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ICT for Ethiopia's land administration

Bachelor Thesis Information Science

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1 Contents

2 Introduction

> ***"Land is the ultimate resource, for without it life on earth cannot be sustained. Land is both a physical commodity and an abstract concept in that the rights to own or use it are as much a part of the land as the objects rooted in its soil. Good stewardship of the land is essential for present and future generations. [...]The role of land in the economy of each nation is not always obvious, but is of great significance. Without secure land rights there can be no sustainable development, for there will be little willingness to make long-term investments. Countries in transition will, in particular, find it difficult to obtain some foreign investment."***
>
> *(Economic Commission for Europe, 1996)*

This good stewardship relies on having a supportive land administration; existing literature concerning land administration in developing countries addresses opportunities, complexities, best practices and guidelines and is mostly focused on policy-making (EU Task Force on Land Tenure, 2004; Economic Commission for Europe, 1996; Toulmin, 2008; Williamson, 2000).

Some information is available on land administration in Ethiopia, of which little mention any complexities or possibilities of the use of ICT in the land administration processes (Deininger, Ali, Holden, & Zevenbergen, 2008; Bekure, et al., 2005; Toulmin, 2008; Abebe, 2006; Adenew & Abdi, 2005). However, an overview of complexities and opportunities regarding the use of ICT for land administration in Ethiopia seems to be lacking. Therefore, this thesis concerns the following problem statement:

> ***"What are the opportunities and complexities regarding the use of ICT for land administration in Ethiopia?"***

3 Method

In order to uncover the complexities and opportunities of the use of ICT for land administration in Ethiopia, both the benefits of good land administration in general – for which ICT is assumed to be an asset – and Ethiopia's past and current land administration practices have been explored. Therefore, literature on Ethiopia's past and current land administration practices, literature on good land administration and ICT in land administration have been researched.

The principles of appropriate technology are adhered to during this research process, for Ethiopia is a developing country and appropriate technology focuses on the use of technology, such as ICT, in the context of developing countries.

Since the principles of appropriate technology address the complexities and benefits (opportunities) of technologies – such as ICT – in developing countries, it provides a framework for researching the problem statement. It has therefore been used as the framework underlying this thesis.

4 Essential background information

The current land administration practices are a result of decades of policy-making and policy reforms, of which a brief outline is presented in section 4.1. Section 4.2 covers the current land administration practices.

4.1 Ethiopia's history of land administration

Crewett et al. summarize that *"Ethiopia has a long legacy of intervention in land tenure relations. The Ethiopian state has exerted considerable influence on local land tenure regimes throughout different political regimes."* In order to understand the current land administration practices to its full extent, it is necessary to have some knowledge of Ethiopia's history of land administration.

4.1.1 Before 1975: The Solomonic Dynasty

Ethiopia's land administration policies date back to 1909, when emperor Menelik II issued the registration of title deeds in the capital city Addis Ababa. Over a decade later, Emperor Haile Selassie, ruling from 1930 to 1974, ordered to measure and register the rural land. This has been conducted by the Ministry of Land Reform, assisted by the Mapping Agency (Abebe, 2006).

4.1.2 1975 – 1991: The Derg

In 1975, Emperor's Selassie's imperial rule was overthrown by the Derg regime. This socialist regime nationalized all rural land and redistributed the land to its farmers. In order to abolish the exploitative landlord-tenant relations, the farmers were organized in Peasant Associations (Abebe, 2006; Crewett, Bogale, & Korf, 2008).

These Peasant Associations were given the power of registration. The association's register listed the names of all members entitled to user rights. The registry was used for taxation and during land redistribution. The land users received tax receipts only (Abebe, 2006).

