration, thereby promoting economic development, social harmony, and long-term sustainability. Cadastral systems must be multipurpose in order to fulfill the demands of today's GIS and IT environments (Enemark, 1999). For the GIS and perfect IT environment the digital Land Mapping is the first requirement.

Land administration is the process of effectively placing land and information about its ownership under the control of a central authority that regulates the structure and patterns of land ownerships, land use, and public access to land resources in such a way that they are used in an environmentally and economically sustainable manner. An ideal land administration would be able to provide land information in an effective and efficient manner, appropriately identifying people with real estate interests and delivering information about their interests (such as duration of leases). It must also allow easy access to land for development where it is needed, increase efficiency in land use management through good planning, and promote greater social equity. It should also allow for revenue generation to the government (taxation), maintenance of environmental quality, and provide security of tenure (Usman, 2010).

At the moment, the ministries and agencies in charge of land management and administration work in silos, with minimal collaboration. The entire procedure is tedious, time-consuming, and manual. Land administration and management is incomplete and ineffective due to traditional techniques of land survey, land record generation and upkeep, and the maintenance of all relevant data for each parcel of land. Furthermore, land record distortion at many phases (e.g. plot-to-plot survey, traditional record preparation and map drawing, objections, trash / inspecting works, printing, etc.) impedes land development control and property tax collection. Because the deed system does not give the final proof of the proprietary right, insufficient and inaccurate land registrations exacerbate challenges in land security tenure and land transfer in Bangladesh (Alam, 1992; Hossain, 1995). Inadequate capacity of the Settlement Press for printing land records and poor quality of record maintenance also aggravate the inefficiency of the existing system. For those the LIS as well as the Digitization of the Map is required with

proper evaluation. With the proper evaluation and the proper implementation the LIS will reduced the Land Complexity in Bangladesh.

Objectives of the Study

The aim of the study is to identify the efficiency of the existing digital land information system in Savar as welll as Bangladesh. The objectives of the study are

- To determine potentialities of LIS through the Digital Land Mapping in Savar upazila for an effective land administration and management system in Bangladesh according to the present land management situation,
- To identify the Digital Land Information procedure ongoing in Savar for the LIS of Bangladesh and
- To address the pitfalls of Digital Land Information System and identify the possible solution for the betterment of the digatal LIS.

Study Framework

Methodology is the course of action by which the study will be accomplished. People who lived in the study area they were surveyed through the Two Stage Sampling Method. The sizes of the primary sampling units are decreased and applied two-stage sampling to each stratum (<www.fao.org>, 2014). The population size of the study is so large. On the other hand the all population are not directly related to the study. Most of the cases tha land are relate dto the male population and they usually handle the issues of the land. The first stage of sampling method is to select the cluster from the population and second Stage of sampling is to select elements from the selected cluster. To avoid potential bias, simple random sampling approach was applied in both selection. This approach is particularly useful when "each unit of the population is given the same probability of independent selection" (Kitchin and Tate, 2000). Then the sample was selected on the basis of holdings bearing the numbers M, M+k, M+2k, ……, M+(n-1). Persons to the related authority are only one so the survey was specified as the Snowball Method. Persons as the specialists will be survey under the Snowball surveying. The sample size for the study area was 200 according to the area size and related persons of the land information system of Savar Upazila. However, the authorities and specialist of related to LIS are according to the necessity.

Observation and Findings

Digital LIS is worldwide famous procedure for the development and planning. The system of LIS changeds its procedure and pattern day by day requirements. To understand the procedure of the digital LIS it is required to understand the terms related LIS. The overall findings are as bellows.

Land information system (LIS): Land Information system means to acquire, manage, retrieve, analyze, display land records. LIS as component of GIS or vice-versa... a long-standing debate, mostly a matter of semantics and disciplinary orientation (Stephen, 2000). Typical LIS are cadastre as a primary component, maintained by unit of government responsible for tracking land ownership, control; typically county

government in US which is parcel-oriented hard copy maps and/or CAD or GIS software for spatial representations relatively large (cartographic) scale (e.g., 1:4800 in rural areas, 1:1200 in developed areas) bridge between legal (e.g., deeds) and technical (e.g., maps, GIS coordinates) land descriptions. It may incorporate other technologies as parcel indexing systems (relational data base management systems), fiche and document imaging systems and surveying. The multipurpose land information system includes

- alternative to multipurpose cadastre
- parcels as one component of layer-based system
- oriented to integration and analysis of data
- geodetic reference framework as organizing principle (Stephen, 2000).

