Multi-channel Approach Towards Digitizing the Land Management System of Bangladesh

Shovon Niverd Pereira[1], Noshin Tasnim[2], M Shahir Rahman[3], Sanjida Nasreen Tumpa[4], Md. Mahboob Karim[5],
Rabius Sunny Rizon[6], Nabila Shahnaz Khan[7], Ruhul Ambia Remon[8]
Department of CSE, Military Institute of Science and Technology (MIST), Dhaka-1216, Bangladesh
Email: {[1]niverdpereira, [2]noshintasnimgrtr5, [3]shahir.rahman3502, [4]tumpa.sanjida, [5]mahboob4146 }@gmail.com

Abstract— **With the motto of being fully digitized by 2020, Bangladesh has already introduced technology to many sectors like administration, business, education, health etc. However, the Land management sector of Bangladesh is lagging behind in terms of usage of technology. Though land has maintained its superiority even after the meteoric rise of science and technology, it is a matter of great regret that different aspects of the land management system of Bangladesh have not seen the light of modern technology yet. Therefore, this paper introduces a cloud based multi-channel approach to synchronize various aspects of land management to improve the current paper-based system into a faster and efficient one. Digitization of the present system is the prime focus of this method without much alteration, which will help to reduce mismanagement among the respective organizations as well. This system also intends to focus on the inheritance of the lands and reduce scam activities related to the land purchase. The user friendly interface of web and mobile applications will also reduce the complexity of this age old management system to the users.**

Index Terms—**Automation, Cloud database, Land management system, Land surveying, Mobile and web technology**

I. INTRODUCTION AND RELATED WORKS

Bangladesh is a developing country and for a fast-growing country like Bangladesh, development in information technology is a must. In Bangladesh, land plays a very important role in the social and economic aspect. For rapid growth of population, per capita land in comparison to the number of people is very insufficient and still, these small lands are diving into parts in each survey. Along with the deviation of lands, the owner of lands are changing, new documents are created for each part. Due to the age-old land management system, mismanagement has become a regular case in this sector. Most of the regulations were enacted during the British period. The outdated regulations rely mostly on land officers, revenue collectors and surveyors which are not compatible with this modern time.

It is necessary to digitize land management to combat corruption. We must implement a transparent and efficient digital system which will make this sector free from all these difficulties. Proper processing of land ownership, registration, relocation, mapping, tax payment, will or testament and other legal documents require a slight modification of the central infrastructure of land administration. Therefore, We have analyzed the bottlenecks and hindrances of the existing land management system and come up with a system which will accelerate the system, will be transparent and serve as a better solution to the people.

In recent and past years, few initiatives were taken to resolve the issues related to the land management system. Some of them focused to digitize the land maps [1], [2] while others worked with the infrastructure of the system [3]–[5]. Table I provides a brief summary of the related works.

Several stages of the system have been explained in the proposals mentioned in Table I and most of them proposed new infrastructures to improve the land management system of our country. But, implementation of a completely new process is very costly and time-consuming. Rather, we can focus on the improvement in the existing situation with some integration of digital technology. Besides, nobody focused on the inheritance of the lands and scam activities. Therefore, we are proposing a multi-channel model which is going to digitize the existing system without much alteration. At the same time, a virtual central authority or administrator is designed which will supervise the overall system and that will terminate most of the obstructions that slow down the process. Also, a mobile application will be provided to increase the ease of access to the information to the users.

The rest of the paper is organized as follows: Section II demonstrates the present scenario while III describes the features, conceptual design, and implementation along with the work flow of our proposed approach. The overall discussion has been added to Section IV which also concludes the paper.

II. PRESENT SYSTEM AND IT'S LIMITATIONS

The present system is totally paper based and prevailing since the British era. In brief, the whole country is divided into *Divisions*. Then the divisions are subdivided into *Districts*, *Thana*, *Mouza* and *Daag*. So, for locating a piece of land in Bangladesh the mentioning sequence *Divisions*, *Districts*, *Thana*, *Mouza*, *Daag* is followed. The related traditional terminologies mentioned here are well described in [7].