4.1.3 1991 – now: Federal Democratic Republic of Ethiopia

After the defeat of the socialist Derg regime in 1991, the Peasant Associations were dissolving rapidly. However, the new government announced the continuation of the land policy of the Derg regime. When Ethiopia in 1995 became the Federal Democratic Republic of Ethiopia the new constitution approved and confirmed the state ownership of land. Even today, *"[l]and policy, the real source of power in imperial and contemporary Ethiopia, remains at the center of a controversial political debate."* (Crewett, Bogale, & Korf, 2008)

4.1.4 A history of colonizing instead of being colonized

It is also worth mentioning that Ethiopia has never been colonized, except for a short period of Italian occupation from 1936 to 1941. Ethiopia therefore lacks a kind of colonial heritage or legacy as can be seen in other sub-Sahara African countries and societies, which resulted in land grabbing by European settlers. This land grabbing is regarded as contributing to the formalization of private

property to land. Furthermore, the expansion of the empire towards the South and the exploitation of this newly conquered land have resulted in a still visible diversity of land tenure systems across the country (Crewett, Bogale, & Korf, 2008; Markakis & Ayele, 2006).

4.2 Current land administration practices

In this section, an outline of the current structure of administrative divisions (4.2.1), a description of the decentralized approach on land policy implementation (4.2.2), and a description of the crucial roles in the current land administration processes played by the Land use and Administration Committees (4.2.3) will be provided.

4.2.1 Structure of administrative divisions

Ethiopia is administratively divided in kililoch, chartered cities, zones, woredas and kebeles. These terms are frequently used in literature covering the aspects of Ethiopia's land administration without any explanation and are therefore explained below.

4.2.1.1 Kililoch

Ethiopia is divided into 9 administrative regions called kililoch (singular – kilil) or Regional States. This division is ethnically-based which causes fierce criticism from some opposition parties; the word "kilil" means "reservation" or "protected area". The nine regions are:

a) Afar
b) Amhara
c) Benishangul-Gumuz
d) Gambela
e) Harari
f) Oromia
g) Somali
h) Southern Nations, Nationalities, and Peoples Region (SNNP)
i) Tigray

The regional divisions have substituted the thirteen former provinces, to which still is being referred when describing locations. As described in the section "Decentralization" (4.2.2), the government has decentralized the implementation of land management to the Regional States in 1997 (Holden, Deininger, & Ghebru, 2009; Deininger, Ali, Holden, & Zevenbergen, 2008; Adenew & Abdi, 2005).

4.2.1.2 Chartered cities

A charter city may have some exemptions from national or regional laws. Because of these possible law exceptions, the three chartered cities of Ethiopia belong to the first level of administrative divisions of Ethiopia, together with the kililoch described above. The three chartered cities of Ethiopia are:

a) Addis Ababa (Ethiopia's capital city)
b) Dire Dawa

c) Harari

A charter gives a city's residents the flexibility to choose any kind of government structure allowed by law.

4.2.1.3 Zone

The kililoch are subdivided in 68 zones (Statoids.com).

4.2.1.4 Woreda

A woreda is equivalent to a district, managed by a local government. The zones of Ethiopia are subdivided in around 550 woredas. Although some woredas can be traced back as institutions (kingdoms) to earliest times, many are of more recent creation (Statoids.com).

4.2.1.5 Kebele

The woredas are composed of a number of kebele, the smallest unit of local government. Kebeles can best be regarded as a neighborhood, a localized and delimited group of people or ward. Most of the efforts on land registration are made on this level, which happens to be the key to success, as described below.

4.2.2 Decentralization

The government has decentralized the implementation of land management to the Regional States in 1997. In 2002 the government delegated even greater legislative powers to the Regional States in land related matters. To implement the land management, the Regional States have taken their own actions, which have resulted in some regional land administration differences:

"Some regional governments have established structures that will be responsible to manage land administration, such as the Environmental Protection Land Use and Administration Authority (EPLAUA) in the Amhara regional state (established in 2000). Tigray also established an EPLAUA in 2004. In Amhara, the new structures for land administration also extend to woreda levels where land administration desks are formed. In the regions where land registration and title certification programmes have begun, like Amhara, kebele and sub-kebele land administration committees have been established." (Adenew & Abdi, 2005)

4.2.3 Land use and Administration Committee (LAC)

Generally, the land administration tasks are performed by a local Land use and Administration Committee (LAC). The members are elected by popular vote and assume responsibility for implementation in a labor-intensive and field-based process. Inclusion of at least one female is required. Plots are registered in a public process with neighbors present in the field. This way transparency is increased, the possibilities of manipulation and error are decreased and conflicts are efficiently solved (Deininger, Ali, Holden, & Zevenbergen, 2008).