LIS Players: Local government is the administrative player for the LIS. Local government officials maintain land records, deed registry and other land information for tax assessing, zoning administration and to serve every other agency who needs to know about land for its various uses (Stephen, 2000). Public interacts with local LIS primarily in land conveyances and land tax assessment: may also some involvement in particular application. The land related business officials and NGOs also required LIS for the development as well as real estate, land banking, title abstracting and insurance, conservation and environment protection, and finally community , land use and economic development (Stephen, 2000).

History of LIS: In the early age the land information system was very poor. People has to maintain by name and address. But when the number of owner increase by inheritance or selling this procedure required more maintenance by the government (<ncgia.ucsb.edu >, 1998). One concept for a modern system is the access to all pertinent records for other government functions public access interface for routine record retrieval by companies and citizens, with appropriate privacy restrictions/protections (Stephen, 2000). The first Digital Mapping in Land Information Systems was cadastre in Poland was established in the nineteenth century, whilst the contemporary Polish cadastre was created in the 1960s. Its base document is the land register. The latter solution was chosen in Poland. Since 1991 the process of conversion of the existing cadastre from the analogue to digital form and creation of the basis of countrywide LIS is being realized (Cichocinski, 1999).

Geographic features too small to be depicted as lines and areas are represented by points, features too narrow to depict as areas are represented by lines, and homogeneous geographic features are represented by areas. Such points, lines and areas are represented as a list of coordinates instead of as a picture or a graph (Cichocinski, 1999). Finland uses totally digitized processes in cadaster maintenance and information services (Tella, 2016). An accurate geodetic framework and cadastral system has been developed, many analysis of land-tenure change could be performed with the assurance of high degree of measurement accuracy. This will help arrive at compatible multiple land uses within selected parcel of land (Hossain, 2015). LIS application combines both traditional survey methods and Global Positioning System (GPS), a sophisticated satellite system for acquiring the local information on land (Demers, 1999). The Cadastral Survey (CS) and Mapping methodology based on ground survey or aerial survey supplemented by ground survey is to be adopted. Completion of these operations would provide digital mauza

maps. Using Satellite navigation systems or GPS, surveyors collect field data using portable backpack or hand-held devices. In this process, they use signals from GPS satellites to work out the exact location on the earth's surface. Most GPS receivers store collected co-ordinates and associated attribute information in their internal memory, so they can be downloaded directly into a GIS database (Heywood, et. al. 2002).

When the 'Transfer of Property Act, 1882' went into effect, the notion of registering land ownership first came up. This law made it legal to transfer land in the present and future. Later, the 'Registration Act of 1908' was passed to create land records and collect 'ad valorem' taxes based on registration fees and other transfer-related duties. At the office of the sub-registrar, the registration records are kept in registers (Rahman and Talukder, 2016). The present system of land recording in the local land management and registration offices follow the age-old system of writing down a great deal of details on how specific land ownership titles were handed down through generations, changed hands, current ownership, heirs on both side (buyer and seller) of the families, the specific land area owned on each 'parcel' or 'daag', in an archaic customary language, which is incomprehensible to most 'lay' readers. The land record and registration offices are not well managed; documents and archives are damaged and frail due to poor storage facilities (Rahman and Talukder, 2016).

