

Approach for organisation restructuring toward customer orientation in the context of Spatial Data Infrastructure

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Keywords: Business Processes, Cadastre, SDI, ICT, and Reorganisations

ABSTRACT

Tenure security and land market are playing dominant role to the economical and environmental development of our society. In many developing countries, the research findings indicate that there are tremendous demands of reliable Geo-spatial data including cadastral information at local development levels. Many customers (such as individual, notaries, real-estate brokers, surveyors, planners, etc.) are demanding cadastral data-sets at their working desks for their tasks. Such services can hardly be delivered by the traditional processes and maintaining analogue maps in a national cadastre agency. For improving such situation, the modern computer systems and network infrastructure seems promising tools both for data producers and data consumers. But the uses of such ICT tools have enormous impacts to the organisations and change every aspects of organisation from the policy to the operational issues. Immediate implementation of such tools is risky and expensive without appropriate coordination and planning and not a single agency can bear such expenses without success.

This research paper provides an approach for managing organisation change using modern ICT tool in the context of spatial data infrastructure (SDI). This approach relates to organisational prototyping environment and some lessons are drawn on the policy, management, operational aspects of organisations and business processes oriented toward customers.

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1. Introduction

Many organisations in the developing countries spend millions of euros collecting and using geographic data for the economic and environmental development of our society. Yet they do not have the information they need to solve the critical problems of inaccessibility of land and housing, tenure security, malfunctioning of land market, etc. There are several causes to these problems. Most organisations need more data than they can afford; the large amounts of money are spent on collecting basic data leaving little or no fund for essential data. But if the different organisations collect essential data, they are often incompatible (Nebert, 2001). The data may cover the same geographic area but use different reference system and standards. Thus, information needed to solve cross-jurisdictional problems is often unavailable. This is particular visible in the domain of land administration where a large amount of data at detailed scale are required for solving such land issues.

This research paper discusses firstly importance of land tenure in functioning market economy with the framework of spatial data infrastructure (SDI) where an institutional based information system is seen as an important part. Then driving forces behind the organisational changes are discussed. Thirdly numbers of possible organisational structures are highlighted to show the managers' roles in the change process. An approach for organisation re-structuring is proposed and discussed in the environment of organisational prototyping. Finally some essential points are laid down as lessons from the prototype.

2. Importance of land tenure in functioning market economy within a framework of SDI framework

The inter-relationship of people and land is so fundamental that no country can sustain its stability in economical development and environmental protection, unless the relationships are promoted in a framework of land and property laws that recognized the rights and duties of the individual, community, enterprises, and the government (UN, 1998). These relationships normally exist in the formal, informal and customary tenure systems. Realizing that many developing nations do not have all these tenure systems in their systems, it is important that informal and customary tenures are included in the formal registration system (UN/FIG,

1999 and Williamsom & Grant, 2002). When we look at land itself, it is the place of all shelter, and the source of food, materials for construction and manufacture, of coal, gas and oil, of spring and rivers and other essentials for life. The activities like building houses, factories, roads and railways, protecting forests and farms, eliminating pollution, and other activities such as mining, quarries and reservoirs are essential for accounting environment protection.

The societies with a well functioning market economy recognize the need for effective systems of land registration and cadastre. These systems not only make possible the realization of personal wealth but also enable people to improve their land and property so maximizing its value and use. It facilitates mobility for those who need to move to alternative employment in a new region, or for those whose family circumstances have changed with the passage of time. Compulsory registration of land rights facilitates a far more crucial feature of a successful economy, because it makes fast procedures for creating and securing mortgages. Access to mortgage finance makes possible the development and diversification of large and small businesses, so promoting commercial responsiveness to internal and overseas demands. For the homeowner, access to finance makes it possible to improve and develop existing property, so increasing the value of the national housing stock (UN, 1996 and UN, 1998).

Another feature of maintaining land registration is to enable governments to establish an efficient and equitable basis for raising taxes from those who own or occupy land and property. Such system generates public income to provide essential public services for the benefit of the community. For the benefit of the society, governments (state or local) maintain public rights which can affect privately owned land. Land registry ensures quick access to this information. Appropriate recording and publication of public restrictions on use of land and buildings are important for the implementation and sustainability of land use plans (Dale and McLaughlin, 1999).

