Evaluation of Land Information System under National Land records management Programme- A case Study in Odisha

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Abstract: Land is the habitat of man and its wide use is crucial for the economic, social, and environmental advancement of all countries. Population growth, technological and social hazards, and environmental degradation have all to be taken into greater account today by policy makers, resource planners, and administrators who make decisions about the land. The objectives of the paper "Digitization of village Cadastral Maps and development of Comprehensive Land Information System" for Revenue & Disaster Management of odisha. Therefore, for planning purpose all land-associated information should be available in the form of a computer database, which can be easily accessed, manipulated by decision makers while formulating and executing a project.

Key words: LIS, GIS, Land record,

1.Introduction: Information about land is of great value to government as well as the individuals. Transparency in land information will benefit the public immensely and also greatly reduce litigations and law and order problems. However it is important to lay down definite rules for legitimacy and ownership of information which may now be more easily available. Land records management involves tracking and administering the ownership of real property and property task programme (G.I.S. plays a central role in these tasks. Using today's client-server technology the exchange of these date with other department can be performed with minimal impact on staff time and without loosing control of the content & security of the date. Such computerized revenue maps can also come handy while implementing aided projects of World Bank, IMF, ADB etc. in the fields of Irrigation, Agriculture, forestry, Aquaculture etc. including infrastructure projects like Highways, Railways, This also becomes extremely helpful while setting up large industrial/ infrastructure projects where the base Revenue maps and Land holdings are extremely crucial in the stages of planning.

2. **Objectives:** The objectives of the study "Digitization of village Cadastral Maps and development of Comprehensive Land Information System" for Revenue & Disaster Management Department are envisaged as below.

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- Study of hardware/software of the Land computerization and digitization of land records;
- Analyses the monitoring various aspects of computerization and digitization of land records;
- Appropriate technology and processes for effective, fast, timely, reliable and cost effective computerization and digitization of land records.

3. Study Area: Odisha is located on the eastern coast of India, between 17º31" and 22º 31" N latitude and 81º 31" and 87 º 31" E longitude. It covers 155,707 km2 , which represents about 4.74% of the area of India. The climate of state is tropical with 1450mm average rainfall. The 2011 Census established the State"s population at 41.9 million, 16% of which lived in urban centres. The average population density is 270 persons per km2, compared to 382 for India. Odisha is a land of possibilities. The State is endowed with bountiful of resources, people, land, water, forest, minerals and other minor resources. The State is divided into 30 districts, of which Mayurbhanj is the largest (1042km2) and Jagatsinghpur the smallest (197km2). The districts are subdivided into 314 CD Blocks. There are 58 sub-divisions and 171 tahasils. According to 2011 census there are 51,349 villages and 6234 Gram Panchayats.The study evaluation conducted in Ganjam, Balasore, Khurda, Mayurbhanj, Cuttack,Jajpur,Keonjhar,and Bhadrak. See Map-1
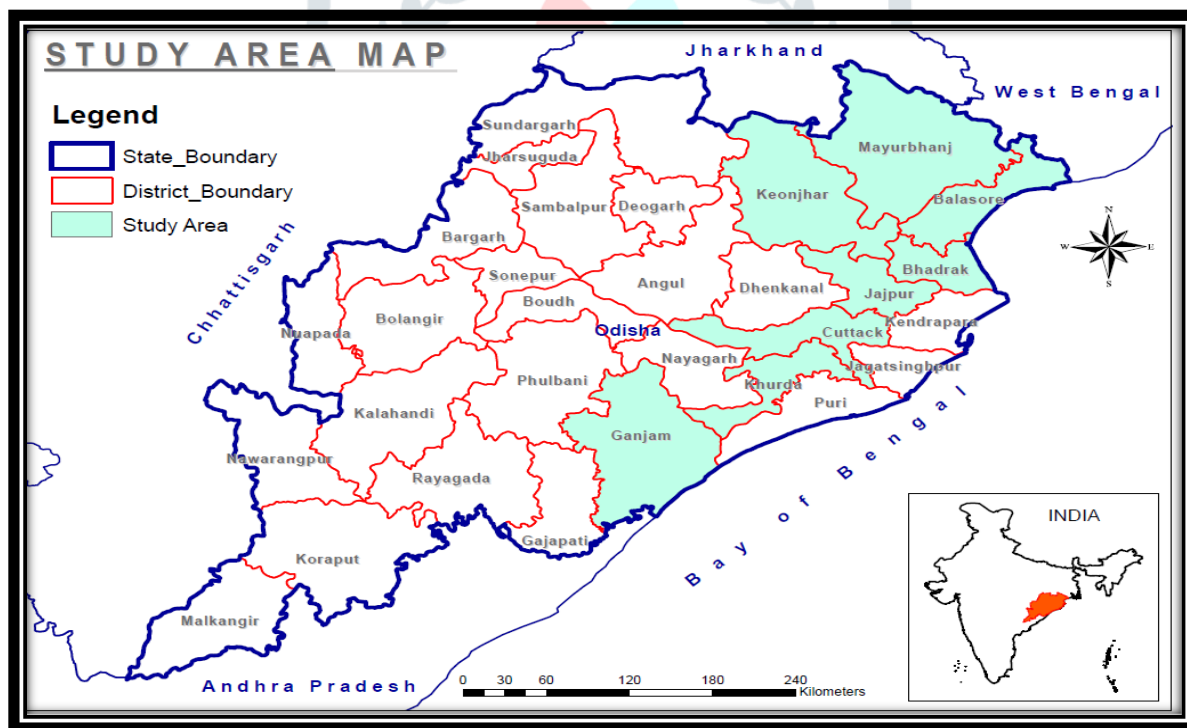
4. **Methodology:** The study methodology aims at assessing the current scenario and identifying the problems and issues and trying to identify the technology alternatives to address these aspects for the computerization and digitization of land records in the districts. Secondary data is the major source of data analysis and interpretation. All the processes, methodologies, technology, hardware and software configurations were studied and analysed, with respect to current technology alternatives and weigh various alternatives for appropriate methodologies. Process study, methods study, work study, mapping methods,

