

Application of Supply Chains in Land Registration

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Abstract

Land is the most crucial resource in any nation especially due to its scarcity in wake of unlimited needs and wants by mankind. Land has been a major resource of conflict due to the need for countries to expand their territories. Even, nowadays land disputes still exist between traditional leaders and municipalities, individuals and cooperations. This is because land is viewed as a social, cultural and economic resource. The registration of land is thus of importance so that rights to land are well defined and are protected. These rights give information on who owns what land and the type of land ownership that exists. This is referred to as land tenure security that is achieved through secure land rights. These secure land rights are then used as a basis financing land related projects by financial institutions where land and other real property and mostly immovable property are used as collateral. In communal areas, land registration can in principle, improve agricultural productivity as farmers can seek funding from banks to make their land more productive due to possessing title to land. Eventually land registration creates land markets which involves the buying and selling of real or immovable property meaning land and buildings which is a major contributor to public funds collected by governments to support service delivery as land and property transactions contribute substantially to the gross domestic product of a country. While land registration is of immense importance, developing countries face challenges in managing land registration processes and in organizing the related land information in a systematic and easy to access manner so that timeous land transactions can be done. In some cases the land registration process is too long and inefficient while it is costly to the buyer of real property or the individual or cooperation wishing to register title. This results in insecure land transactions and a failing of the property market in a country. This affect government revenue acquired though through land and property tax and this brings the need of a well-functioning land registration system in the nation. Land registration systems have been modelled using unified modeling language in previous research. This paper employs supply chain management to model land registration process in an urban environment. This paper argues that supply chain management can be used to model and manage the land registration process. In this study, the land registration process is considered to be a supply chain comprising of a land owner, surveyor, surveyor general's office, notary and the deeds offices as the supply chain partners.

Keywords

Supply Chains, Supply Chain Management, Land Registration, Land Information, SCOR

1. Introduction

A supply chain details all activities that transform raw materials into finished goods that are demanded by customers (Handfield and Nichols, 1999). In this chain there is movement of materials, money and information. The supply chain partners include suppliers, manufacturers and customers (see figures 1 and 2). Modern day supply chain systems have entered the age of adaptive and intelligent supply chains in order to effectively deal with aspects such as supplier failure or demand uncertainty in order to optimize supply chain performance (Sadraoui and Mchirgui, 2014). This is partly achieving through harnessing information technology within the supply chain and the supply chain management process. Efficient movement of materials and components can improve supply chain efficiency while reducing storage costs through just in time purchasing. For the purposes of this study, supply chains detail the process involving the extraction of raw materials, their transformation, packaging, distribution to retailers and delivery to end users for final consumption through a coordinated effort of different supply chain partners.

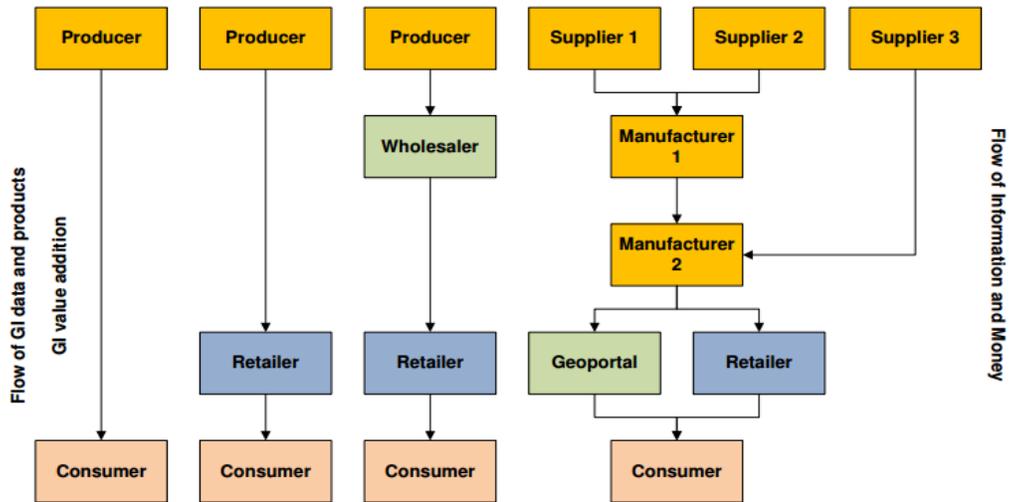


Figure 1: Geographic Information (GI) Supply Chain – (Kurwakumire et al., 2013)

