

An Electronic Geoinformation Supply Model for Land Registry Organisations (LROs) in Countries in Transition – South Africa and Zimbabwe

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Key words: Electronic Geoinformation Supply Model, Information Technology, Countries in Transition, Land Registry Organisations.

ABSTRACT

In many countries National Mapping Organisations (NMOs) and Deeds/Title registration departments make up the Land Registration Organisations (LROs). These LROs play an important role in the dissemination of Geoinformation for Land administration. An effective and efficient land administration system relies on an efficient management of information supply by the LROs. The NMOs and the Deeds department, often lie under different ministries. LROs information must be accessible, cheap and readily available. This poses a lot of challenges for LROs in Countries in Transition. South Africa and Zimbabwe are examples of Countries in Transition.

The LRO departments need to decentralise their operations and services to reduce user-commuting distances, costs and make information accessible to the majority of people. The so-called democratisation of Geoinformation. LROs are commercialising and privatising to reduce financial dependence on government purse. This exposes them to competition from other geoinformation suppliers. There is need to reduce supply costs, increase viability, and increase their market share. They need to invest in new and appropriate technology. LROs for Countries in transition operate under very strict and mean budgetary limits. There is need to balance between privatisation, recovery of investment costs and their statutory obligations to make information accessible and available free of charge.

LROs need to develop electronic geoinformation supply models that ensure information is brought closer to the users. These will reduce user-commuting distances and overall information costs. Two electronic geoinformation supply models are found which depend on the IT infrastructure of a country. These are the Web Model which fits well in countries whose Internet market is big and the Electronic Supply Model which relies on the establishment of Satellite Service Offices (SSOs) in regional cities and the existence of a wide area network (WAN).

The success of the electronic supply of geoinformation depends on the successful fit between the infrastructure, equipment and human resource with the modifications in the organization and management of the LROs.

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1. INTRODUCTION

Land Registration Organisations (LROs) supply cadastral and legal (title) registration data and other geoinformation products to private companies and the public. LROs are not-for-profit organisations. In their legacy operations, they have used legacy information supply systems that are mainly manual. The land market has been very active in the past decade and the demand for geoinformation is increasing tremendously. Parallel to these developments and demands have been the developments in IT. Of particular importance is the Web popularly known as WWW and the Internet. This has seen business organisations making Internet a media for providing, marketing, selling and buying of goods and services. It is a market, a virtual market and the business is popularly called E-Commerce. E-Commerce is, “the conduct of selling, buying, logistics, or other organization management activities via the Web”. (Perry and Schneider, 2001).

In most countries in transition, Southern Africa for example, the National Mapping Organisation (NMO) and Deeds Registry are custodians of land records and transactions in land, which are of utmost importance for the whole society. These organisations provide basic land information to a wide range of users in the public and private sectors. There is a growing demand for services from these departments.

Despite being the only departments serving the whole country in land information, the two departments have offices in only two cities in Zimbabwe or in all provincial capitals in South Africa. The average commuting distances for information users is in the range of +/-500km. This is very costly in terms of travelling time, travelling costs, and also information costs. Some countries have integrated the two department’s activities but in most countries, they lie under different ministries and hence operate separately, a situation that has reduced information supply efficiency. The departments' operational procedures were created a long time ago and are not capable of meeting the demands from today's users. A need to streamline procedures, reduce duplication of work, improve security and facilitate timely access to reliable data has become a necessity.

The objective of this study is to develop an electronic geoinformation supply model for LROs in countries in transition with special reference to South Africa and Zimbabwe. It will discuss the current state of geoinformation supply, the problems being faced by the two countries and an Electronic Geoinformation Supply Model, which the two countries can adopt to increase access to geoinformation by the public.

The remainder of the paper is as follows: Section 2 discusses the two LROs, the Internet and E-Business. Section 3 discusses results found from the survey carried out about the LROs. The current LROs business model will be discussed in section 4, from which the need for an Electronic geoinformation supply model is born. Possible electronic geoinformation supply models will be discussed in section 5 and finally, section 6 looks at the way forward for LROs for countries in Transition. The terms E-Commerce and E-Business will be used interchangeably in this paper.