accuracy levels, geo referencing, etc were undertaken for assessment and evaluation of computerization and digitization of land records.

5. **Evaluation Process:** The following parameters were proposed to evaluation of the computerization and digitization of land records:

1. Ownership of information.
2. Access control of information.
3. Pricing of data and cost recovery.
4. Copyrights and authority to replicate or distribute data.
5. Value addition to data.
6. Cost recovery and self-sustenance of the system.
7. Technology trends and availability
8. Easiness of working
9. Accuracy levels
10. Speed
11. Time and cost saving
12. Acceptable levels
13. Proximity to legal acceptability levels
14. Storage; mapping and transfer levels
15. Uploading/updation levels

In table-1 and Map-1, 2, 3, 4, it shows district wise scanning, map digitization, map checking and map validation

Table-1 Status of Digitization of Cadastral Maps

Name of the vendor	Name of District	No. of Scanned Maps Issued	No. of Maps Digitized	No of digital prints submitted	No. of Maps checked	No of Maps validated
M/s RMSI Ltd., Noida	Ganjam	14232	14232	1021	803	126
	Balasore	4697	4304			
M/s Aabsys-DCS Consortium,	Khurda	5948	5948	5893	2484	234
	Mayurbhanj	5244	5236	-	-	-

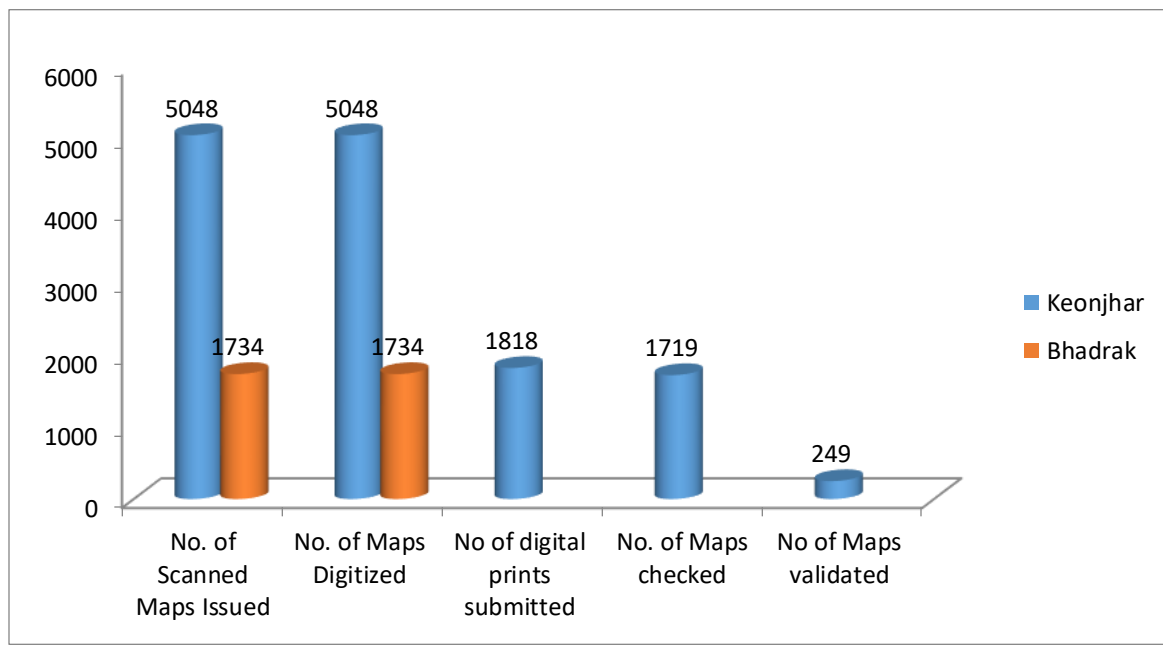| Bhubaneswar						
M/s Micro Documents, Nagpur	Cuttack	5342	5342	36	36	119
	Jajpur	2226	2218			
M/s Genesys International, Mumbai	Keonjhar	5048	5048	1818	1719	249
	Bhadrak	1734	1734			
Total		44471	44062	8768	5042	728