Supply chain management (SCM) involves the management of multiple relationships within the supply chain network partners. A supply chain presence a complex network with several one to one and many to one and one to many relationships between multiple supply chain partners (Lambert et al., 1998). SCM integrates all supply chain activities in order for firms to gain competitive advantage (Ellinger, 2000) through supply chain costs reduction and increased efficiencies. At the same time, competition has shifted from individual business units to supply chains (Lambert and Cooper, 2000) bringing the need to manage the total supply chain. Integrating supply chain activities is important to deliver customer value at minimum supply chain costs (Christopher, 2011). Customer demand planning and forecasting is an important factor for determining supply chain effectiveness (Moon et al., 2000). This is because, failure to cope with customer demand translates to the total supply chain partners failing to meet its goals. Customers wish to receive products they desire at the right time and place. It is thus of importance to manage supply chains as this impacts on the ability to fulfil the customer demands or requests. The next section discusses land registration, which is the domain, in which supply chains are applied in this article.

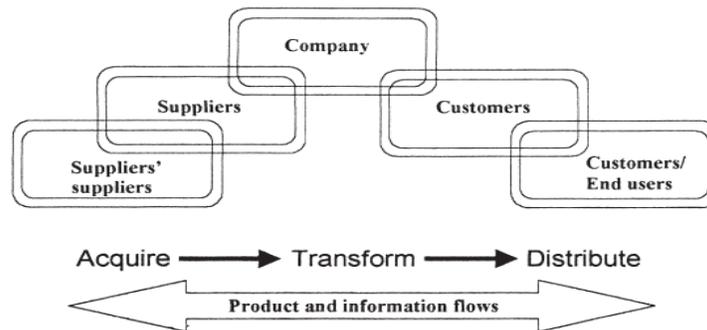


Figure 2: Supply Chain Concept – (Ballou et al, 2000)

1.1 Land Registration

Land is a resource whose value is viewed differently in different communities, nations and contexts. Communities can derive its value from the myths, cultures and local institutions they attach to it (Kurwakumire, 2014a). Land is a primary source of wealth to nations, communities and individuals as all development and spatial planning activities happen on this resource. Land can be a source of power and a commodity for economic trade. It is a resource that ultimately supports all livelihood on earth (UNECE, 1996). Land is the most valuable resource in many nations (Bell, 2007; Grover et al., 2007) which unlocks great economic potential. Almost all raw materials employed for manufacturing various products are extracted from land and it is the same land that supports all agrarian activities that feed nations and continents. Land is a major contributor to government funds through taxation (Grover et al., 2007) and land based activities contribute significantly to a nation's gross domestic product. There is great need to use and manage land sustainably so that future generations will have land to support their evolving land use needs. This makes land management and good governance in land of importance (Kurwakumire, 2014b) with secure tenure a major enabler to sustainable development (UNECE, 1996). Land needs to be managed from the individual unit referred to as a land parcel. This parcel has some form of relationship to mankind which is referred to as land tenure. The rights that man have to land need to be registered and documented in order to make them more secure and protect the right holders.

Land registration is the process of recording information about the ownership of land (UNECE, 1996) referred to as 'rights to land'. The land registration procedure records rights to land and confirms the legal existence of such rights and the land or property to which they attach to (Kurwakumire, 2014a). A well-functioning land registration system provides a "safe and certain foundation for the acquisition, enjoyment and disposal of rights in land" (UNECE, 1996) meaning a secure platform for a land market which enables the formal exchange of real property between different parties. Formal land rights in Zimbabwe include freehold and leasehold (Paradzayi, 2007). The land registration information is important in the formulation of new policies and in land management (Kurwakumire, 2014b) in support of future land development. Secure land rights are a pre-requisite for economic growth, social development (Zakout, 2006), agricultural productivity and resource management (Maguranyanga and Moyo, 2006). One of the purposes of a land registration system is to protect the land rights of individuals and cooperations and this is complemented by the existence of a good governance in land system (Grover et al., 2007).