2. BACKGROUND

With the advent of web technology, people have been talking of Internet GIS, Internet mapping and most importantly, the World Wide Web (WWW) and National Mapping Organisations. Hootsmans and Kraak (1999) discussed the role of the WWW in information supply. Information can be accessed quite easily in distributed database environments. Developments in IT have enabled the integration and querying of spatial datasets, the locating and obtaining of datasets across a network, and the transfer of dissimilar spatial datasets across networks.

These technological advances should help ease the traditional problems of information supply that currently bedevil Land Registry Organisations. They should bridge the distance gap between the information producers and the users.

2.1 Land Registry Organisations (LROs) in Countries in Transition

Most Countries in Transition are lagging behind the technological developments witnessed in the developed worlds. E-Commerce infrastructure could be there but clear policy on E-commerce may be lacking. This leaves LROs operating in an environment without an Internet regulatory policy (authority). Intranets, extranets and Internet could be connecting LROs to other organisations in many countries but they lack a strategy to utilise these facilities to do business electronically. LROs have a PC centric approach to the Internet (UNCTAD, 2001) and their business models ignore the fact that most of the potential (and the actual volume) of E-commerce does not require home based PCs and web surfing. It is business to business. Although computing power has declined, PCs remain unaffordable for the majority of people in the world. Telecommunication charges are very high for users in countries in transition.

2.1.1 South African LRO

The Department of Land Affairs (DLA) is mandated with the distribution of geoinformation in South Africa. It consists of the National Mapping Organisation(NMO) and the Deeds Office. The two departments are under different ministries but share their information. The NMO is reorienting its services in order to meet the land information requirements of all South Africans especially the Landless (GoSA, 1997). The DLA is devising ways of transmitting cadastral data to the users and needs to link the information with deeds office records. The functions of the Surveyor General performed in the former Republics of

Transkei, Bophuthatswana, Venda and Ciskei (TBVC states), one sub-office and six registration offices in the former 'self-governing territories' have been rationalised and the whole country is being served from Surveyor General's offices in Pretoria, Pietermaritzburg, Bloemfontein and CapeTown.

The Deeds Office maintains centralised modern deeds registers, which are computerised and form part of a Wide Area Network (WAN). Processing of Deeds, changes and enquiries are done from eight deeds offices. The department provides an online enquiry facility where users can access the deeds database.(GoSA, 1997). The NMO and the Deeds department form the Land Registry Organisation in South Africa.

2.1.2 Zimbabwean LRO

The Department of the Surveyor General (DSG) is the national mapping organisation under the ministry of Lands and the ministry controls the policy issues for the smooth running of the organisation. The government of Zimbabwe in 1995 made a policy decision to commercialise it (Chigumete, 2001) in a bid to reduce the burden of funding it from the taxpayer's money. The commercialisation and its intended privatisation is the first in the region.

The Deeds Registry department is under the ministry of Justice, Legal and Parliamentary affairs. The deeds registry is tasked with the maintenance and publishing of the public records concerning parcel ownership and the rights to the parcels. These departments form the Land Registry Organisation

2.2 LROs, The Internet and E-Commerce/ E-Business

Land Registry departments have intranets running in their organisations and these can be connected to the Internet and easily run over high speed LAN and WAN lines. With single or multiple data servers, the organisations servers can be merged into a single virtual database. Most of them have connections to the Internet and have homepages running. Despite this, LROs are faced with problems of making their products accessible to the users. E-business must come as a solution. LROs must view E-commerce/Business as the sale or purchase of goods or services, whether between businesses, households, governments, other public or private organizations conducted over computer mediated networks (UNCTAD, 2001). Ordering of goods is over the networks but payment and the ultimate delivery of the goods may be conducted online or offline. The definition includes electronic ordering, marketing and advertising, the three, which make up most of the LROs business dealings in Countries in Transition.

Internet tends to reduce economies of scale, for it creates new opportunities for outsourcing and lowers fixed costs. The myth that the Internet changes everything must be avoided by LROs. E-business is subject to the same traditional law of economics that is, supply and demand. Profits are the motive for any commercialisation venture for the LROs. Financial planning, marketing strategies and logistics remain very important in E-business ventures just

like in the brick and mortar era. The Internet reduces travel costs, improves customer service, reaches more customers and enables LROs to enter new markets.