Furthermore, people living in rural areas have easy access to the locally based LAC committees. Transparency and (therefore) accountability within the decision making processes are increased because of the high accessibility and because the people concerned are directly involved in the field.

Possible language barriers are minimal: local language ensures access to records and avoids possible mistranslation of rights (Toulmin, 2008).

LAC is mostly supervised at woreda level. However, in the South supervision takes place at kebele level and committees working independently with some assistance from woreda level exist as well. Except for some ICT piloted institutions, all records are kept on paper on kebele or woreda level. Land certificates based on these records are also issued by government officials at kebele or woreda level (Deininger, Ali, Holden, & Zevenbergen, 2008).

This decentralized approach on land administration is regarded as the key to Ethiopia's successful swift and cost-effective first-time land registration. Ethiopia's success seems to be a rare case though:

"In fact, hardly any of the [sub-Saharan] countries that introduced legal reforms with much fanfare have succeeded in developing, let alone rolling out, a low-cost system for land administration at a scale that is sufficiently large to provide an option for the majority of the poor. This made it difficult for many of the expected benefits from such legislation to materialize, implying that the poor often continue to be excluded from formal systems and vulnerable to land loss. More generally, failure to implement land legislation has raised doubts regarding the technical, institutional, and political feasibility of such reforms." (Deininger, Ali, Holden, & Zevenbergen, 2008)

5 Appropriate Technology

> ***"It sounds pretty normal: when you plan a mountain hike you ensure to wear firm boots and a pullover against the cold at higher altitudes; in case you go to the tropics you choose a light, well ventilating tropical out-fit and a hat or cap against the merciless sun." (Reijswoud & Jager, 2008)***

According to the concept of Appropriate Technology (AT), technology should be adapted to local contexts in order to be successful. AT is technology that is suitable for the environmental, cultural and economic conditions in which it is intended to be used. AT is embraced by fields like architecture, building technology and agriculture but has not yet rooted in the area of ICT (Reijswoud & Jager, 2008).

The following guiding criteria are proposed by Darrow and Saxenian (1986) and are grouped for reasoning throughout the remainder of this thesis.

Benefits:

- The technology must result into economic and/or social progress.
- The technology must contribute to the increase of productivity.
- Technologies may be relatively labor-intensive, but must have a higher output than the traditional technologies.
- The technology should not have a negative impact on the environment[i].

Flexibility:

- The technological solutions must be flexible and easily to be adapted to changing circumstances.

Knowledge and awareness:

- The technology must be understandable for people without specific or academic training.
- Small rural communities should be able to produce and maintain the technology.
- The technology must be fully understandable for the local population, the end-users, resulting into possibilities for them to become involved in the possible innovation and extension of the use of the technology.

Resources and implementation:

- It should be possible to implement/ realize technological solutions with limited financial resources.

[i] As described further on, land administration can have significant benefits on environmental issues. Therefore, this Appropriate Technology principle, being interpreted as the relation between the introduced technology and the environment, is grouped with the other "benefits".

- The use of available resources must be emphasized to reduce the costs and to guarantee the supply of resources e.g., for maintenance.

These grouped principles will be discussed in more detail in the next sections.

5.1 Benefits

Concerning the possible benefits of the application of technology in developing countries, these AT principles should be taken into account, as proposed by Darrow and Saxenian (1986):

a. The technology must result into economic and/or social progress;
b. The technology must contribute to the increase of productivity;
c. Technologies may be relatively labor-intensive, but must have a higher output than the traditional technologies;
d. The technology should not have a negative impact on the environment.

For ICT is considered to be a tool to support "good land administration", both the benefits of keeping a good land administration and the benefits of using ICT for land administration should be taken into account. Therefore, the benefits of good land administration in general are discussed in section 5.1.1. The benefits of using ICT for land administration are discussed in section 5.1.2.

5.1.1 Benefits of good land administration

The technology is intended to support the land administration processes. Thus, in order to understand the impact of ICT on these processes, the benefits of good land administration in general should be clarified. The Economic Commission for Europe (1996) summarizes that a good land administration system will:

1. Guarantee ownership and security of tenure;
2. Support land and property taxation;
3. Provide security for credit;
4. Develop and monitor land markets;
5. Protect State lands;
6. Reduce land disputes;
7. Facilitate land reform;
8. Improve urban planning and infrastructure development;
9. Support environmental management;
10. Produce statistical data.