Some countries have embedded information and communication technologies in the land registration procedure and reap wider efficiency and effectiveness benefits (Tulloch and Epstein, 2002). In this case, the land registration system is embedded in a larger multi-purpose land information system designed for wider land management and decision making applications. It is mostly the manual or analogue registration systems that are problematic. Record keeping presents a problem due to space requirements and proper document management while retrieving records is time consuming. In some cases, documents may get lost as the accountability system is often inadequate regarding secure access to particular documents.

Formal land registration is often time consuming and expensive particularly for the low income social groups (Kurwakumire et al., 2014a). As a result, this study models land registration procedures. This is a first step towards developing a supply chain management based tool for managing the land registration process. The land registration system in Zimbabwe is used as a case study in this article. This system is to date still highly analogue (Kurwakumire et al., 2014b) as previous efforts to align information and communication technologies to the processes have been futile.

Supply chain management has been applied in a land development process in (Kurwakumire et al., 2013) in which geographic information (GI) is the product that gains value as it moves across the chain (see figure 1). In this scenario there are several upstream raw collectors of surveying data who are the suppliers. They collect this data and process it into a usable form by the manufacturers. The manufacturers add value to this data by performing multiple operations that transform this data into the products demanded by end users. This data can be sold to end users through a retailer or geographic information data vendor or users can access this data directly from a data warehouse, referred to in figure 1 as the geo-portal. The supply chain ends with the consumer or end user who uses the geographic information products for problem solving and decision making (Kurwakumire et al., 2013).

1.2 Land Registration Supply Chain

Taking from the definition of a supply chain from (Handfield and Nichols, 1999) given in section 1, the land registration supply chain describes all activities involved in the registration of title of real or immovable property with the deeds registry or office. The ultimate product of this supply chain is a title deed which is delivered to the end user or property owner. This process involves suppliers of raw and processed land information that is used as input raw materials in the creation of the title deed, which in this case is the final value added product. The process of creating a deed goes through a quality control process and upon certification as true and correct, the deed is endorsed and becomes a legal document. When the actual real property is registered for title it automatically acquires value within the land markets and banking system as such property can be used for collateral by banks. The land registration supply chain thus involves the acquisition of raw materials, their transformation into finished products and delivery of finished products to the end users as depicted in figure 2. The ultimate product, the title deed, is designed after several transformations of data and information in the land registration supply chain. The key supply chain partners in cadastral and land registration include land surveyors, the surveyor general's department, notaries, and the deeds office (Mapamula et al., 2016). These actors are adopted in this study to demonstrate the applicability of supply chains in managing the land registration process.

2. Problem Context

The land registration system in Zimbabwe is highly analogue and inefficient. There is lack of management methods to improve the delivery of title to land or to facilitate efficient land and property transactions. The land information itself is difficult to archive, retrieve and manage. This resulted in a study of re-engineering the cadastral process in Zimbabwe detailed in (Kurwakumire et al., 2014b). The premise behind the study was that, the efficiency of cadastral system, which includes the land registration system, depends on the efficiency of the individual units or components of this cadastral system. This is synonymous to what happens in supply chains whereby a supply chain is defined to be as efficient as its weakest link. The first challenge in land registration is in fully visualising the procedures involved. The concept of supply chains is thus used in this study to map and visualise the land registration system. This system is referred to as the land registration supply chain in this article. The land registration procedures have to be managed as one system in order to promote the efficiency of the overall supply chain. This relates to the concept of supply chain management, which in future may be adopted in managing land registration systems.