To realize the above benefits, the proper functioning of organisations is most crucial in the modern market economy. In many developing countries, there are many organisations that have the responsibilities for implementing land administration. In a certain country, it is possible that there is one organisation responsible for handling and registering land rights under the hands of lawyers, while the second organisation is responsible for the surveys of cadastral boundaries under the government or private surveyors. Additionally, the other forms of institutions on land management/administration dealing customary or informal tenure using a range of spatial units may also exist. If there is no coordination and cooperation among them, such institutional arrangements may lead to duplication of effort, additional costs, inconsistencies and hence, inaccuracies in the data, and a danger of confusion resulting in wrong decisions being made. To avoid such confusion and duplication, the cadastral system is to be institutionally based, and accommodate multiple institutions and a range of spatial units within the SDI framework (Clarissa, Molen & Groot, 2002). In

practice, the institutional relationships have often been driven more by the strength of the personalities of those involved than by an objective of serving the users or communities who really need the services. Therefore, today's organisations are strongly being pressed for the change and their traditional processes and product development are reengineered using enabling IT tools in order to make it competitive and effective in the market orientation and to satisfy users and communities.

3. Driving forces of organisational change

Monopoly given to the national cadastral or mapping organisations no longer exists or is limited to as small extent as possible (Groot, 2000). Therefore, today's organisation has to adopt new strategies so that its roles and goals are guaranteed to the market structure and satisfies the requirements of customers and stakeholders.

Moreover, the Information and Communication Technology (ICT) such as communication network, internet access, digital database technology, and the political factors such as governmental innovation and reformation, new legislation, etc. have also forced the land related organisations to review their mandates and determine how the biggest return on the investment in national surveying and mapping by society can be realized (Groot D. & Kraak M., 1999).

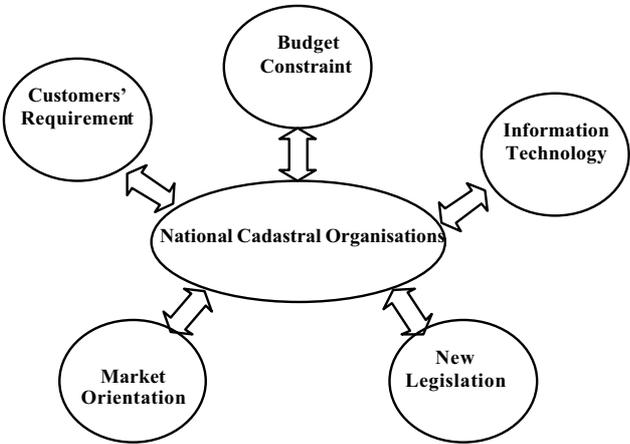


Figure no. 1: Driving forces for changing organisations (adopted from Kwon, 2002)

The figure no. 1 indicates five driving forces that affect organisation changes. Such changes occur in the government's policies (e.g. reducing budgets and introducing new legislation), customer's requirements, changing market situation, and enabling technology (Oosterom et al, 2002). Additionally, increasing diversity of the users has brought in a wide array of differing values, perspectives



and expectations among the users. Public consciousness has become much more sensitive and demanding that organizations be more socially responsible. Much of the third-world countries have joined the global marketplace, creating a wider arena for sales and services. Organizations became responsible not only to stockholders (those who owned stock) but to a wider community of “stakeholders.”

Due to the serious governmental deficits, most countries have been trying to reduce the size of government organisations and funds. Many organizations have been privatized or independent from governmental intervention. National mapping agency is also confronted with the pressure of being independent organization. It means that some portion of cost should be recovered by its own income. There are significant successes in some organizations including the Netherlands’ Cadastre, Service New Brunswick (SNB), the Ordnance Survey of Great Britain (OS), the Danish National Survey, and the NMA of New Zealand (Groot R., 2000). For example, the Netherlands’ Cadastre has sought full cost recovery policy. Significant changes on organizational structure and processes have taken place to make the organization able to be self-sufficient (van der Molen, 2003).