The *Daag No* represents a certain amount of land which is the unique identification number of a land. A *Daag No* can be associated with a single owner or shared by multiple owners. But the ownership is not demarcated in the map. There are mainly three aspects of a land that is Survey, Recording and taxation and Registration of transfer which are maintained by different offices.

TABLE I: Summary of the Related Works to Digitize the Land Management System

Authors	Paper Title	Proposal	Platform
Choudhury et. al. [1]	A web-based land management system for Bangladesh	Put a model of land management by scanning the current paper-based maps and convert the images into scale-able vector graphics format into database	HTML5 based frontend, PostgreSQL (a geo-spatial capable database) for storing data, InkScape to trace scanned images of maps
Khan et. al. [3]	Automated digital archive for land registration and records	Developing a digital archive and retrieval system with automating manual procedures and collect land data using ground survey, GPS based data collection system. Also, smoothen the land purchase and sale process.	VC++ and Active X components which will have a linkage with a GIS software, The new Google Earth software for image processing
Talukder et. al. [5]	Digital land management system: A new initiative for Bangladesh	GPS based land surveing and online land management encompassing an assortment of web-based participatory services	GPS (Global Positioning System) based land surveying, Google Map API is used to automate map drawing system using GPS data
Nahrin et. al. [2]	Land Information System (LIS) for land administration and management in Bangladesh	Geographic Information System (GIS) and Satellite navigation system is used for field data collection.	GIS based land survey and mapping
Others [6]	-	According to the plan of Bangladesh government for Land Record and Survey a central data center and a recovery data center will be placed. Map scanning is already ongoing using Trigonometrical, Geo-Detic , Topographical survey and Aerial photography	GPS, GIS and an on-ground survey is operational

The ownership is written on land registration papers that are known as *Porcha* [8]. These papers are reviewed during several land surveys occurred at different times. Some of them are known as CS Survey, the land survey that was done on British period; RS and SA Survey, during the Pakistan period and BS Survey is done during Bangladesh Period. In these survey papers, the owner is given a unique ownership number usually known as *Khaatian* number [9]. The survey process is a long process and sometimes can take years.

For land registration and recording, records may be updated as a result of surveys [10], via the sub-registrar and through inheritance when new maps and *Khaatians* are sent from Directorate of Land Records and Surveys (DLRS) after completion of a land settlement survey. A notification of transfer by sub-registrar is sent to AC Land[1] office, due to the paperwork it sometimes delayed by months. As per the present land transfer process, at first buyer and seller agree on a price. Upon agreement buyer checks ownership with AC Land[1]. After getting validation of land and ownership, buyer arranges deed preparation. After the deed is done, buyer and seller go to sub-registry where sub-registrar establishes that money has been paid, collects the immovable property transfer tax, and registers the transfer. After the transfer, the authorized deed will be collected by the new owner and land transfer record will be sent to AC Land[1] office. Then, *Tahsildar* inspects the paper and AC Land[1] office updates *Khaatian* Record.

An authorized deed is supposed to be issued within a month but frequently takes a year. Transfer Documents delay months of time in case of sending to AC Land[1] office and sometimes few corrupted officers of AC Land[1] office refuse to update the record without the bribe [11]. As there is no direct link between the offices and the system involves a great deal of paperwork and correspondence the sector is identified as the

most corrupted and inefficient sector [12].

III. PROPOSED SYSTEM

A. Requirement Analysis

- Land offices were visited for gathering information related to the research.
- Detail information about the existing system, some samples of *Khaatian* and deed documents had been collected.
- A short survey was made to know the requirements of the current employees and their opinions about the digital land management system

Combining these perspective ideas, conceptual design of the system was developed keeping in accordance with privacy and security of the system.