The fast track land reform which resulted in allocation of A1 and A2 small holdings (Maguranyanga and Moyo, 2006; Cliffe, 2011). A2 farms were to be registered under the leasehold tenure (Paradzayi et al., 2007) while A1 holdings using permits (Maguranyanga and Moyo, 2006) covering the whole land redistribution exercise. Such an intensive program would then require an efficient land registration system. The fast track land reform exercise commenced near the turn of the century in the late 1990s bringing forth a demand for land registration. This demand for land registration further brings out the need to have an efficient land registration system in order to issue registration documents faster, better manage land and land registration information, perform land audits and manage agricultural productivity initiatives in the resettlement areas. Currently land rights on resettlement areas (USAID, 2010) are insecure due to the lack of documentation or registration and this affects agricultural productivity negatively. The registration of all land is good practice in modern land administration systems to enable good land governance and management (Kurwakumire, 2014a). While there is common consensus that good governance in land administration, which includes land registration systems is crucial for sustainable development and establishing land markets (Tikue, 2016), there lacks methodology of managing service delivery for land registration systems. The aspects stipulated under good governance in land administration include efficient service delivery, transparency, and accountability (Zakout, 2006; Bell, 2007; Grover et al., 2007). This study thus explores the application of supply chains and supply chain management in managing service delivery within land registration so that delivery of title documents can be executed more efficiently resulting in timely land transactions.

3. The Land Registration Supply Chain in Zimbabwe

Supply chains describe the processes that are carried out to deliver desired products to the consumer. In the case of the land registration supply chain (see figure 3), the main products are the legal approved diagram to a property or piece of land and the title deed to that portion of land, which is also a legal document.

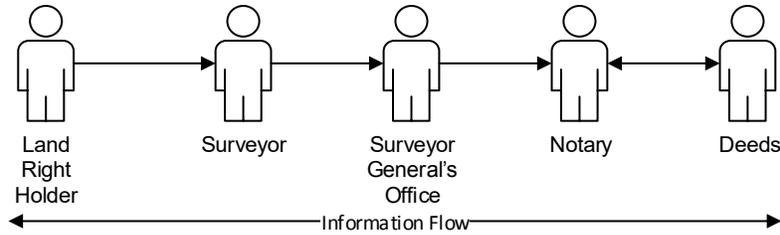


Figure 3. Land Registration Supply Chain

The land registration supply chain commences with a natural or non-natural person who wants to register a portion of land with the deeds registry. In order to obtain title to land, a cadastral survey of land is required to legally define the boundaries of the real property in question. This survey is carried out by a professional land surveyor and results in a survey diagram. This survey diagram is used, though a notary or land conveyancer, to register title at the deeds office or registry. When the process is done, the applicant (natural or non-natural person receives) the deed confirming title or ownership of the property (see figure 4). There are several product, monetary and information flows in this land registration supply chain.