In the above environment, new legislation is also being introduced imposing the involvements of new customers such as private land surveyors, notaries, real estate managers, etc. within the organisational processes. Additionally informal and customer tenure rights may required to be registered according to the new legislations. These bring dramatic changes in organisation structure and processes. New digital products such as immediate access to information via internet have to be developed for a wide variety of customers, because geo-information is linked to numerous different fields such as environment protection, natural resource management, national defence, transportation and construction, etc.

Customers’ requirements are the most important consideration for the business organization like national cadastral and mapping organisations. Here, the market orientation is considered as influential factor in the customer satisfaction, because in order to perform well, organisations needs relevant and timely information about the markets i.e. their customers and stakeholders or competitors. Because opportunities and threats continuously change e.g. due to the move made by stakeholders or competitors, the emergence of new technology, or shifts in customers’ preferences and behaviours, the market must continuously be surveyed. Therefore, the continuous stream of market data need to be collected, interpreted, distributed among organisation members, and be adequately utilised and exploited to stay competitive in the market. As a result, the market strongly influences mission, vision, strategy, business processes, products and services of the organisations (Tuladhar & Molen, 2003).

Information technology has also been considered as the main driver to change into new direction. It gives a lot of potentials that are not possible before. For example, data acquisition using GPS, updating integrated databases, scanning and electronic delivery of deeds, producing orthoimagery, immediate access to data using internet, etc. are now possible by using new technology. It allows delivering diverse products and securing the quality of all products.

4. Organization Structural Changes

As a result of the above driving forces, organizations adopt a “new paradigm,” or view on the world, to be more sensitive, flexible and adaptable to the demands and expectations of customer and stakeholder demands. These driving forces are causing dramatic changes in how organizations design themselves to conduct business effectively. Many organizations have now abandoned or are abandoning the traditional top-down, rigid and hierarchical structures to more “organic” and fluid forms. They are of self-organizing, self-directing or self-managing in nature. The following three structures are most commonly used.

Functional Structure

Most organizations start out with a functional structure, or a small variation of this structure. This is the basic "building block" for other structures. In this structure, there is a central office, which oversees various departments or major functions, e.g., human resources, finances, sales, marketing, engineering, etc. To cover nation-wide surveying mapping for land administration, the functions such data acquisition and maintenance are traditionally decentralized to the districts or municipalities (as in Nepalese cadastral system), while the complete responsibility of land administration functions lies with the state government (as in Indian Land administration system). The drawback of this structure is mainly on lack of focus on customers' requirements unless a particular business process runs through the various functional units.

Divisional Structure

In this structure, there is a centralized corporate office and under it, are various divisions each of which is dedicated to producing and / or selling a certain type of business or product, e.g., product 1, product 2, etc. Each division that is dedicated to a certain business or product is, in turn, is organized as its own functional structure. So, for example, the division dedicated to making product 1 has its own sales department, human resources, etc. Basically, the divisional structure is a bunch of functional structures each of which reports to one central office. Basically this structure is very good to focus on the customers' needs, however there is a possibility of duplicated functions among various divisions, hence increases cost efficiency of the organisation.

Matrix Structure

This is another interesting structure, where someone from each of the major functions in the functional structures (the boxes along the bottom of the organization chart), e.g., people from sales, engineering, etc., are organized into a separate group intended to produce and sell one certain kind of product or service. Members of this group stay together until that product is produced or they continue to sell and service it. This overall structure (made up of a functional structure that also has groups assigned to products) is a matrix structure. This structure is useful because it focuses highly skilled people from across the organization to work on a complex product or service. It can be difficult, though, because each person essentially reports to two supervisors: the supervisor of the functional area (e.g., engineering) and the product manager, as well.

Although some organisations may have very good structure, yet they may not be able to adapt successfully to modern, competitive markets. This might be due to low potential of employees, absence of positive culture in the organisation, weak management system, no shared values among the managers, and poor communication among employees and within divisions.

Managers' role in changes

Some organisations need radical change to adapt; others may need minor changes and assurance that their development is under control and progressing in the best direction. Change can be planned and implemented with minimum disruption and maximum impact on the organisations effectiveness. Today's managers must deal with such continual, rapid change. Managers faced with a major decision can no longer refer back to an earlier developed plan for direction. Management techniques must continually notice changes in the environment and organization, assess this change and manage change. Managing change does not mean controlling it, rather understanding it, adapting to it where necessary and guiding it when possible. Managers must count on and listen more to their employees. Consequently, new forms of organizations are becoming more common, e.g., worker-centred teams, self-organizing and self-designing teams, etc.