These perceived benefits will now each be discussed in general and in relation to Ethiopia's land administration.

5.1.1.1 Guarantee ownership and security of tenure

The land administration should provide formal identification and in some systems legal proof of ownership (Economic Commission for Europe, 1996). The guarantee that someone cannot be removed from his or her land, also called tenure security, is expected to enhance investment and vice versa (Holden, Deininger, & Ghebru, 2009).

The government of Ethiopia does not grant ownership rights, but claims the ultimate ownership rights of all land, with long-term use rights held by citizens (Toulmin, 2008). Because of the state ownership of land, tenure security has become a major problem: *"the fact that administrative redistribution of land is not an empty threat is illustrated by the fact that such action, partly in pursuit*

of political ends (Ege, 1997), was carried out in Amhara as recently as 1997. In fact, a number of surveys highlight that a large number of farmers expect redistribution in the near future and that this reduces investment (…), and a desire to prevent this has led Amhara to more strictly circumscribe conditions for redistribution." (Deininger, Ali, Holden, & Zevenbergen, 2008)

According to theory, land certification can enhance tenure security, thus land certification may enhance investment. Since there is evidence that tenure insecurity has hindered investment in land in Ethiopia (Adenew & Abdi, 2005), most of Ethiopia's regional states have started land registration and certification (Holden, Deininger, & Ghebru, 2009).

However, Daniel W. Bromley (2008) argues that *"land registration and the issuance of titles is but the latest in a long history of optimistic policy prescriptions imposed on the poor nations of the world."* As such, empirical research is *"unable to establish any robust and reliable connection between 'more secure' tenure and enhanced agricultural activity."* (Bromley, 2008)

5.1.1.2 Support land and property taxation

The efficiency and effectiveness in collecting land and property taxes can be improved by good land administration, mainly due to easy identification of the landowners (Economic Commission for Europe, 1996).

Currently, Ethiopia's land registration mainly consists of tax records. As Williamson (2000) supposes, keeping tax records is an appropriate first step towards a complete land administration, and seems to be a typical first administrative phase for developing countries. However, since the Regional States have adopted different structures for land registration (Abebe, 2006; Bekure, et al., 2005; Crewett, Bogale, & Korf, 2008; Deininger, Ali, Holden, & Zevenbergen, 2008), depending on the region, these tax records are kept at kebele, woreda, zonal and/or regional level. No literature has been encountered citing a need of improving the tax collecting processes.

5.1.1.3 Provide security for credit

The Economic Commission for Europe (1996) explains that *"[c]ertainty of ownership and knowledge of all the rights that exist in the land should provide confidence for banks and financial organizations to provide funds so that landowners can invest in their land. Mortgaging land is one way to acquire capital for investing in improvements. Landowners can then construct or improve buildings and infrastructure or improve their methods and management of the land, for example by introducing new farming techniques and technologies."*

Thus, property rights may contribute to better access to credit if land can be used as collateral (Holden, Deininger, & Ghebru, 2009), and thus may contribute to investment in the land. This is one of the most apparent motives for improving Ethiopia's land registration (Abebe, 2006; Adenew & Abdi, 2005; Bekure, et al., 2005; Deininger, Ali, Holden, & Zevenbergen, 2008; Marquardt & Bekure, 2006).

5.1.1.4 Develop and monitor land markets

An efficient way of transferring land rights, provided by good land administration, enables a land market in which land rights can be guaranteed. Those who do not wish to sell their land can be

protected. *"The registers should be public so that at any time a landowner can confirm his or her rights. Those who wish to buy land can do so with confidence, knowing that the person who is trying to sell the land is the legally guaranteed owner. Those whose properties are subject to compulsory purchase – for instance where a new highway is to be built across their land – can be treated with fairness since the registers should provide information on current land prices, thus allowing better estimates of the market value of land to be made."* (Economic Commission for Europe, 1996)

In Ethiopia, all land is owned by the State and therefore mortgaging and sale of land are prohibited. Rural land is becoming a scarcity, pressing on the government which has granted rights to free land to every farmer (Abebe, 2006; Adenew & Abdi, 2005; Marquardt & Bekure, 2006).