The recent scheme taken by the Government of Bangladesh intends to digitize the land records, integration of AC land and Sub-registry offices, e-filing requesting Khatian (RoR) from District Record Room and scanning of tattered Khatian and maps. This intervention is expected to not only save in Conduct RS or BS Mutation on property Verify the record of rights (ROR) Obtain inspection for RS Mutation Obtain the non-encumbrance certificate from the relevant Sub-registry office Prepare deed of transfer and pay stamp duty Pay capital gains tax, registration fee, VAT and other taxes at a designated bank Apply for registration at the relevant Sub-registry Register the change in ownership at the Land Revenue Office 7 government expenditure but also to reduce fraud and litigation in connection with land ownership. Access to Information (A2I) has been given the responsibility by the Prime Minister's office to digitize the land sector. Some AC Lands of various Upazilas have also taken the initiative to digitize the land administration system. The implemented projects are –

- The digitization projects are being implemented in six Upazilas under two different technologies, digitalization of land records and integration of AC land and Sub-registry offices in 45 upazillas of 7 districts, e-filing requesting Khatian (RoR) from District Record Room and scanning of tattered Khatian and maps. ′
- In Savar Upazilla, for 4 mauzas, digital piloting program has been completed. Savar Land office has digitized their system (Office Automation System) to improve official performance (linking sub-register office with land office) and ease the civil service (e-filing for mutation or requesting of RoR).

A2I has started an application simplificati service for Porcha (ROR), known as 'Electronic-Porcha Delivery System', which also helps to update the land records. The digitize process is shown in the following chart (Access to Information, 2014)–

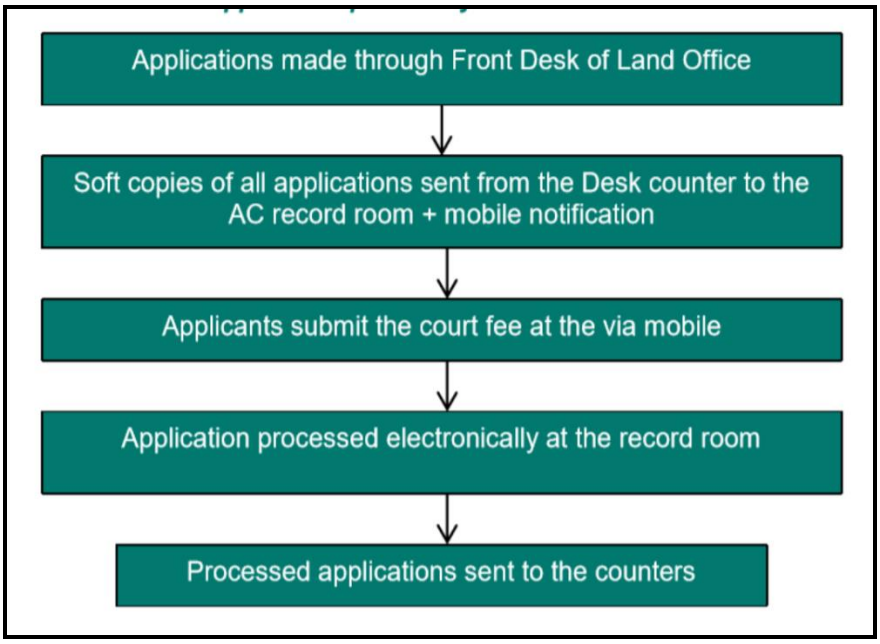

Fig 1: Application process of E-Porcha
Source: Rahman and Talukder, 2016

Before buying any property in Bangladesh, it is necessary to check the ownership of the property. Property ownership disputes are fairly common in Bangladesh. Property documents are easily falsified and untrustworthy. If a person is not cautious while purchasing a property, he or she may face complications, including possible litigation with the property's ownership later. However, verifying property ownership in Bangladesh is a time-consuming process (ogrlegal, 2018).

Process of Digitizing LIS: As part of digitizing Bangladesh's land management, around 65 lakh bhumi khatians (records of land rights) have been scanned and indexed into a computerised system under a government initiative. According to an official document, 18,500 map-sheets have also been scanned and indexed under the "Digital Land Management' project" that began in July, 2011, and ended in June, 2016. The Land Record and Survey Department has finished the necessary civil engineering for the construction of a central data center, as well as installing the necessary equipment. Bangladesh Computer Council has managed the installation of a data backup and recovery facility at the University Grants Commission (UGC) in the city's Agargaon region. The official document further said the refurbishment work of 53 district and upazila offices under the project has already been completed. The document also mentioned that 20 upazila Land Information and Service Centres have already started offering services and consultants have been appointed to run them. On completion of the current project, the Land Ministry plans to implement another project titled "Land Management Automation," which was sent to the Planning Commission for approval, said the ministry official. After gaining the Planning Commission's approval, the land management system of the entire country will be run through a computerised system following the project’s implementation, according to another official document. Besides,