5. Organisation re-structuring

If the existing organisation is already matched with the traditional systems, the organisational restructuring and process reengineering of the existing systems becomes necessary with the introduction of new IT components. The Figure no. 2 shows a possible approach for organisational restructuring. This approach essentially consists of two parts that affect organisational restructuring and process re-engineering. First part mainly deals with management processes that guide the development of organisation and its activities aligning with IT components. Here three levels can be distinguished. The policy level is

responsible for deciding on the objectives or goals that the organisation wants to achieve and what resources are to be used.

The management level is responsible for the reasonable and effective use of the resources and of setting up the appropriate organisation and structure including strategies on the way to achieve the objectives or goal. The strategies for the targets are aligned with the objectives or goals of the system including IT components. The operational level carries out the specific tasks or activities (Stuedler, D. & Kaufmann, J., 2002).

Second part of the approach deals with the actual organisational activities and IT components, which form business processes for services and product delivery to the customers.

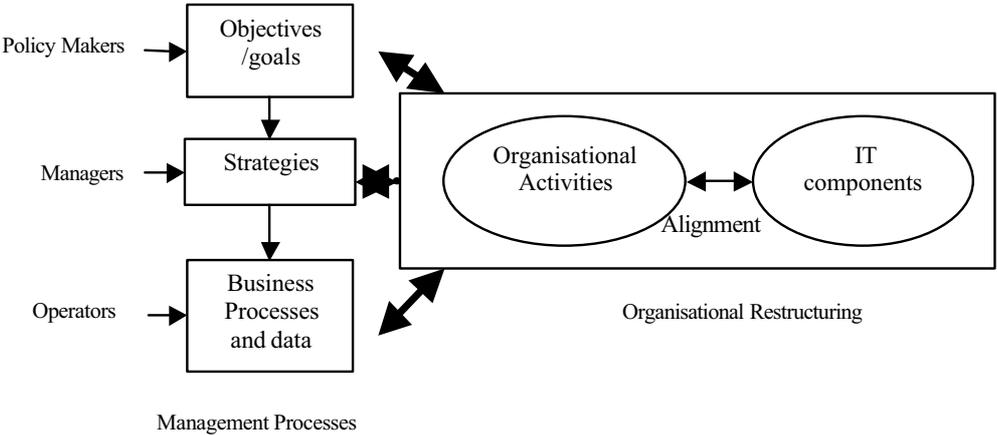


Figure no. 2: Management and Organisational Restructuring

Each activity is assigned to the responsible units of the organisations. Thus a business process may run from the one unit of organisation to another organisation. In such intra- and inter-organisation processes, the efficiency and effectiveness largely depend on how well coordination and cooperation between these organisations exist.

6. Organisational prototyping

It is the intention of this paper to show a prototype on how an organisation can be restructured and aligned with the business processes. As a business case for the cadastral system, it is assumed that there are five major cadastral business services at the district level. The traditional processes are considered as bottlenecks in terms of delivery time, cost and resource used in the organisations

especially in Nepal (Tuladhar, BC, Budhathoki, 2002). The newly proposed sample processes for this prototyping are as follows:

- *Initial data structuring and loading,*
- *Land Parcel subdivision,*
- *Boundary dispute resolution,*
- *Preparing parcel maps and*
- *Disseminating the parcel information.*

Each of these major processes is made up of a number of lower-level processes or activities. Each has well-defined start and end points, each of which is associated with a customer.

In this organisational prototyping, the Oracle Designer/2000 is used (Lulushi, 1998). It has ability to model business processes, and decompose activities under the organization units. It defines what information a system must manage and process, and provides the details about how information is used by business activities. Thus it allows quickly to prototype the organisational management needed to carry out functions in according to the strategic goals or objectives provided at policy level.