The land administration system should be updated when formal land transfers occur. These transfers are: inheritances, divorces, leases beyond a certain length, and land takings for public use.

Keeping the land administration system up to date is one of the key factors regarding the system's sustainability and should receive adequate attention (Abebe, 2006): *"First-time registration only creates the basis for continued operation of a land administration system […]"* (Deininger, Ali, Holden, & Zevenbergen, 2008). Some of Tigray's land administrations at kebele level are outdated already.

Identified causes for the outdated administrations are awareness of the benefits of a legal property transfer (Adenew & Abdi, 2005; Deininger, Ali, Holden, & Zevenbergen, 2008), and complexity of the transfer processes and administration processes (Deininger, Ali, Holden, & Zevenbergen, 2008; Bekure, et al., 2005).

5.1.1.5 Protect State lands

The land held by the State for the benefit of the community is poorly documented in many countries. *"This is not a problem in countries where the State owns all land, but where there is private land ownership, that which remains in the possession of the State must be properly managed."* (Economic Commission for Europe, 1996)

Based on this argument and the fact that in Ethiopia all land is owned by the State, this benefit is not relevant for Ethiopia. However, Deininger et al. (2008) point out that there is a need of registering the common property resources. Common property resources can be defined as *"(…) community's natural resources, where every member has access and usage facility with specified obligations, without anybody having exclusive property right over them."* (Jodha, 1995) They are of particular relevance to the poor and the rural farmers (Ramanathan, 2002).

Adenew et al. note that encroachment into common lands is generating conflict at local level in the Amhara region. (Adenew & Abdi, 2005)

5.1.1.6 Reduce land disputes

Solving land disputes is costly and takes much time. Even more, *"[l]and often cannot be put onto the market or put to better use without resolution of the disputes, since no potential investor is likely to wish to be committed to developing land where a lawsuit may be pending."* (Economic Commission for Europe, 1996) Keeping a good land administration, based on legal procedures, should prevent these disputes arising in the future. (Economic Commission for Europe, 1996)

Ethiopia's land registration processes are generating conflict at the local level, caused by illegal land grabbing, encroachments into common lands and illegal land sales. *"Those who are likely to be marginalized by the ensuing disputes include youth, for whom landlessness is a real concern, and migrants. Women, especially divorcees, and the elderly are other groups which are vulnerable to marginalization, as they often have to look to others to sharecrop their land."* (Adenew & Abdi, 2005)

Deininger et al. (2008) however report that many of these disputes can be solved by the local Land use and Administration Committees, as mentioned above in section 4.2.3.

5.1.1.7 Facilitate land reform

Redistribution of land requires detailed records of the present ownership and use of land. *"The design of new patterns of land ownership to provide greater productivity from the land can be effective only if the existing pattern is well documented."* (Economic Commission for Europe, 1996)

Land reform during the communist Derg regime wiped out most land tenure systems. After 1995, *"[t]he government made changes in land policy such as reducing the frequency of land redistribution. Some regions declared that they would not make any more administrative land redistribution while others restricted the scope for redistribution to irrigated land. The Amhara regional state was an exception and here sudden land redistribution took place in 1997."* (Adenew & Abdi, 2005)

Every Ethiopian who wants to engage in agriculture has the right to receive inheritable use rights to a piece of land for free, according to the 1995 constitution. This is *"a principle that can be enforced through administrative reallocation of land but that will likely conflict with the goal of ensuring land users' tenure security."* (Deininger, Ali, Holden, & Zevenbergen, 2008) (See also section 5.1.1.1 for an example of the likelihood of this conflict.)

5.1.1.8 Improve urban planning and infrastructure development

This benefit is focused on urban centers, which need carefully planned and controlled redevelopment as well. The urban land administration should support this by integration of the land records, land value and land use with sociological, economic and environmental data (Economic Commission for Europe, 1996).

No specific information was found about Ethiopia's urban land administration supporting urban planning and infrastructure development by using sociological, economic or environmental data. Most literature on Ethiopia's land administration seems to be focused on the rural areas, not on the urban areas.