3 THE SURVEY

This section discusses findings from a questionnaire, part of it shown in Appendix A, which was administered to the Surveyor Generals of South Africa and Zimbabwe. The information gathered shows that Deeds and NMO are separate departments under separate ministries. The databases of the two are not linked at all and people who require land registry information have to make separate visits to the separate departments.

The information cannot as yet be downloaded from the Internet hence there are no Internet transactions. Distances covered by users to collect data from the LROs are too long adding to the cost of data. LROs indicated they want to decentralise their operations, services or datasets to smaller towns in the form of satellite service offices (SSOs). These come as a set of distributed servers which store data with the ability of being updated. There is no distributed processing. Processing is only done at the present designated production centres. The LROs highlighted the need to adopt a customer driven approach and be user friendly. Commercially they need to achieve positive cash flows and need to make their products accessible to all who need them, affordably, cheaply and fast.

These results are consistent with Chigumete (2001) who highlighted the need to improve revenue generation by identifying new product lines, reviewing existing processes and reengineering them to reduce business costs and improve service delivery. There is a need to balance the commercial interests of the LROs with the statutory regulatory role expected of it. There is a need to establish an interface between the Deeds Registry and the property register in the NMO. The interface is made difficult because the departments lie under different ministries.

4 THE LROS CURRENT BUSINESS MODEL

LROs must understand the basic technology that drives the Internet, the business models that have implemented it, and the limitations and risks of this tool as well (Oz, 2000). E-business model for LROs must be adapted to their competitive strengths and not just replicate the approaches of LROs in developed worlds. This will allow them to recover the costs in the technological investment. LROs must identify business processes that they can accomplish more effectively using electronic commerce technologies. Some business processes use traditional commercial activities very effectively and technology cannot improve them.

Commercialisation and subsequent privatisation opens the market to competition and LROs would want to capture a large customer base at a lower cost. In view of this, they must not underestimate the cost of making users change their habits. There is considerable effort needed to educate consumers and enterprises about their Net presence. LROs must have marketing departments and marketing personnel must develop ways of identifying customer needs and then match products and services to those needs.

The requirements, which LROs must fulfil to improve their information delivery needs, are encapsulated in a business model that is shown in fig 1 below. Six elements, that is the LRO business market, business strategy, business functions, IT market, IT strategy and IT functions must holistically be considered together in any E-business venture for the LROs.

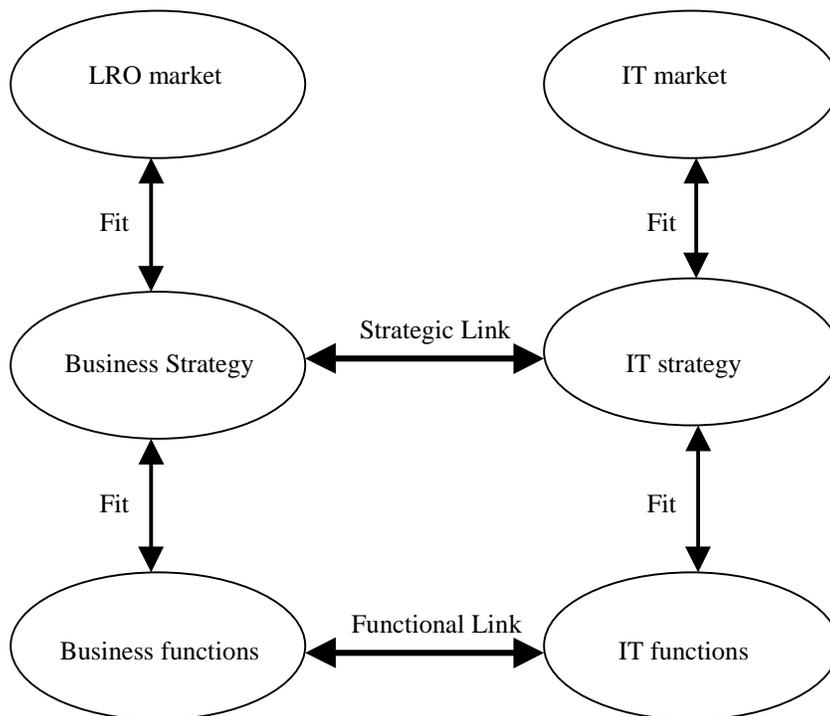


Fig 1: LRO Business Model

4.1 The Business Market

The business market consists of public property dealers, conveyancers, notaries, estate agents, municipalities and government ministries. The market requests data, which must be affordable, reliable, and fast access to the data. Market analysis should result with a good fit between the LRO business strategy and the expectations of the users.