For this research paper, only one process called ***Initial data structuring and loading*** is considered. Although this process does not interact with the actual customers, yet this is most fundamental process that builds up the information system with both spatial cadastral and ownership data in the organisations. In this prototype, three main departments of Ministry of Land reform and management (MLRM) are involved actively in carrying out the activities of this process. Setting up and managing databases are the responsibilities of “Department of land information and Archiving (DoLIA)” and its “Information Management section (IMS)”, while spatial data loading into the database is the task of district cadastral office under the “Department of Survey”; and entering data about ownership, mortgage and restrictions are the responsibility of District registration office under the Department of Land Reform and Management. The Topographic Survey Branch supplies only topographic data or ortho-images for the districts. In this prototype, preparing large-scale foundation data is not included, as it requires more resources and time and can be considered as a separate entity process, as the funding mechanism may be different, because there are more other users interested in the topographic or ortho-image data.

There are about sixteen activities or sub-processes in the business process of initial structuring and loading that run across the different organisational units as shown in the figure no.3. At the departmental levels, the DoLIA has three major sub-processes e.g. decision making for automation, defining requirements for information system and IT infrastructure, and acquiring IT hardware and software, while IMS has three sub-processes namely installing and testing IT infrastructure including networks, establishing databases (spatial databases and

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land record databases) and user interfaces as per specifications for data entry, loading, editing, etc.

District Cadastral survey office has five sub-processes namely collection of cadastral maps for conversion, scanning them, on-screen digitizing together with integrating topographic data (or ortho-images), topological editing and loading cadastral parcel data into the district spatial databases. Three sub-processes could be computer-based while other two processes of collection and archiving can be manual without computer supports.

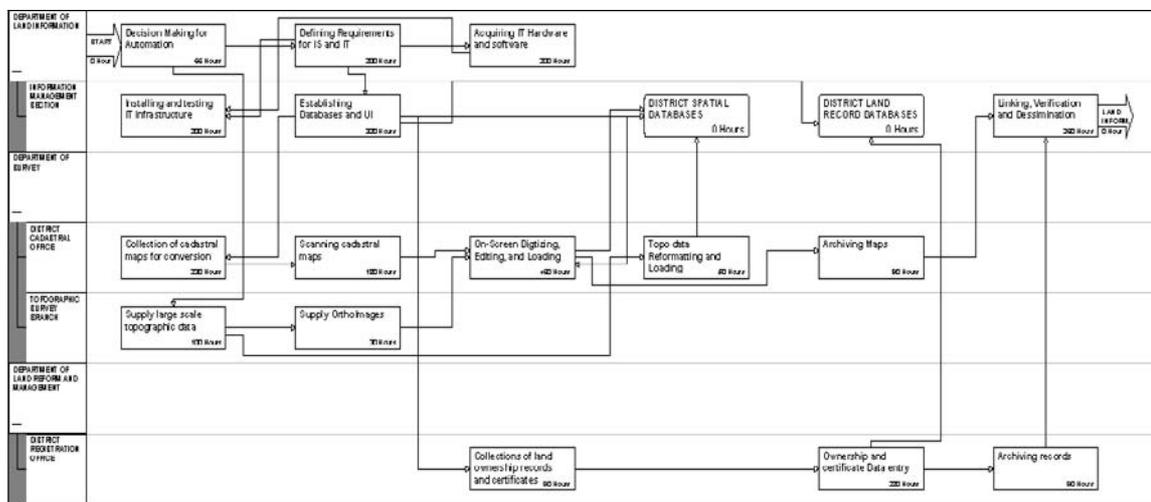


Figure no. 3: Initial database structuring and loading process

Similarly District Registration Office has three sub-processes out of which sub-process such as Data entry on ownership and certificates is computer-based, while other two sub-processes of collection and archiving records are purely analogue based.

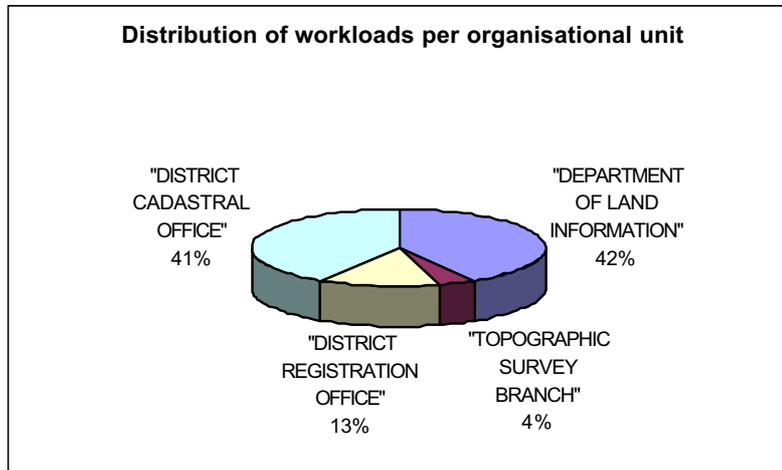


Figure no. 4: Distribution of work loads per organisational unit.