However, Adenew et al. (2005) note that the urban land administration is generally incomplete or outdated. The land administration registers land plots, although transfers are based on the rights of the property built on the land. These property transactions usually take place between 'buyer' and 'seller', and are not formalized in the land administration.

Furthermore, Solomon Abebe (2006) reports that increasingly more information about land (not specific urban or rural) is included in the land administration system (land use, land form, fertility status and soil structures).

5.1.1.9 Support environmental management

A multi-purpose cadastre can be used to map areas that need protection (for cultural or environmental reason), to prepare environmental impact assessments, and to monitor the consequences of development and construction projects (Economic Commission for Europe, 1996).

In 2005, the Ethiopian Parliament approved a proclamation drafted by the Ministry of Agriculture and Rural Development, aimed at conserving developing the nation's various ecosystems and set up a national land administration system which would support this. The proclamation is intended to prevent soil erosion and forest depletion as well, and land on steep slopes is taken out of cultivation (Adenew & Abdi, 2005).

The Common Property Resources, also mentioned in section 5.1.1.5, should be included in this land administration as well, since they are generally natural resources needing special attention (Deininger, Ali, Holden, & Zevenbergen, 2008; Jodha, 1995; Ramanathan, 2002).

The additional information (regarding land use, land form, fertility status and soil structures) mentioned by Solomon Abebe (2006), which is currently being registered, may be an asset to this administration.

5.1.1.10 Produce statistical data

Based on the land administration records, statistical data can be assembled in order to support resource allocation, measuring performance of development programmes, and decision-making for both long-term strategic planning and short-term operational management (Economic Commission for Europe, 1996).

5.1.2 Benefits of ICT for land administration

The Economic Commission for Europe (1996) summarizes the possible benefits of a computerized land administration system as follows:

1. Force standardization in the collection and processing of land information;
2. Speed up the processes of first registration of title;
3. Decrease the cost and space required for storing land records;
4. Prevent unnecessary duplication;
5. Simplify the preparation of "disaster" copies of registers;
6. Facilitate access to land-related data and improve their distribution;
7. Reduce the time and cost involved in transferring property rights and in processing mortgages;
8. Facilitate the monitoring and analysis of market and rental values of land and property;
9. Provide built-in mechanisms for quality control.

These perceived benefits will now each be discussed in relation to Ethiopia's land administration.

5.1.2.1 Force standardization in the collection and processing of land information

The enforcement of standardization is currently in its preparatory phase, according to the Ethiopia Land Tenure and Administration Program (ELTAP) conference reports (Marquardt & Bekure, 2006).

5.1.2.2 Speed up the processes of first registration of title

First registration has already made significant progress in Ethiopia's main regions without using ICT (Deininger, Ali, Holden, & Zevenbergen, 2008), except for a computerized pilot in Amhara (Deininger, Ali, Holden, & Zevenbergen, 2008; Abebe, 2006; Toulmin, 2008).

5.1.2.3 Decrease the cost and space required for storing land records

There are millions of households to be registered in the land administration system. Each household has a record containing several documents. These records are kept on paper, and are stored in archives at kebele, woreda, regional and/or zonal level (Deininger, Ali, Holden, & Zevenbergen, 2008). Digitalizing these records will decrease the space used for storage, decreases paper costs, and improves record management's efficiency (storage and retrieval), thus reduces record management costs.

5.1.2.4 Prevent unnecessary duplication

Due to the decentralized implementation of land administration, many records are duplicated (for instance, kebele records may be used at woreda level as well). This leads to inconsistencies among duplicated records (Deininger, Ali, Holden, & Zevenbergen, 2008; Abebe, 2006).

5.1.2.5 Simplify the preparation of "disaster" copies of registers

All land records are kept on paper (Adenew & Abdi, 2005; Deininger, Ali, Holden, & Zevenbergen, 2008), there are no disaster-copies kept. In the unfortunate case of a disaster causing the original data to become unusable or inaccessible, all stored data will be lost. Using ICT, full digital backups can be made almost effortlessly.

5.1.2.6 Facilitate access to land-related data and improve their distribution

This benefit concerns firstly the communication of land-related data between different institutions and secondly the accessibility of the data by the public.

