Land Record Information Management System (LRIMS) – A Conceptual Framework

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Abstract: The land record information management is very difficult with the FMBs and the pattern of alphanumeric data such as the *Jamabandi, Khasra Girdawari and Pedigree Sheet.* The upcoming technologies such as *GIS*, *Data warehousing* and *Web* are very much helpful for the generation, updation as well as management of the land record information. The use of these technologies will make LRIMS easier and faster.

1. Introduction

Land, which is a scarce natural resource, has been regarded as a measure of wealth, status and power, from time immemorial. Any developmental activity is nearly impossible to conceive without taking land into consideration. Now, it is being widely regarded that the efficiency in land management is one of the indices of a nation's developmental status. Hence, it can be said that the land plays the role of the most crucial role for societies progress anywhere in the world.

It can also be said that the rights of the citizens to own private holdings and enjoy the wealth generated from the same, constitute a very important facet of public administration. This is particularly true for India, which is a predominantly an agricultural economy. As India is rapidly transforming into an industrialised economy and, consequently, suffers from maladies like urban overcrowding, unlimited exploitation of precious natural resources like land are being put to enormous strain, screaming for proper management. Land Administration in India, therefore, shall have to evolve procedures and methodologies consistent with the social dynamics of the day.

Land records in India, are said to have originated during the Mughal period, but were put on scientific foundation by the British. During this period that large-scale cadastral surveys were conducted to determine the boundaries and extent of each individual landholding and to settle the crop-sustaining ability (or fertility) of different soils. This had been done to rationalize the levy and collection of land revenue from the landholders each an every village.

2. Present Day Scenario

In most of the states of India, the land records data are maintained at Taluk offices. These are of two types and are maintained in various registers.

- The map data is stored in volumes for each village. These are known as the Field Measurement Books (FMB).
- Various alphanumeric data like Jamabandi, Khasra Girdawari, Pedigree sheets etc. pertaining to each individual land holding is primarily classified into land details and the ownership details and is maintained in various registers.

2.1 Field Measurement Book (FMB)

In FMB's the individual survey number maps are maintained at a scale of 1:1000 or 1:2000. Each survey number is divided into several sub divisions. Each sub division is owned by a owner. The FMB's also depicts the dimensions of each field boundaries and the sub divisions. Various components of Field Management Book are discussed below:

G-line

This is an imaginary line (Guess Line) which converts the map into various sizes of triangles in order to accurately fix the boundary lines and the various points in the map. This line is the foundation on which the entire map is built. Any error in a G-line will affect all calculations based on that G-line.

F-line
It is the outer boundary line in a sketch, which signifies the actual field boundaries of the outer lines of the sketch. The F-line points are fixed with reference to its offset distance from the G -line.

Subdivision lines
These lines demarcate a small parcel of land within a survey number. A subdivisional polygon's extent is directly correlated to the extent found for the particular sub division. The sub division lines are generally defined through a ladder etc., except for the graphical representation in the FMB.

Ladder
As mentioned earlier, the field line points are defined with reference to an offset distance from the G-line. The offset distance may be to the left or right side of the G-line. This left or right angle deviation (offset) is depicted by Ladder. By converting the ladder details into electronic data, once can produce the outline of the FMB sketch. The ladder details get attracted whenever there is a change in the field line, involving a bent.

Extension lines
Each survey number field is an integral part of the village map and hence other fields surround each sketch. The exact direction in which the subject field joins the neighbouring field is shown on the FMB as an extension line.

Neighbouring field survey numbers
As mentioned earlier, each survey sketch is surrounded by other fields. These surrounding field numbers are marked around each FMB. This enables mosaicing of FMBs into D-sketches and village maps and so on.

2.2. Alphanumeric Data
Different kinds of data maintained in various registers are:

Jamabandi
It is the record of rights. It indicates the ownership of each parcel. Form of mutation holds the records through which the changes are affected in Jamabandi.

Khasra Girdawari
It is the crop inspection register, giving details of the cultivator, crop, and area under such crop.

Pedigree Sheet
This sheet gives the details of the cultivating and landowner families of the village and their relationship.