B. Conceptual Design

The overall architecture of the proposed system is demonstrated in Fig. 1. Key concepts of the system are listed below:

1) **System integration and synchronization:** All the offices affiliated with land data and records will come under a single umbrella.
2) **Triggering update:** Every instance of data will be changed in required places as soon as triggered by a single change in any of the places with proper validation.
3) **Location of any land:** Location of any land can be found easily along with required information.
4) **Finding appropriate office:** Users often find it confusing which branch of particular land office to contact for any kind of necessity. The proposed system provides all information regarding land. With the help of the provided information, one can easily locate the concerned office.
5) **Mutation:** Every time a land changes hand only the National IDs of the buyer and seller will be needed to along with other identifying factors of the land. The

[1]Assistant Commissioner of Land

system will update the owner information of the land in a blink of an eye.

6) **Requesting raw documents:** Any kind of documents' hard copy such as *Khaatian*, the deed will be available on demand as required format.

7) **Ease of access:** The system has very user-friendly web and mobile interfaces. Users do not need to take the extra trouble to run to some land offices on demand of some basic information. All the required information will be available online in an organized and secure way.

8) **Security:** We are maintaining different layers of authorization level. As a result of user accounts, one can only see his own information. The edit privileges will lie to the editors from different land offices. Also unique *Khaatian* numbers are used in every mouza to ensure distinction of each land.

9) **Land owner's profile:** Every land owner will have an account to see the most updated information regarding his lands.

10) **Updated land price:** This system will contain the current land price for different zones. Thus the user will be able to see the estimated price of his land.

11) **Averting fraud of real estate brokers:** The owner will be able to bid his land through this system while the buyers will remain updated about the actual price rate of land and which lands are currently available for sale. This can conserve people from scams and frauds of real estate agents. While communicating from one office to another paper documents are the only source of transaction and record verification which is easily forged. But through our system authentic online notification will be issued for inter-office communication to prevent scam activities.

12) **Alert message to land owners:** To prevent all kinds of illegal buying and selling of land, whenever a land will be sold, an alert message will be sent to both the previous and current owners. Within six months if the previous owner reports that his land has been sold illegally or without his consent, then complain will be filed for further investigation. So it won't be possible anymore to sell land using fake deeds or without letting the owner know.

13) **Keeping track of lost lands due to river bank erosion:** In Bangladesh, every year hundreds of people lose their land due to riverbank erosion and become homeless. When after many years river chor appears at the same place, due to lack of information of the actual justified owners, the land is occupied by the powerful landlords of that area. Through this system, Government will be able to keep track of the owners of the lost lands in river erosion and notify them or their inheritors even after many years about the newly emerged chor on the river and hand over to them their portion of land.

14) **Notify inheritors:** The system will be notified automatically about the death of a land owner after his death certificate is issued by authority and it will instantly notify the inheritor or children or nominee of that land owner about the land's ownership transfer procedure.

15) **Prevent forceful occupation of lands:** Often landlords or powerful personalities try to occupy lands from the general helpless people by force, without their consent and at a very low price. In this system, if a land is sold at a price much less than its current estimated price then a alert message will be send to the owner and also to the regional police station so that they can further investigate about why the owner sold his land at a very low price rate.
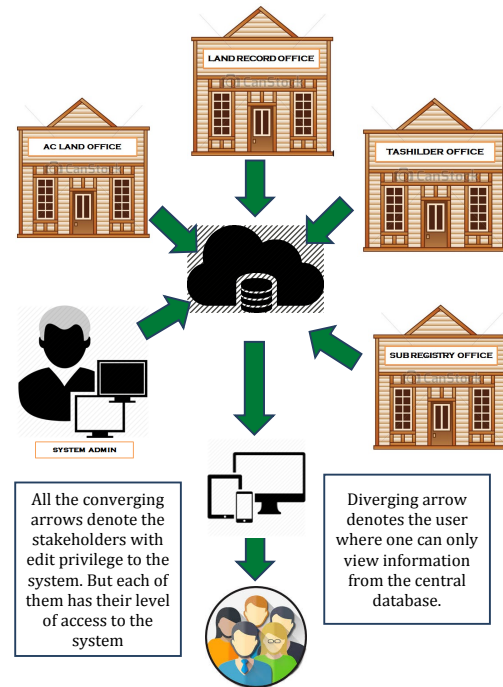

Fig. 1: System architecture involving all stakeholders

C. Development of the Prototype

The proposed system is designed from the perspective of the four offices mentioned before. Though they will work separately as they do now, the virtual admin will ultimately merge them together to make a complete set of information. Integration of the current paper-based system to the database is under testing for the prototype. Paper-works related to land management such as, *Khaatian*, *Porcha*, Deed have their individual significance but there is no exact format for these except *Khaatian*. As a result, the integration has to be done manually entering data in the system which is going to be a long process.