4.2 The Business Strategy

The Business strategy should strike a balance between efficient supply of information and keeping operation costs at a minimum. Part of the strategy is to reduce dependence on public funding and at the same time fulfilling their statutory obligation of providing information for free. Commercialisation and privatisation are key issues and may expose the LROs to competition from other suppliers. From the business strategy, an information system strategy is also formulated.

It must combine the information needs of both the Deeds Registry and the NMO. The information supply strategy should make a good fit with the business functions of the LRO. Business functions such as title registration, cadastral registration, supply of title information and topographical data are central to the making of a good strategic link with the IT strategy.

4.3 IT Market

The market consists of soft/hardware vendors who can provide IT tools such as databases, computing devices, communication devices, Email facilities, the Internet and the WWW. LROs should choose IT tools which fit their IT strategies.

4.4 IT Strategy

There exists the need to link databases from Deeds Offices and those from NMO electronically. The strategy is to develop an electronic supply of geoinformation and enable trading of this information on the Net. IT and Business strategies are connected through a strategic link that ensures constant reference to each other during business planning process.

4.5 IT Functions

There is need for fast data collection, processing, and dissemination to the users. EDI and WWW, Email, FTP, Internet are tools LROs can use. Online ordering, purchasing and payment of data are needed. The data sets need to be transferred as files to users and satellite service offices and users must be able to surf the Net and find information from LRO sites. The IT functions should have a sound fit with the IT strategy at the same time maintaining a good functional link with the business functions. IT capabilities should support the business processes and business processes need to be in the abilities IT can provide.

A thorough look at the business model shows that like any business improvement process, the following stages need be considered when developing an electronic supply model for geoinformation .

- Carry out market analysis to establish user requirements, where to put Points of Presence and Satellite Service Offices depending on the volume of information trade.
- Design a business strategy that fit with the IT strategy.
- Develop an IT strategy that fit with the IT market and the IT functions.
- Model the business functions (processes) and match them with the correct IT functions, which accomplish the business goals.

This process leaves LROs with a vision of the electronic supply model they can implement and which satisfy their needs too.

4.6 The Geoinformation Supply Models

Two electronic geoinformation supply models are found which will depend on the IT infrastructure of a country. South Africa, for example has one of the most advanced Internet

infrastructures in the continent. Many consumers have access to the web. A web information supply model will be discussed for such a scenario where Points of Presence Web servers will be established at designated areas to reduce telecommunications costs. Zimbabwe, while there is Internet in the country, very few people have access to it. An electronic supply model, which relies on the establishment of Satellite Service Offices (SSOs) in regional cities, will be discussed for this scenario.

4.6.1 The Electronic Model

This model relies on the establishment of a Wide area Network (WAN). Servers are established at major towns as shown in fig 2 below. While Harare and Bulawayo are the main processing centres, regional subsets of the data are created for distribution to the local sites, such as Chinhoyi and Mutare where there are SSOs. Users can move short distances to get data about their properties or access the data over a cheap Local Area Network (LAN)



Fig 2 Proposed Servers at Regional Offices. (Source: Courtesy of Mavetera,

The concept of a caching server, like the one used in the normal Internet world can be introduced. A smaller server at each regional office is used to cache data over a Wide Area Network. The replication is dynamic, and is determined not by the physical boundaries of the organisation but rather by the data actually accessed by the individual users. The regional offices have access to the entire enterprise database, data updates are automatically applied concurrently to both master and regional cache servers. The performance pressure on the master is reduced since the most frequently used data is always cached locally.

4.6.2 The Web Model

This model fits well in countries whose Internet market is big and the existence of Web enabled databases, for example, Filemaker Pro, and Internet mapping tools such as Internet Map Server from ESRI makes it the more appropriate option in Countries in Transition. In the work of privatisation, Internet pages, which have catalogues of the products LROs are offering, will be provided with some marketing information that will increase their competitiveness. Catalogues will enable products to reach an unprecedented geographical reach as well as more people.

LROs Net presence can take any of the following five models.