the document reveals that a pilot project, "Strengthening Access to Land and Property Rights to All Citizens of Bangladesh," is also being implemented. Under the pilot project, AC (Land) office, sub-registry office, settlement office, and two union land offices of Monirampur upazila in Jessore district have installed "Integrated Digital and Land Record System" software to digitalise the land management system. Once the system is fully automated, landowners and buyers will not have to visit more than 10 government offices regarding documents. All the documents will be uploaded to a central database, to which the government officials and the people, in some cases, will have access. Through this project, a plan has been put in motion to simplify land management through countrywide land mutation, collection of land development tax, khas land and sairat mohal (water bodies) management and office and finance-management.

The government also has further plans to resolve problems related to land management through digital system. To this end, three projects have been taken so far. The projects are- Strengthening governance management project (Component- B: Digital Land Management System), Digital land record, Survey and Maintenance project, and National Land Zoning project. Once the ongoing land digitization projects are completed, the government officials sitting at their offices will be able to check any transformation of land, including infrastructure and ownership. Bangladesh's land has been divided in terms of authorisation, which continues to pose a problem.

Digital Land Information System of Savar Upazila Land Office: Savar is an Upazila of Dhaka District in the Division of Dhaka, Bangladesh. It is located at a distance of about 24 kilometers (15 mi) to the northwest of Dhaka city. Savar AC land has taken the initiative to digitize the land administration system. Office Automation System is the software used by Savar AC Land office to improve official performance and ease the civil service in a unique way. The purpose of the software is to finish the land office work in a quick, easy and accurate manner, which makes the land management as well as other official matters simple and automatic. The software was inspired by the National e-service system or NESS, and the procedure is also similar to NESS; 50% of the system has been completed (Rahman and Talukder, 2016). With this software, currently the following work is being done:

- Mutation / Jomakharij (sub-division) / consolidation
- Miss-case (currently only review clerical correction which is under section 150) regarding activities are being performed
- Various SMS notification sent to users
- Automatic digital archiving of documents
- Immediate signatures of AC land where approved
- Immediate copies of documents
- The Land Development Tax notice and mutation information are directly passed online to the Assistant Commissioner (Land) by the Sub-Registrar. According to the AC Land Savar, the government can save 5-10 thousand BDT per month on documentation.

- Finding out the latest update of the applications from any mobile phone and websites via SMS
- Preparing different registers (register I, II, IX (Part III), XIII, etc.
- Monitoring of land offices by the higher authority

Application for Mutation: This process is done at the front desk of the Land office by computer operators, who are support staff at the office. The application process is given below-

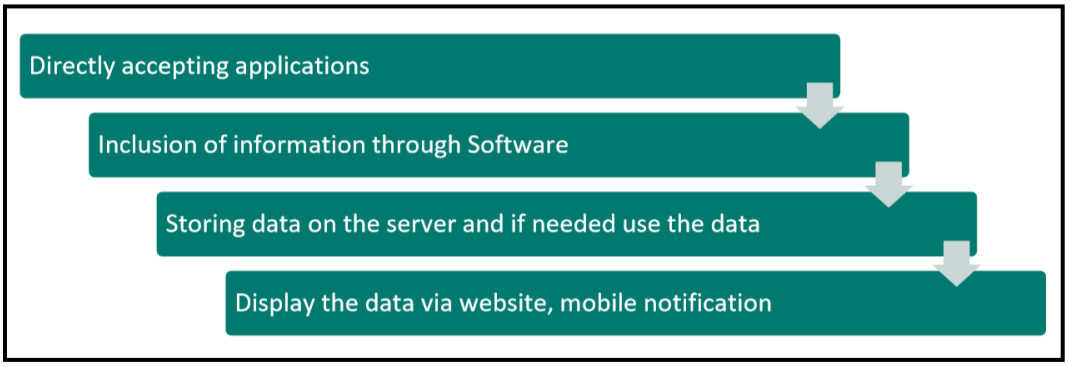

Fig 2: Application of Mutation at Savar

Source: Rahman and Talukder, 2016

After the submission of the application, applicants are notified about all the process associated dates via SMS, if needed, applicants can also check the progress via SMS. Even though, any applicant can submit applications themselves, in truth, everyone has to submit through middlemen or agents (Rahman and Talukder, 2016).