MAP-1
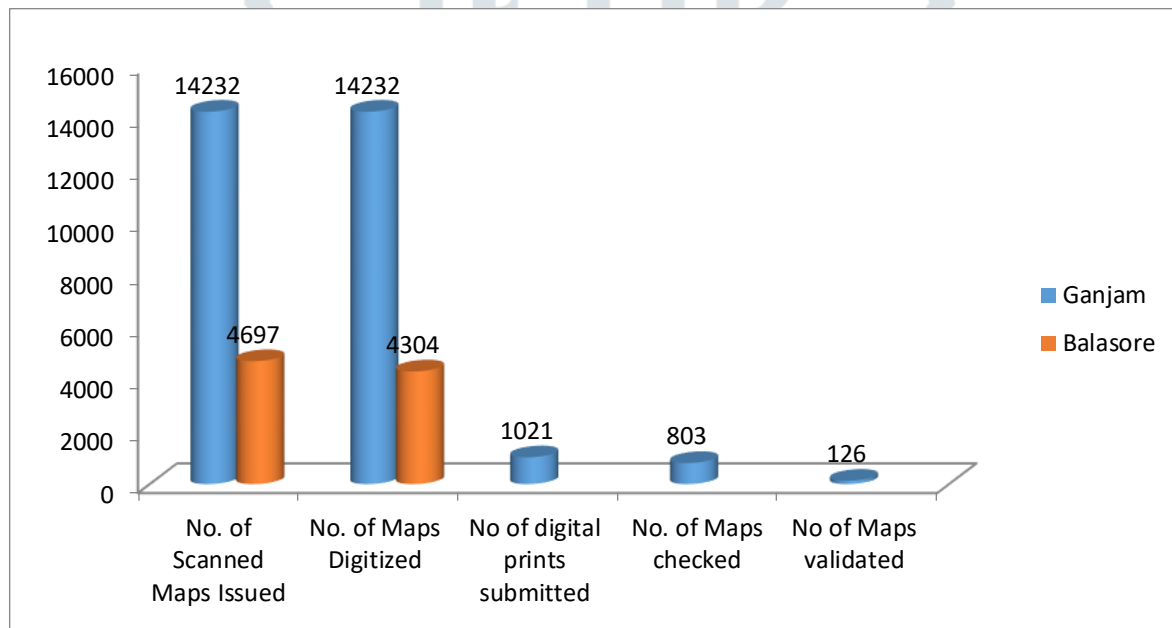
MAP-2
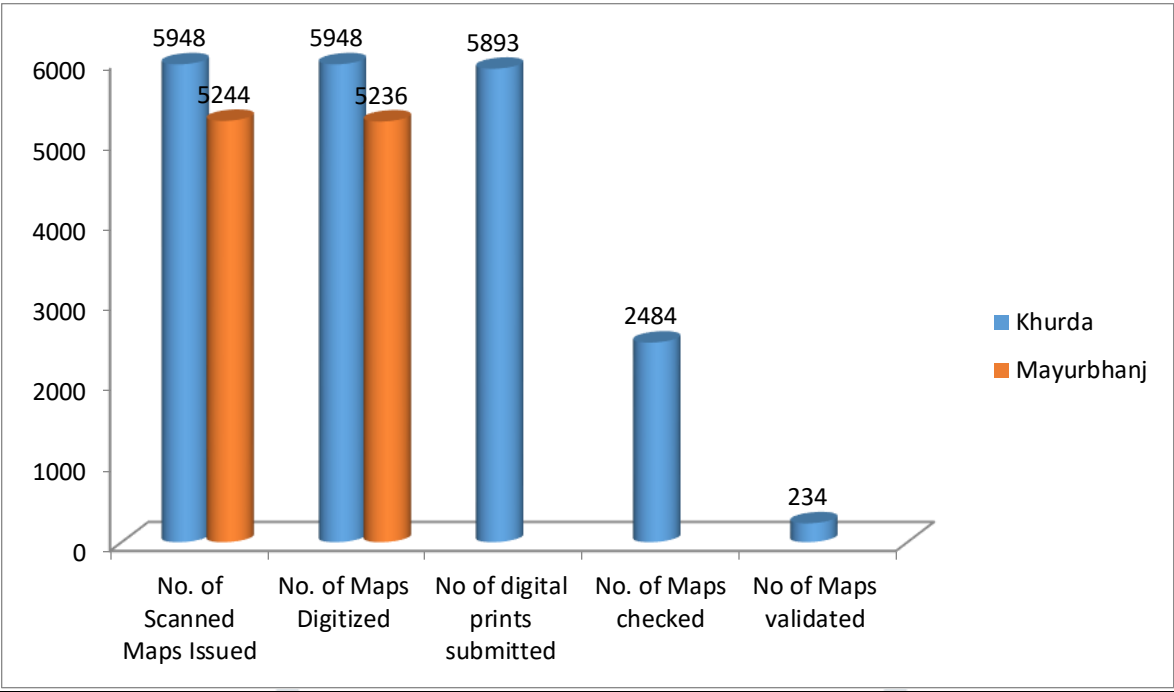