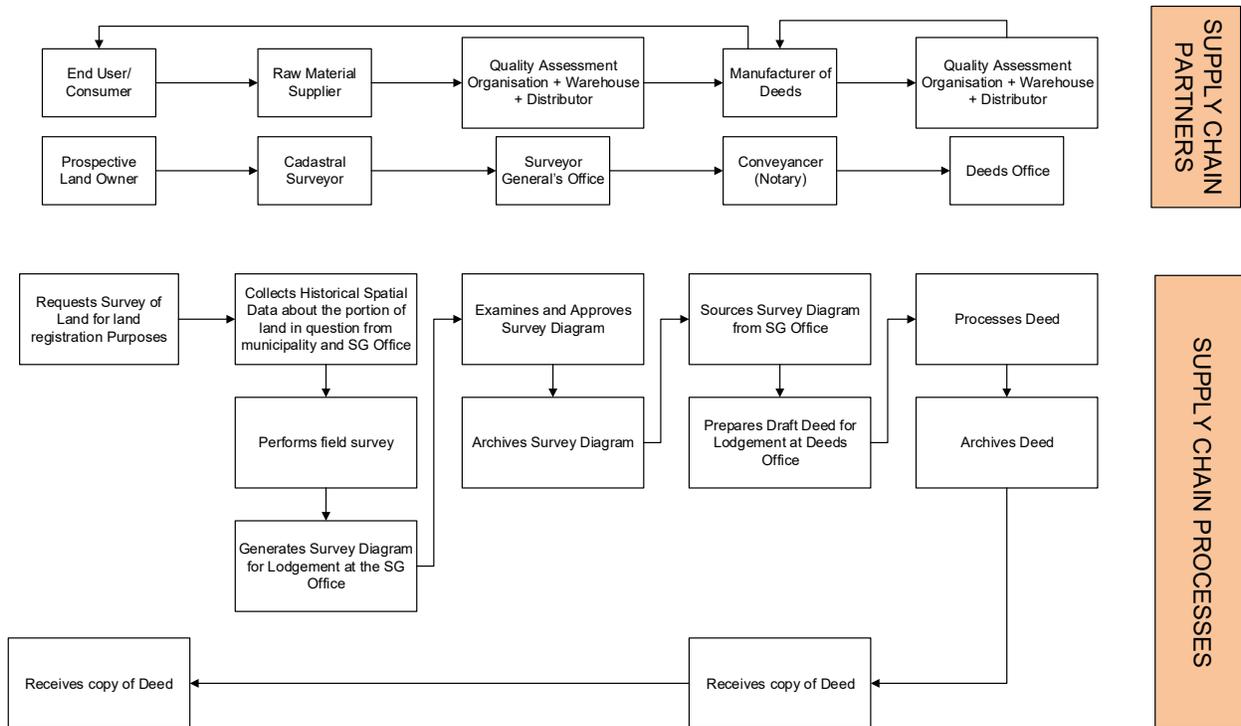


Figure 4. Land Registration Workflow (Based on Supply Chain Mapping)

From figure 4, a prospective land owner requests for a cadastral survey of land since the product (survey diagram) from this process is required for the creation of a deed to the property in question. In order to create this survey diagram, the cadastral surveyor has to source land information from the surveyor general's office, local municipality and internally within his own firm. This information is used in doing computations required to carry out the fieldwork using Surpac software. The surveyor then embarks on the fieldwork in which the beacons forming the property boundaries are placed and monumented. The surveyor then designs the survey diagram using Surpac and AutoCad software. The prospective land owner pays the surveyor to carry out the cadastral survey. The cadastral surveyor submits this diagram to the surveyor general's (SG) office who certifies that the diagram is meeting quality requirements. The surveyor pays the surveyor general's office for this service. The conveyancer or notary requests for the survey diagram from the surveyor general's office and prepares and draft deed. The conveyancer pays the SG office for the diagram. The conveyancer then submits the draft deed for quality control and finalization at the deeds

office. The conveyancer pays the deeds office for finalizing the deed. The prospective land owner pays the conveyancer for preparing the deed.

The cadastral survey process is expensive and time consuming due to lack of use of modern technology (Kurwakumire and Chaminama, 2012). Accessing records required for the cadastral survey is time consuming due to an analogue achieving system. As a result, automation of the document access system has been proposed in (Kurwakumire and Kuzhazha, 2015) and is presented in figure 5. This would improve the turnaround time for the land registration supply chain.