Mutation Automation: The system has a different interface for different officials. AC (Land) and each assistant have been assigned to do their particular work in their respective interfaces. After receiving the mutation application, the next activities are –

- The initial authorization of the application by AC (Land)
- Concerned ULAO submits an investigation report on the land
- If the repost is positive from ULAO, then the date of hearing is announced
- Kanungo / Surveyor or Sub-assistant officer to the report
- If each steps is verified, one can submit an recommendation for mutation to the AC Land
- After collection of fees via DCR, applicants will be supplied the ledger. These DCRs copies are being stored by the system as well.

If the concerned ledger of application is entered in the database from before, then it can be selected; otherwise at the time of the new application, it should be added. Because of a shortage of employees, old land records are not computerized. Only the current mutations and its relevant ledgers are being computerized and digitized. In the case of more than one owner, several concerned daags, comments, any kind of land-classification –

everything can be updated in this system. According to the AC Land, the mutation process is done within 28 days, whether they approve or deny the application. For this process, the user has to be present for 4 days (Rahman and Talukder, 2016).

Activities of Upazila Land Office: To provide information regarding land management, a digital land record system was launched at Savar Upazila Land Office. Dhaka district administration office assisted to introduce the automated system, a pilot project under the Access to Information (a2i) Programme of Prime Minister's Office. The system, first ever in Bangladesh, will help people to get land-related information online without hassles (the daily star, 2015). In practice the digital land record system is still not in work. The service of the Upazila Digital Centre and the access to Information (a2i) is below-

- One can apply online for the land Mutation
- One can apply for Settlement record through online.

The web address for the online application is land.gov.bd and land.gov.bd/application. On the other hand for the web address ther is two services provided by online as the application for

- Land Mutation and
- R S Khatian

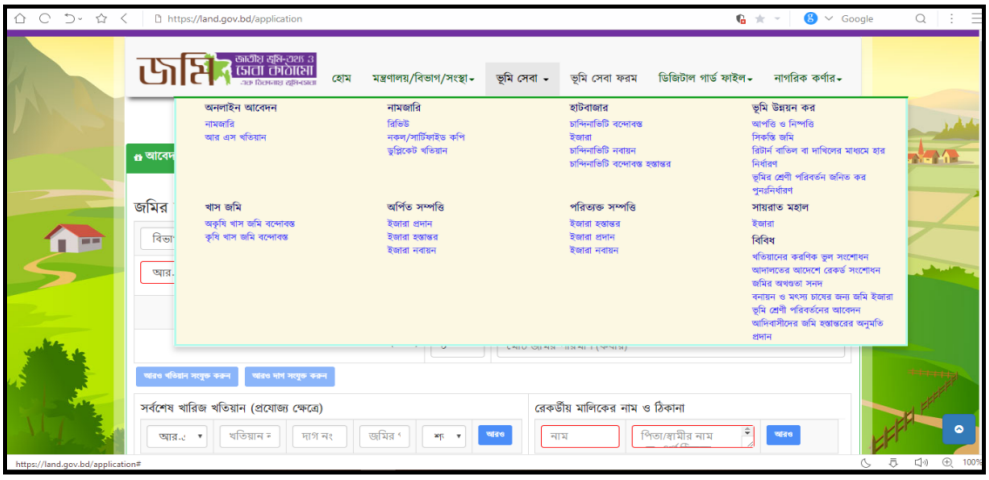

Fig 3: Online Application server for Savar Upazila

Source: <land.gov.bd/application>, 2018

There is no other services for the land owner or related people online or in work. On the other hand there is the services (show the Mauza Map or Khatian Book, providing any copy in white paper or the photocopy of record or correct the ownership paper or photocopy of mutation paper) that are not provided form the Upazila land office. But the digitization process of the land is ongoing. The process includes the Satellite image turned in to the GIS image through Arc GIS and then the attribute will be added as the owner name and other information. Now the Digitization of the Satellite image is finished now the attribute of the land parcel are being added.