MAP-3
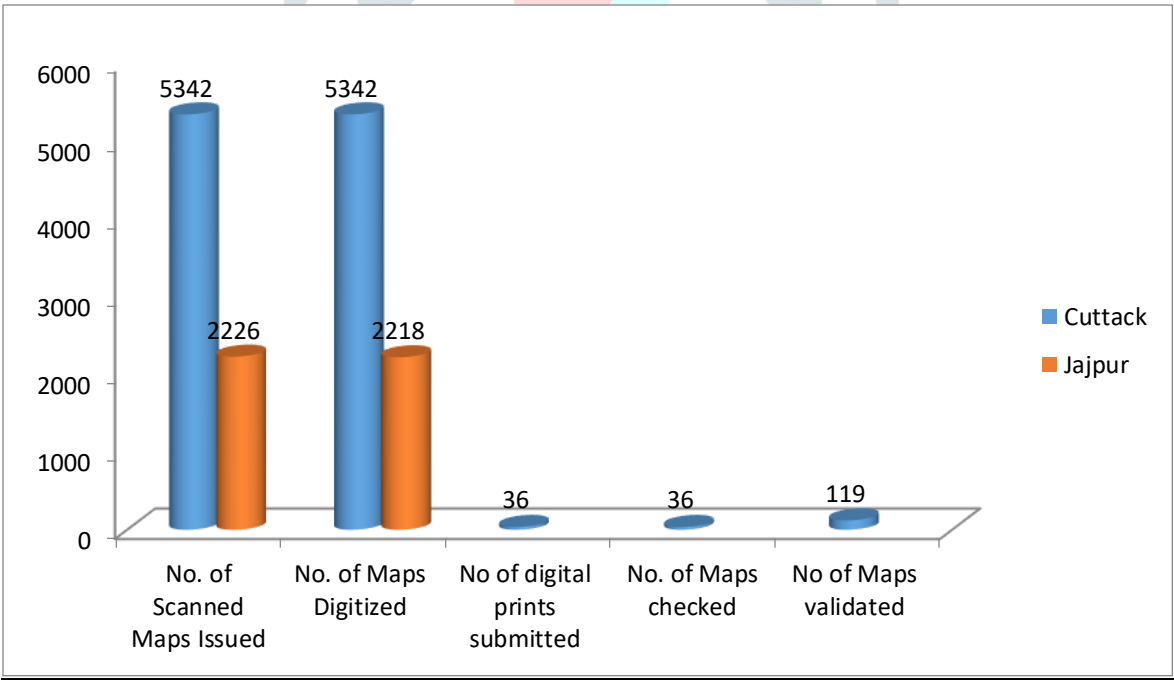
MAP-4