The survey office will insert the physical information of a new land and AC Land[1] office will be notified automatically by the system of this fact. Then, AC Land[1] office will generate a *Khaatian* with required information and unique *Khaatian* number. *Khaatian* numbers are unique in every *Mouza* and
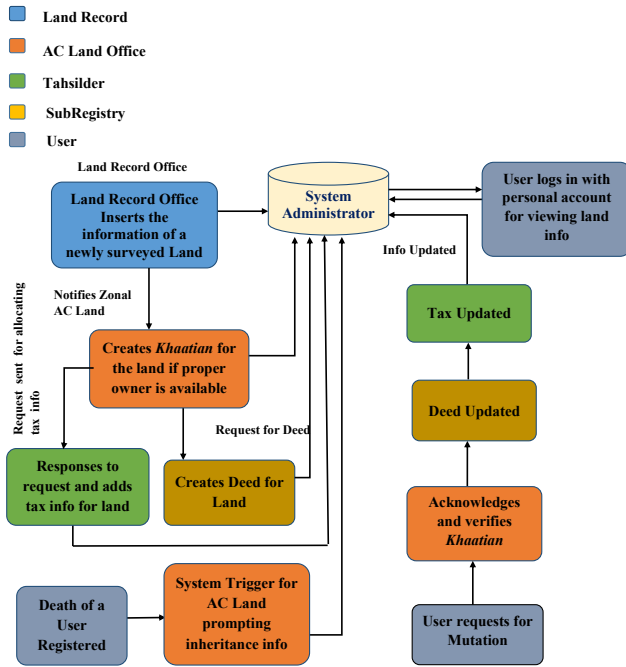
Fig. 2: Work flow of the proposed system

Fig. 3: Home page of the proposed system

also unique for a owner or set of owners' ownership. By this, a land's information can be tracked down following the *District, Thana, Mouza, and Khaatian* number without a chance of overlapping, In turn, the sub-registry office will require to create a deed for the land and notify the tax office that this land needs taxation info. Finally, the tax office will add that info. These flow will complete an information about a land. All subsystems will be integrated into a single system. Figure 2 represents the work flow of the proposed system.

Each of the offices will have different authorized modules with proper access. Special search criterion will be provided to make it more user-friendly to all stakeholders. Figure 3 demonstrates the initial user interface of our proposed system.

Laravel framework has been used to develop the front end and back end, Android OS is used for the mobile platform

and MySQL is used as the database. The cloud facility for MySQL database is provided by Google Cloud. Google cloud enables us to focus more on coding rather than the underlying infrastructure. The services includes 24/7 online capacity and support. We have maintained the three phases of database design: Conceptual database design, logical database design, and physical database design. To translate the conceptual design to a logical design we have designed an Entity Relationship Diagram which has been uploaded in [13].

IV. DISCUSSION AND CONCLUSION

The present system of keeping records of lands in Bangladesh are very legit and strong process. But as the whole system is completely paper based, many chaos created because of the mis-communications among the offices. Our proposed system is a new way of digitizing and integrating dispersed part of land management system of Bangladesh. After implementation, the prototype was tested and evaluated by a team of 20 students and 7 teachers and they recommended the system to be user-friendly, well-organized and sound.

A huge amount of money is wasted to resolve the problems created by the existing system. The proposed system can serve the land management purposes of the country as well as provide all kinds of necessary information to the general mass people. Thus, it makes the overall system transparent and will reduce the mismanagement. And, this transparency of the system will help us to get a corruption free Bangladesh effectively.

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