2.3. Issues
The present land records are generated by employing manual labour and making use of inexpensive, approximate and rudimentary, but friendly survey instruments. As the entire exercise is manual, completion of survey and mapping operations has taken even decades and, by the time the maps and the land registers are put to maintenance, they were already outdated to a great extent. Elaborate and time consuming land settlement operations also contributed to the delays in finalising the land records.

Hence prime emphasise should be given for the computerisation of the land records maintenance for the benefit of the public and to bring in e-governance into effect at the grass root levels. Evolving system architecture, educating the concerned officers and the public of the benefits and implementing it are the key areas that require the most attention. The system architecture design should be taken into consideration the specific problems related to the land records.

3. Emerging Technologies/ Trends in LRIMS

There are various kinds of real time problems and drawbacks in the present-day land record information management. In the cyber era unique technologies have emerged up and they act as asserts to the present demands in information technology. Some of these technologies with their affect in LRIMS are elaborated in the following sub-headings:

3.1. GIS
Geographic information system (GIS) is a computer-based tool for mapping and analysing things that exist and events that happen on earth. GIS technology integrates common database operations such as query and statistical analysis with the unique visualisation and geographic analysis benefits offered by maps. These abilities distinguish GIS from other information systems and make it valuable to a wide range of public and private enterprises for explaining events, predicting outcomes and planning strategies.

LRIMS requires a huge amount of maps integrated with large databases. GIS is an excellent tool which handles all these kind of spatial as well as non-spatial data.

In the conventional mapping and recording procedure, the data is widely distributed. For any kind of information different sub-branches of land record department have to be traced, which is very time consuming. If geographical database like maps and alphanumeric database like ownership information, crop information and revenue information are integrated to generate a single LRIMS, the information extraction for the future use will be very easy. It is very clear that initial generation of LRIMS along with the GIS will take a substantial amount of time, but once the system is in place further querying, analysis and updation will be very fast. GIS will help LRIMS to visualize each and every land parcels in terms of "polygons" along with their related attributes. Edge-matching the land record maps is easier in GIS environment. All the maps will have single projection system as well as there will be topological relationship between the land parcels.

3.2. Data Warehousing and Data Mining

Data warehouse is a storage device or simply a vessel in which information is added. In essence, a data warehouse is a large database organising operational data in a repository for easy query and analysis. It is a well-conceived and well-designed environment containing data that are keys to an organisation's decision making process. A data warehouse helps organise the data. Data mining helps end users extract useful business information from large databases. It brings the power of predictive modelling to Decision-makers and Strategy planners. The concepts of data warehousing and mining are extended to spatial (maps and images) data also.

The huge volume of information created for the LRIMS can be implemented in data warehousing. The history of property transfer as well as division of land parcels can be visualised with this technology. The revenue information for land holders, crop pattern and yield trends can very well be studied once the LRIMS is warehoused. There are large number of *COTS* (Commercially Off The Shelf) softwares available which take care of spatial data warehousing and data mining.

3.3. Web

The explosion of internet activity over recent years has sparked a global move away from traditional isolated single-software, single-machine computing, towards distributed multiple-software, multiple-machine computing. The advantages are obvious - larger information base, up-to-date information and greater computing power.

The web technology has given tremendous scope to LRIMS. The huge database of LRIMS including both map as well as alphanumeric data can be safely stored in a centralized server in the main land record department of each state. These informations will be accessed through internet from different sub-divisions. Various levels of informations will be available to different departments and they can be *password* protected to prevent illegal accessing of data. Land record data updation and modification of revenue information, property transfer and crop yield can be done at the client side and saved back in the server. On the client side the permission for data updation, deletion will be given to the concerned authority with the provision of *login* and *password*.

4. Conclusion

Integration of FMB and alphanumeric data is indispensable to have a full-fledged LRIMS. In the traditional manual methods the query of land record with all the related data is comparatively time consuming and laborious. The technologies like GIS, spatial data warehousing and web are very mush helpful to generate a complete LRIMS. All *Taluka* offices, to update the information as well as to keep a track of ownership, crop yield and revenue will use this system. With the aid of these recent technologies all the land record information will be under fingertip (click of mouse). Land record information management will be easier and faster.

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