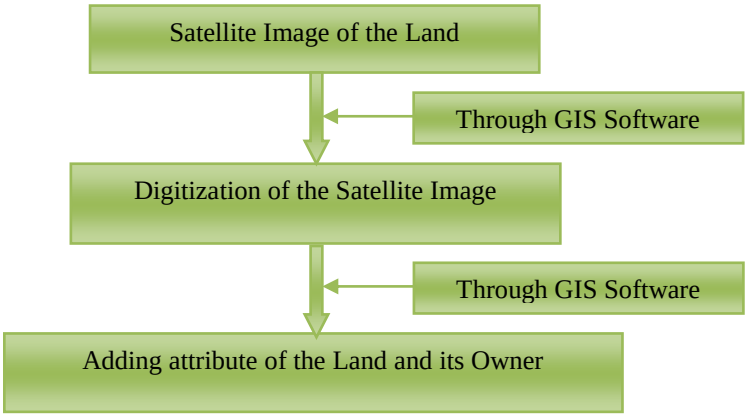

Fig 4: Land Digitization Process

Source: Field Survey and Self Illustration 2018

Challenges and immerging issues of LIS in Savar Upazila

Land Information System (LIS) is the most feasible systematic approach for developing an efficient land administration and management system in Bangladesh (Nahrin& Rahman, 2009). There are some challenges and emerging isseues regarding LIS in this upazila which may affect overall land administration and management system.

The people related to the land and its ownership are one of the stakeholders for the digital land mapping and the Digital land information system. The main concern is the land information system is not properly digitized yet. On the other the media and the local authority do not have the proper knowledge about the Digital land Information and the Digital land mapping. The survey was made to know that the digital land mapping and the digital land information system. The knowledge of a2i of the people around 38% to 83% according to the area of the upazila. The people of the paurashava area around 85% people are aware about the a2i but the are not using them directly. Most of them usually go to the shop and use the a2i if needed by paying a small amount. Near the Upazila land office there are people who take it as an extra income.

However, the general people of the upazila are the direct stakeholder of the digital land information system, but the rate of the knowledge of the digital land information system are very low in the upazila. most of the people are not well known about the system. But they are aware that it’s a step of Bangladesh government as the digitalization of the system. The ration of the people knows about the digital land information system is 18% to 55% which varies in the paurashava area and outside of the paurashava.

The people of the area are not friendly with internet as to use for the necessary activities of the digital land information system. the young generation are used to the internet for the social networking mostly but the people related to the land and its ownership activity as well as exchange land through buying and selling are not well known about the internet or the system. the rate of the surveyed people about the internet access to internet is around 51% outside the paurashava area and 86 % in the paurashava area.

Table: Summary table of Survey regarding Savar Upazila

Ward/Union No.	Knowledge about the a2i	Knowledge about the Digital Land Information System	Access to Internet	Using the a2i Service	Satisfaction of the Upazila Land Office (a2i)
Amin Bazar	61%	23%	65%	11%	85%
Ashulia	53%	36%	51%	8%	69%
Yearpur	43%	41%	55%	5%	75%
Kaundia	38%	35%	49%	16%	78%
Tetuljhora	64%	39%	68%	17%	68%
Dhamsana	62%	18%	73%	23%	51%
Pathalia	55%	32%	80%	19%	82%
Banagram	49%	28%	55%	17%	73%
Biralia	61%	23%	38%	29%	75%
Bhakurta	43%	21%	54%	26%	45%
Shimulia	51%	19%	61%	31%	52%
Savar (Paurashava Area)	83%	55%	86%	59%	70%
Savar (outside Paurashava Area)	65%	33%	51%	35%	21%

Source: Field Survey 2018

The user of the a2i services is very poor outside the Paurashava area. But in the paurashava area the percentage is about 59%. Most of them are using these services before buying a land ort property. On the other hand in the outside paurashava they usually buy land or property by using their general knowledge regarding the land ownership or the existing paper. Though the land ownership is a very complex matter to be owned or sell local people are not interested to go throuh the process as much as possible. They usually do not update the tax issue or maintion the development changes of the land.