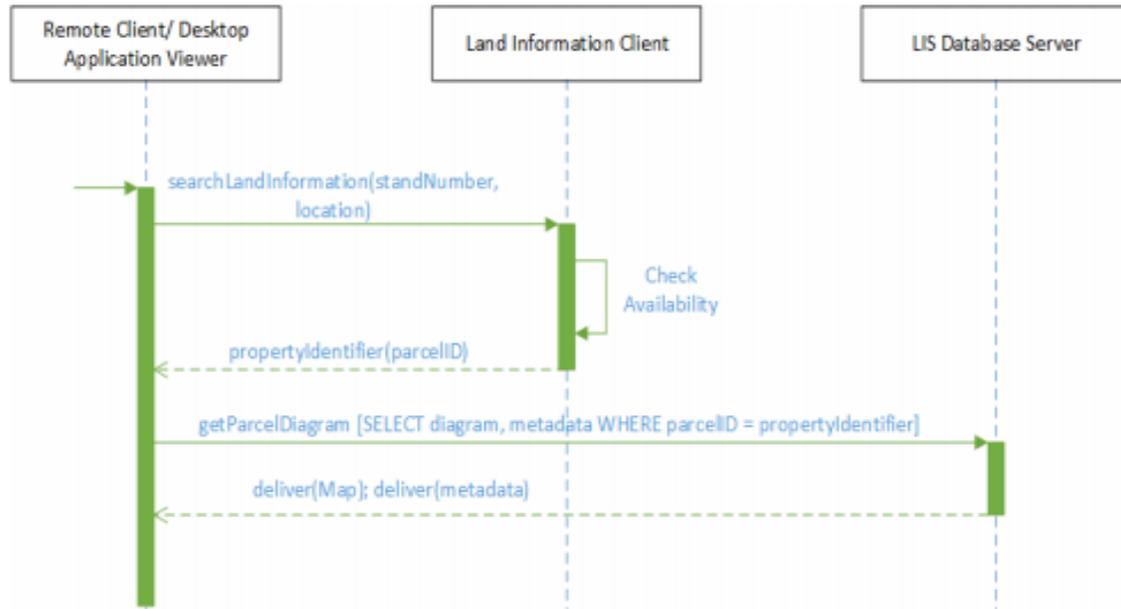


Figure 5. Adopting ICT in Accessing Land Information (Kurwakumire and Kuzhazha, 2015)

Within this system, which is based on client-server technology, the information consumer searches for land information (cadastral or deeds information), using the property number or identifier and location of the property of interest through a website which is the remote client. The system checks whether the number exists in the catalogue. If the property is not available, it returns null and a message that there is no information pertaining the property number or it is an invalid property number for the given location. If the property is available in the catalogue, a message is sent to the database server to retrieve the records relating to the property in question. The consumer can then download the information about the property from the site through a file transfer protocol or can choose to receive the file through electronic mail. This is an instant process for information querying (see figure 5) whose duration is dependent on the quality of internet bandwidth and size of files to be accessed.

Currently the processes of surveying the land carried out by the land surveyor and the conveyancing which results in the creation of the deed are the most inefficient in terms of time. The surveying process can be greatly improved by using global navigation satellite system (GNSS) survey equipment. Figure 6 proposes new timelines for the land registration process so that property can change hands from between 14 to 28 working days. This time frame is reduced if the land in question has already been surveyed and only the conveyancing process is required. Speeding up especially the conveyancing system makes the land registration system more secure as land owners are less able to attempt to fraudulently sell the same immovable property to different clients. However, the longer it takes for the land registration process to end with the delivery of the deed, the more insecure it is, particularly to the buyers who stand to lose the amounts transferred as payment for the property.