By applying ICT, land-related data will be easier to share between different institutions, and unnecessary duplicates causing inconsistencies across involved institutions (see also section 5.1.2.4) can be prevented (Deininger, Ali, Holden, & Zevenbergen, 2008; Toulmin, 2008).

Concerning public accessibility, Toulmin (2008) argues that *"restricted access [to the land administration records] is easier to manage but increases the risk of poor governance; open access allows verification of land claims by neighborhoods and media, and public scrutiny reduces corrupt allocations."* The Economic Commission for Europe (1996) and the EU Task Force on Land Tenure (2004) plea as well for making the land administration records accessible for the public. However, it should be mentioned that *"computerized records [...] are not accessible for most rural and poor urban dwellers."* (Toulmin, 2008)

5.1.2.7 Reduce the time and cost involved in transferring property rights and in processing mortgages

Recording transfers is essential to keep the land administration up to date (Abebe, 2006; Bekure, et al., 2005; Deininger, Ali, Holden, & Zevenbergen, 2008). This process is however very time consuming, since validating a transfer may demand cross-checking with numerous cases.

Deininger et al. (2008) have estimated the number of annual transfers to be recorded on kebele, woreda, zonal and regional level, as presented in Table 1 below.

Administrative division level	Number of annual transfers
Kebele	47
Woreda	1,274
Zone	13,500
Region	135,000

Table 1

Based on these figures, Deininger et al. (2008) argue that computerization at kebele level is not appropriate. However, both the administration processes' overall benefits caused by computerization and the possible complexities encountered while validating a transfer seem to be neglected.

5.1.2.8 Facilitate the monitoring and analysis of market and rental values of land and property

As described in section 5.1.1.10, statistical data can be assembled for monitoring and analysis purposes. These assembling processes can be automated when keeping a digital land administration. This way, data gathering by manual examination of numerous files can be reduced to a single computer command.

5.1.2.9 Provide built-in mechanisms for quality control

ICT can be used to check for consistency within the administration and in this way ease quality control. For example, the administration can be checked for redundant records.

ICT can also be used to check for data consistency with land administration or land right policies. For example, the system can check for prohibited overlapping land claims, which is known to be a very time consuming task. A system providing functionality for policy checking can enhance accountability and thus contribute to the reduction of corruption.

5.2 Flexibility

Darrow et al. (1986) advise that the technological solutions should be flexible and easily to be adapted to changing circumstances. In this case, the flexibility can be seen from an organizational perspective, or technology perspective. Both perspectives are discussed below.

5.2.1 Organizational perspective

From an organizational point of view, the changing nature of policies, the organizational structure, and the existence of potential language barriers may have some implications for the system's flexibility requirements.

5.2.1.1 The changing nature of policies

Williamson (2000) explains that

"[t]he humankind to land relationship in all countries is dynamic […]. This means the land administration response to manage that relationship will always require change. The current global drivers for change include sustainable development objectives, urbanisation, globalisation, economic reform and environmental management, with technology impacting across all areas."

Based on Ethiopia's history of land administration (see section 4.1) can be concluded that the land administration policies have been changed during several political reforms, that these changes have had a strong impact on the dynamic humankind to land relationship mentioned above, and that the land administration has changed significantly throughout the last decades in order to enforce these policies.

Like Crewett et al. (2008) state that land policy remains at the center of a controversial debate, it is not unlikely that land policy will be different in the near future. Furthermore, these policies are made and eventually changed at both national and regional level. An appropriate ICT land administration solution will need to support policy changes at both levels.

It should be noted however that the government of Ethiopia is already putting effort into standardizing the different approaches to land administration across all regions (Marquardt & Bekure, 2006).

5.2.1.2 Organizational structure

The possibility to directly access and/or update land administration records is demanded at most of the administrative divisional levels. However, not all functionality is necessary or even desirable at all institutions. An appropriate ICT land administration solution will need to support these institutional differences.

5.2.1.3 Language barriers

One of these differences in particular is the language used in the administration. Multiple languages are spoken and written throughout Ethiopia. Although the official national language is Amharic, usually the locally spoken language is used when creating legal documents such as land certificates (Deininger, Ali, Holden, & Zevenbergen, 2008; Toulmin, 2008).

It could be concluded that an appropriate ICT land administration solution will need to support operation in multiple languages. However, if the records are to be exchanged between institutions and these institutions have no common language, the exchange may become worthless.