Our multiplying population is faced with the immense challenge of apportioning the limited lands for a variety of uses. All lands are not equally resourceful; some are good and some are wasted. Moreover, unplanned growth has resulted in unprecedented pressure on urban and rural systems. Remote sensing has helped in analyzing these problems at their very root and suggest remedial measures.

Rapid and unplanned urbanization results in economic development on one side but also causes unguided expansion of the city and creates problems of infrastructure planning and management. The details provided by high-resolution satellite data are ideal for mapping/updating the base maps of a city, which is a potent tool for guiding urban development activities.

The old method of preparing manual drawings on drawing sheets, taking cumbersome ammonia prints/ photo copying / offset printing, storing of cadastral sheets/ master sheets in pitiable dusty conditions are now going to be things of past. With rapid strides of the computer age and with upcoming techniques for digital data storage at least a hundred such map drawings can now be computerized and stored in a computer media (magnetic media) no larger than size of a normal book in a dust free, damage free, environment with an assured long life. Such digital drawings have wide maneuverability for change of scale, selective enlargements, super imposition, consolidation of boundaries and can further be extended to have a date base connectivity (ROR) database) to serve as an integrated Land Information system (LIS).

The present manual method of maintaining cadastral maps and records suffers from certain inherent drawbacks, such as :

1. Manual map preparation involves more time taking and manpower.
2. Involves cumbersome techniques for distance and area based calculations and its plotting.

3.   Involves cumbersome and inadequate map conversation techniques for change of scale.

4.   Enlarged mapping for congested area in manual method needs to be simplified.

5.   Map updation / reproduction need not include duplication of the entire work.

Furthermore, the following improvements in the current cadastral map keeping are envisaged keeping in view the increase in transactions.

1.   Need for further expandability to accommodate database connectivity (ROR database) for development of an integrated L.I.S.

2.   Need for enhanced facilities such as selective enlargements, superimposition of orthophotos, coordinate conversion, facility for consolidation of boundaries in the map production procedure.

3.   Mapping to adopt complete metric system (choice of unit as per need).

4.   Simplified map production procedure without adhering to the conventional offset printing/ photocopying/ ammonia printing.

5.   Need for convenient and efficient storage of map in a dust free, damage free environment with long assured life.

6.   To overcome problems associated with aging of maps such as expansion contraction of maps, invisibility of map features such as roads, parcel boundaries, river etc.