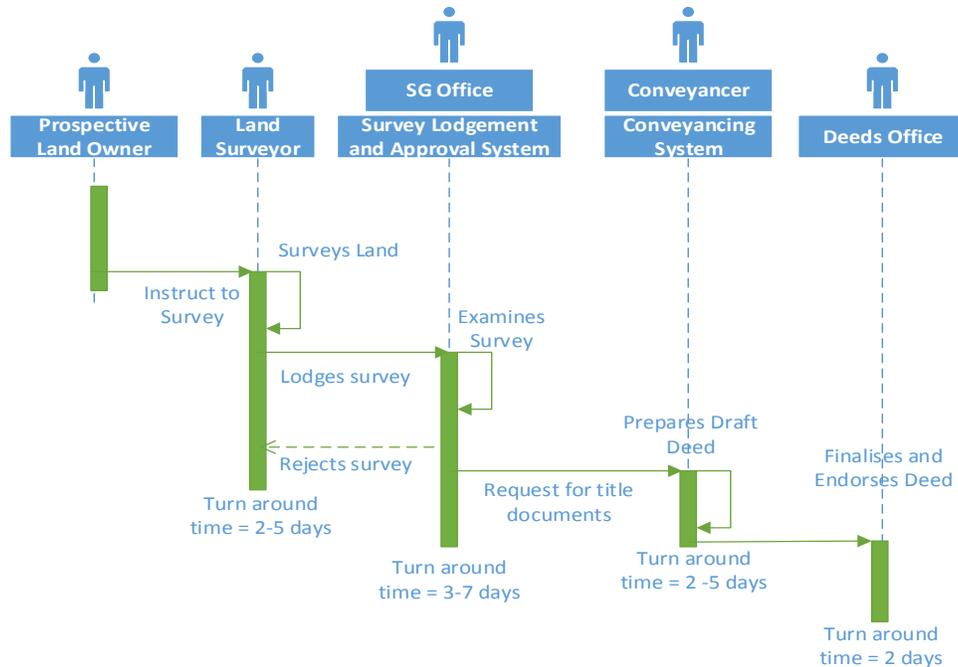


Figure 6. Re-engineered land registration workflow – Adapted from (Kurwakumire and Kuzhazha, 2015)

4. Application of Supply Chains in Land Registration

Land registration offices need to better plan customer demand as suggested in (Moon et al., 2000) to enable their supply chains to be more efficient. The ability for land registration offices to better forecast the volumes of new land transactions based on previous data, can aid such offices to attend to new transactions effectively and timeously thus shortening the land registration supply chain. Adoption of information and communication technologies such as geographical information systems and the in-cooperation of workflow management systems is essential within the land registration offices (Mapamula et al., 2016). Kurwakumire (2014b) and Kurwakumire and Kuzhazha (2015) suggest the adoption of information technology and data warehouses to support access and management of land information. The surveyor general's department and deeds office would greatly benefit from information systems integration since their information is land based and highly related (Mapamula et al., 2016). The process of lodging survey records need to be automated to enable easy and fast delivery of survey jobs (Kurwakumire and Chaminama, 2012). Supply chain management aims at improving the effectiveness of the overall supply chain, in this case the land registration supply chain. Managing this supply chain as one unit with an object to deliver the title deed can improve the operational efficiency of the supply chain. Currently, the supply chain partners operate independently without taking into cognizance that one's output is one's input for further processing. If supply chain partners acknowledge that they are in a supply chain network in which more customer value is created through faster delivery, then the overall process for registering land can be made much faster.

Time inefficiencies in the land registration supply chain are due to lack of integration of this supply chain with information and communications technology. The surveying work that demarcates the real property boundaries is not carried with the latest technology such as global navigation satellite systems which makes this process slower and more expensive. The land survey act of Zimbabwe has been detecting what technology can be used instead of the act embracing new technology as it comes (Kurwakumire and Chaminama, 2012). The examination of surveys at the surveyor general's office is a manual system and with the absence of a workflow management system to manage and monitor jobs in the examination process, there are some inefficiencies encountered. The deeds creation process at the deeds registry is also manual resulting in further inefficiencies. All data searches are manual resulting in time wastage as locating relevant documents or raw materials for preparation of the deed is time consuming.

Supply chain management can be used to identify problem areas within the land registration supply chain and to effect corrective measures to enable each supply chain partner to be more efficient in work execution which results in total supply chain effectiveness. Integrating suppliers and customers in the land registration supply chain could in

principle result in a one stop shop for the land registration system (Chimhamhiwa, 2002), in which the person or corporate body requiring registration only has to visit one office in order to receive the total service, which often results in increased customer satisfaction.

5. Conclusions

Supply chain mapping can be utilized in modelling and visualising land registration systems. The processes involved in land registration have been mapped successfully including the connectivity between the supply chain partners. The supply chain mapping revealed that there are several actors who participate in the land registration processes towards the delivery of the final legal documents which confirm land title to the applicant. The processes relate to an analogue procedure which needs to be embedded with information technology as demonstrated for the document access system. Information technology improves supply chain success due to improved communication between supply chain partners and quicker turnaround times in production processes. Thus, adoption of information and communication technologies will in principle improve the overall effectiveness of the land registration supply chain. There is still need to test the suitability of supply chain management as a management tool for land registration systems. Future work entails the adoption of the supply chain operations reference model (SCOR) in the management of the land registration process. The SCOR model uses basic processes namely Plan, Source, Make, Deliver and Return in managing supply chain activities.

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Biography

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