- Provision of internet visibility. The site includes basic information on the LRO. Its business process remain unchanged.
- Unidirectional information channel sites.
- Sites which allow users to interact with the staff of LROs. Downloadable forms are also found that can later be submitted offline. Complex transactions are not supported. Emails can be sent and received but history has shown that a lot remain unanswered (UNCTAD, 2001).
- Sites that support formal transactions that involve either payments or the creation or transfer of legal rights. Users can check the status of their requests.
- Sites that allow all transactions in geoinformation to take place. Cadastral and title registrations, ordering, purchasing and online payments.

5 THE WAY FORWARD

- LROs need to rethink their methods of interaction with the users and should ensure compatibility of technical standards and business models. LROs require reliable and fast technology
- They must start small and build on success stories. Large ambitious projects usually fail and take too long a time to realise return on investment.
- LROs sites must allow some interactivity with users and offer more search options to answer most the land market queries.
- Points of Presence should be established to reduce transaction time and satellite service offices should be established in smaller towns to reduce travelling distances. These have counter services where people without access to internet can come and get information.
- There is need to explore partnerships with the private sector.

6 CONCLUSION

To improve geoinformation supply to users, LROs must consider the use electronic networks. This introduces LROs to field of E-business. E-business does not mean electronic payments. LROs may think that since most of their products or services do not lend themselves easily to be traded online, embarking on E-business does not give them any competitive advantage.

Electronic supply expands the potential markets for, and the sales income generated by, products and services by increasing the range of potential new customers and business hours. An electronic supply of Geoinformation is no answer to LROs in countries in transition unless significant investments are made and organizational and cultural changes are done. LROs should prioritise areas where results can be expected earlier so as to minimize the financial effort and to encourage people to embrace change.

The electronic geoinformation supply model is born from the LRO business models, which differ from country to country. Poor countries should establish satellite service offices. Richer ones can use both the Web model and the Electronic Supply Model as herein described. The introduction of an electronic supply of geoinformation may amount to a full scale business process reengineering. LROs must gear up for the length of time that could be taken to realise some return on investment. The success of the electronic supply depends on the successful fit between the infrastructure, equipment and human resource with the modifications in the organization and management of the LROs.

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BIOGRAPHICAL NOTES

Nehemiah Mavetera is a Lecturer in the School of Information Technology, Monash University, South Africa Campus. He lectures in Information Systems and Analysis. His research interests in Internet and Supply of Geoinformation in Countries in Transition started when he was studying for the Masters degree in Geoinformation Management at ITC, Netherlands, 1999-2000. He has research interests in E-Commerce, Data Mining and Object Technologies. He has worked as a Land Surveyor (i.t), Mine Surveyor in Zimbabwe and as a lecturer in Surveying and Photogrammetry at Harare Polytechnique. He is a member of South African Institute of Computer Scientists and Information Technologists(SAICSIT).

APPENDIX A

The following questions are part of the questionnaire sent to the Surveyor Generals of South Africa and Zimbabwe. The answers given form part of the survey results discussed in section 3 above.

Sample Questions from the Questionnaire

1. Are your legal registration and cadastral registration departments under one Ministry?
2. If no, are the legal registration databases linked to the cadastral spatial databases?
3. Can users access and download title and parcel information from the Internet?
4. If yes, what type of information do they get on the Internet?
e.g. cadastral parcels with ownership info, mortgage info, title deeds data, maps, etc
5. Is your legal and cadastral information accessible to the public for a fee?
6. If yes, how do Internet clients pay for the information?
7. What major value added products do you produce in your mapping departments?
8. Are the different Surveyor General's departments linked through an intranet/internet?
9. Can staff from one province access another province's databases e.g. for legal/cadastral data?
10. Do you have service offices in the districts?
11. What type of database management systems are you using for your attribute data?
12. What GIS packages do you use?
13. Do all the Surveyor General's departments use the same GIS packages?
14. Do all the Surveyor Generals departments use the same DBMS packages?
15. How have you solved the problem of heterogeneity in operating systems?
16. Do the separate Surveyor Generals Offices share their data/information?
17. In the wake of Electronic Commerce, do you consider Electronic Conveyancing/Registration as an option?
18. Are your websites designed to market the National Mapping Organisation and the products thereof?