The prototype also suggests that most resource consuming sub-process is digitizing analogue cadastral maps followed up by the establishment of digital databases and user interfaces and then collections of cadastral maps due to the poor storage situation in the district cadastral offices and so on.

The figure no. 4 shows that Out of total required resources for this process, the DoLIA contributes 42% in resources for setting up the databases and making sure that data are correct and logically consistent, and the Department of Survey contributes 45% resources (District Cadastral Office 41% in data conversion, loading and assuring quality, and Topographic Survey contribute only 4% by supplying topographic data or ortho-images). District Registration Office contributes 13% resources in entering ownership, mortgage and restriction data into the databases.

The customers such as real-estate officers, planners, land owners or tenants and others are directly involved in the other business processes of Land *Parcel Subdivision, Boundary dispute resolution, preparing parcel maps and Disseminating the parcel information*. Internally District Survey and District land registration offices are main service providers while Department of Land Information and Archiving acts as enabler to other departments and provides information to the customers via internet.

7. Lessons from the organisational prototype

Number of implications to the organisational structures can be drawn from the point of views of the policy, management and operations.

At the policy, the business processes must match with the well-defined objectives of the organisation in view of societal needs ensuring equal access to services by all people regardless of races, groups or castes, and the system is economically viable. At the management level, organisational structure for the system management and operations are clearly defined and useful to reach and satisfy objectives. At the operational level, the process steps are appropriately assigned to the organisational units as a part of workflows to complete a business process, and the organisational unit feels the responsibility of sub-processes as a part of strategies and objectives.

The following points can broadly be laid down as lessons learned from this prototype:

- *Customer-orientation:* Most important lesson is that organisation aligns business processes toward customers according to the demands of a specific customer or customer type. The main advantage is in the relationship to the individual customer and the reduced reaction times to their demands and, as a result, a higher customer satisfaction level. In the cases of business processes on the parcel subdivision and full transfer of ownership, the cadastral agencies must satisfy the needs of individual owners, real-estate officers, notaries, banks and surveyors in order to ensure timely delivery of products and services at affordable cost. Otherwise the cost for establishing systems and organisational changes that require huge investment cannot be justified.
- *Product orientation:* With product orientation, the different department of the organisation is assigned according to the different types of products or product groups with the aim of achieving synergy and training effect. This is one of fundamental reasons why two or more organisational departments or units are normally installed within the organisations like Ministry of Land reform and management (MLRM) in Nepal to deliver the different type of products.
- *Process orientation:* Its main goal is to optimize the workflow through structuring along similar production procedures. With the assignment of personnel along the workflow departmental boundaries can be evaded.
- *Task orientation:* Similarly to the product orientation, its aim within the organisational units is to focus on technical competence and human-related productivity by combining similar tasks or functions into the same organisational unit. The repetition of similar tasks may allow for a certain specialisation of the assigned personnel and may lead to a reduction in process times.
- *Order orientation:* This allows the organisation to assign similar orders similar to task orientation; the assignment of order specific activities can

be made to specialized personnel while keeping the range of assigned activities at a higher level.

The combination of the different parameters may benefit from the advantages of the individual parameters for restructuring organisation based on the process characteristics.

8. Conclusions

In conclusion, this research paper emphasizes that organisation change continuously takes place from the views of customers and stakeholders within the framework of SDI where market is continuously monitored and evaluated for the effectiveness and efficiency. Policy makers and managers must be vigilant to the geospatial market development to accommodate the necessary changes in the processes and organisation structures.

To this end, the organisational prototype is recommended, and it provides guidance to the managers for allocating the appropriate resources to the changed processes in the environment of learning organisation.

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