6. Study Outcomes:

The problems of the existing system of land records and cadastral surveys have been lucidly enunciated. The following are the outcomes from the LIS study of Orissa:

6.1 Management of change; Technological and Social

In case the realistic solutions have to be found, the approach has to be in the realm of 'management of change'. The basics of the body of knowledge of management of change - which is quite vast now should embrace the following guiding points. The change should be:

- Right, technically/
- Professionally and Socially Acceptable,
- Economically Feasible

• Most of the time, especially professional persons plead for the technology without taking its social impact and expenditure. The experience of the Computerization of Land Records supports this view.

The 'betterness' of change is always to be proven, so to say. This proof should come in the form of the productivity i.e. less cost, more accuracy, more reliable etc.

6.2 First, go for More Reliable Data Base

Technically, the process of digital photo-mapping will be a simpler process in comparison to the photogrammetry. This task can be outsourced to a large number of firms which have generated capability for this technique. Even otherwise, the technique can be easily transferred to the States. Fiscal Records should continue to be generated by the staff of the Land Records Dept. The present system of computerisation of the records can then continue in a smoother way.

6.3 Second, Utilize Internet Technology for Transfer and Utilization of Data Base to District/Tehsils
Security of Data

Here security of data will have a major consideration. Modern security methods practised in IT should be adopted. Know - How is available in many IT firms, NIC and other Govt. Depts.
Updating of Information

Director Land Records should take final responsibility of correctness - may be after sample check. Mutations should always be carried out by the person maintaining the records. Mutations can be incorporated in digitized revenue map with Tehsil/HQ
Record Book to the Farmer at Tehsil Level

The Patta Book/ Ownership book can be prepared at Tehsil level with the usual checks and passed on to the, farmer.

6.4 Incorporate Other Desirable Information

Many suggestions have been made regarding Soil type of land Heights for irrigation channels Land use Cropping pattern Live stock Population Ground water etc. These information can be incorporated in separate layers (like GIS) eventually. But this should be done only after the basic Data Base has been prepared.

6.5 Town Maps - Innovative use of Photogrammetry

The most worrisome problem experienced by the State surveyors in town surveys is to provide traverse control-net by the traditional traverse method. This problem can be elegantly solved by utilizing the technology of the Photogrammetry. Photogrammetry needs sparse ground control and that too at convenient locations. With the help of the limited field control, the model can be set in the photogrammetric machine. The plotting of all the clearly visible terrain details can be done easily. Imagine that about 50% of the property corners or well recognized details are plotted/mapped. These details can then be utilized as control work/starting point for picking up property on the ground by the field surveyors. This is rather reverse - use of the photogrammetry but it will reduce the time taken for the completion of town surveys by more than 50%. The plotted points can be designed to be within the accuracy of 7 to 10 cms. on the scale of 1:2000.

7. Conclusion and Suggestions:

LIS is an expensive and time taking proposition. Often governments have tried to find easy solution through

computerization of existing Land Records because, creating authentic land data confirming to the ground realities is very difficult to attempt. Had the present set of records been meeting the need of the day, perhaps mere computerization of the records is the obvious solution. But, alas, almost all the existing cadastral systems are out-dated, the reason being the existing system was introduced in the distant past when land was in abundance and cheap. Therefore, loosely made specifications were laid down to prepare the land records. As the land prices sore up and fragmentations of private land and encroachment of public land grew rapidly taking full advantage of the existing weaknesses of the system, the records were badly corrupted by the unscrupulous ones year after year. No computer database will behave better than quality of its data sets. In the context of LIS, the primary data- set are the land parcels, whether belonging to private, public or the government, and all other information are associated to this primary set of data.

Coming to the technology aspects a wide choice is available today, from high resolution satellite imagery, soft copy photogrammetry to field oriented GPS and Total Station. No modern technology is cheap except for information technology. Therefore innovative way of blending of indigenous software can only reduce the overall technology cost as has been tried in the subject case study. Also one needs to take into consideration the available infrastructure and the capacity of human resource available to create and maintain the LIS.

Computerized land records are not acceptable in the Court of Law unless the existing legal system is suitably modified, which in itself is a major task. This needs strong public opinion and support. Any system, which is transparent, conforming to the ground reality is needed by all of us to harness the technology properly for success of various developmental projects.

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