Most of the surveyed people are satisfied about the digitalization of the LIS because they learn that this will make the complex LIS in a very easy way. On the other hand, their concern about the digital LIS is also paying less illegally for the information they need. The government officials concern about digital LIS is that the people generally dot pay tax unless they need any mutation paper of selling the land. The officials as well as government are agreed that this system may improve the taxation system. they also agreed that the documents of the land aare esy to find out and need not to preserve as before.

Unlikely Bangladesh, Savar Upazila is also far away to serve thyself the internet and computer education. More over people ususlly pay tax and work regarding land during selling or buying property. General people always try to pay lass regarding tax and follows illegal way.

In the study area, while collecting survey data for the digitalization process ther are some problems regarding ownership. The land data was collected from the BS and BRS survey but bofore that CS and SA data was not considered so that the previous problems remain same.

Moreover most of the general people of the Savar upazila are not compatible with the digital land information system. The people of the city corporation are are more aware about the digital land information system. Most of them are using the existing digital land information system in a analogue way. On the other hand the officials are attending various tanning session for the knowledge of the digital land information system. But they are not directly related for the updating the system still now.

Recommendations

Several research findings were arrived at after carefully analysis of the data collected. Several recommendations have been made based on those findings. The LIS system is not completely digitize either, though there are some pitfall of this system. The possible solutions are as belows.

- The image conversion from the paper based map to the digital map is a quite hectic process. Automation in this function can be done by image processing tools. Some work can be done in the database side also for keeping track of the owner information more wisely. For example, in spite of containing the information of the current owner only, the database can keep track of the history of ownership for a particular land. With the ownership history land area can also be tracked that has changed over time, e.g. if a land divides into two owners then the system should keep track of the division. In our system there is only textual information about the land type such as whether it's a plain land or a hilly land. Contours of each land can be stored; in fact if the land view can be converted in to 3D view using DOM technologies then the system will be more realistic towards the general users. (Choudhury, E., et al, 2011). Though the study area mostly plain but some edditiona data shaoul be added as the low land while it is water body ar not or a n uncultivated area.
- Large-scale geographic and land information systems (GIS and LIS) are developing rapidly in local and state governments and other organizations across the country. These systems handle critical information related to land parcels, transportation, utilities, and other infrastructure and facilities. They are changing the way organizations operate and make decisions, and therefore, they affect the daily activities and lives of the citizens and customers of these organizations. According to Ibraheem (2012), the attributes of different types of geospatial data such as land ownership, roads and bridges, buildings, lakes and rivers, counties, or congressional districts can each constitute a layer or theme in GIS. In this regard the data of the upazila should be clarify form the previous record of CS and SA.
- GIS has already become a standard tool for handling spatial data. Adding multimedia material and organizing friendly entries and alternative search techniques, the system

then becomes an efficient tool for different users. This system may be improved, by adding the following steps: (Ibraheem,2012).

- Promote and ensure the reliability and integrity of large-scale land information systems and Facilitate collaboration between GIS and surveying professionals at the local levels like field area of Savar Upazila.
- Promote the use of sound surveying and mapping principles in the development and the use of land information systems. The general people and the owner of the upazila should be included.
- Foster the development and adoption of useful standards, specifications, and procedures for the development, operations, and the use of land information systems by informing the people of the Upazila its consequences and effects. This informing can be done through field training.
- The LIS's structure conducts the user's navigation through alternative searching paths, created by the application.

- The importance of sound information management principles cannot be underscored. Computerization of data and the processing of that data to form relevant information for use in land rent record management can solve the difficulties currently faced in the retrieval of land information. The computerized database should be available for use by the different departments within the Ministry of Lands and Settlement and other organizations by the use of Intranet and Internet respectively. Each user of the land information would therefore have easy access to this information each time it is needed and many users can access the information simultaneously (Monica, 2001). In this regard the related officials of the Upazila can be incorporated while trainning or other activities.
- There is however a danger of making information readily available. The danger is that it would be susceptible to use by unauthorized persons. This danger can however be curbed by the use of data protection mechanisms like user names and passwords.
- The problem of outdated land rent records can be solved by the use of computer aided valuation techniques and land rent review using Excel spreadsheets. Land value modeling can be done with the development of a land value map to guide values on property values for specific areas. The use of mass appraisal techniques can also be used as it enables the valuation of larger geographic areas within relatively shorter time periods.
- Strict Enforcement of Legislation Implementing strict Laws on non-payment can solve the problem of leaseholders not paying their rents on time. Frequent reminders should also be made in the media to create awareness of the need for annual land rent payment. Implementation of the law- stipulating auction of properties should also be done to serve as an example to leaseholders that do not pay their rents. The Government should embark on rent arrears collection campaign and issue out deadlines for such payment and stiff penalties for failure to pay within the stipulated time.
- Improved Communication Network may reduce the problem of rent demand notes communication to the leaseholder can be solved by electronic communication. Each

leaseholder should give the names of their employers or e-mail addresses or banks, where the information on land rent demand can be sent electronically.

- Staff Training in the use of Computerized LIS Change is not easy. Many people have eyed computers with a lot of suspicion. The personnel employed in the land rent section must be educated in the use of computers so that they will be able to perform their functions efficiently. A computerised LIS cannot bring about change unless there is competent personnel to use it. Computers will cut down the need for many clerical staff, especially those employed to manually retrieve land rent records. With the advent of computerisation, these employees will be rendered should therefore be re-deployed or trained in other fields like maintenance of the computers or inputting of data into the databases.
- Decentralisation of Land Rent Payment Currently, the payment of land rent is limited to land offices or their respective revenue offices. The use of alternative payment points should be established to reduce over crowding at the land offices, especially as the deadline approaches. These alternative payment points could include commercial banks, grocery stores, parastatal offices and other convenient places.
- Policy Implications for the effective collection of land rent, policies must be formulated that ensure stringent penalties for non-payment. The present penalty of interest rates payment per period for non-payment has failed to prompt leaseholders to pay their rents on time. The legislation on land rent payment recommends that only 1% of Unimproved Site Value should be reserved as rent. This figure is quite low and requires to be revised. The current rate used by the valuation section of the Ministry of Lands for land rent determination is actually 5% unlikely Savar Upazila.

Digital LIS is to reduce the hassle and unconvinced of the officials by implementing proper way. The third party should the removed with proper training of the stakeholders and by influencing them with the proper knowledge of the positive consequences of the digital LIS in the study area. The use of sound surveying and mapping principles in the development and the use of land information systems. This system may be improved, by promoting and ensure the reliability and integrity of large-scale land information systems and Facilitate collaboration between GIS and surveying professionals at the local, regional, and national levels (Ahmed, 2012). The digitization should be the two way path as collecting information from the stakeholders through survey and application and using the policies for the betterment of the system as soon as possible.

Conclusion

Land administration and management system in the country is very complex and time consuming. LIS could bring an appropriate land administration and management in Bangladesh. However, the initiatives of LIS through the digital land survey all over the Bangladesh would face a great challenge regarding the legal and institutional matters of the country as well as for technical constraints. LIS responsive land reform, institutional arrangement, extensive privatization, sufficient training, and the overall political will would be needed for introducing the new system. Despite the huge installation and recurring cost of new technologies, once the land record is completely computerized, various space-specific parameters could be hooked-up to the land record. The same

record could be utilized for various purposes such as taxation, subdivision planning and other tasks in urban, rural and regional level. For this purpose, demand responsive step-by-step approach within a timeframe would bring the effective results for land administration and management through LIS. The First step of the LIS in Bangladesh is already started over. So with the help of proper evaluation of the LIS through the Digital Land Mapping will play a great revolution for the LIS in Bangladesh.

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