Theoretically all records could be translated into one common language, which would probably be the national language, Amharic. Unfortunately these translating processes are both costly and prone to error and corruption. Additionally, all staff members would have to understand this common language in order to be able to work with the records kept in the system.

If this language-based standardization would take place, developing a system which can be operated in multiple languages might become unnecessary, for its users then all would be presumed to understand the common language used in the records.

The national Amharic language and other Ethiopian languages pose the development of an appropriate ICT solution with another complexity: their written form. These languages have their own alphabet and cannot be written using the Roman alphabet.

5.2.2 Technology perspective

The most common technical flexibility issues may be known as compatibility issues. In the context of Ethiopia's land administration, special data transfer methods and the approach taken during implementation require some consideration as well.

5.2.2.1 Compatibility

One of the benefits of keeping a digitalized land administration is the possibility to integrate the stored information with other systems (Economic Commission for Europe, 1996). While the system should be able to support software changes over time, required and/or future compatibility with other systems should remain guaranteed.

Furthermore, compatibility with different cadastral survey methods should be supported. If a parcel is to be recorded, it should be identified and measured first. Marquardt and Bekure (2006) conclude in their conference summary that multiple cadastral surveying methods are to be considered. These include:

- Rope
- Combined use of rope and GPS (Global Positioning System)
- Compass and tape
- GPS on corners
- Total station (optical equipment used for measuring distances and angles)
- High resolution satellite
- DGPS (Differential GPS, a variant on GPS, using a network of ground-based reference stations)

Decisions on which methods to use will be based on cost, accuracy, potential land value and required skills (Marquardt & Bekure, 2006). Since different methods may be applied simultaneously, a land administration should be compatible with all methods applied. Even more, new options may become

available, for both technology and Ethiopia's infrastructure advance. Therefore, future compatibility should be taken into account. For example, in the Netherlands an open source project has just started using low-cost open source enabled mobile phones with GPS, camera and mobile internet for registering trees (Ministry of Economic Affairs (The Netherlands), 2009). A similar approach may become available to Ethiopia's land administration.

Over time, the data stored in the land administration systems will increase not only in volume but in complexity as well:

"Land administration systems of the future will need to manage a growing complexity of rights, restrictions and responsibilities over land due to a greater awareness of environmental and social imperatives, as distinct from a more traditional focus on economic imperatives […]" (Williamson, 2000)

Due to the low cost of data storage, developed countries' governments tend to store records for an indefinite period. Technology advances over time and may undermine the accessibility of old records. The field of digital sustainability is concerned with this kind of issues. Digital sustainability expert Bradley (2007) states that digital sustainability involves more than technology only:

"[…] the ability to preserve and provide access to digital information is linked to more than technical issues, and that economic, social, and other such factors will play a part in determining the useful life of any information encoded in digital form."

The system needs to support the increasing data complexity and remain compatible with other systems, while not undermining digital sustainability.

5.2.2.2 Data transfer methods

Ethiopia's internet connectivity is growing: between 2000 and 2006 the number of internet users has increased from 10,000 to 113,000 (Fuchs & Horak, 2008). Usage of mobile telephones and therefore the opportunities for mobile applications are also increasing. However, the related costs taken into account, data transfers between institutions may be considered more appropriate using a data carrier such as a CD. Pros and cons regarding data transfer methods should be considered from time to time. The system should be able to be adapted easily to different data transfer methods.

Since the Ethiopian power supply remains considerably unstable, connectivity may be dependent on this power supply, and connectivity itself behaves unpredictable, it is probably best to keep locally managed databases instead of a single central data depot. These databases can be synchronized using the data transfers. This is a similar setup to the locally kept paper records. However, the records can be maintained consistent with less effort and consistency errors due to manual synchronization can be prevented with automation.

5.2.2.3 Implementation: phased approach

It is generally considered good practice to implement large-scale ICT projects using a phased approach. This supports agile methods of system development, which can deal with advancing understanding during the development process by adding and reviewing a single functionality at a time. These methods require some flexibility (extendibility) in the system as well.

5.3 Knowledge and awareness

According to the guidelines for Appropriate Technology as proposed by Darrow and Saxenian (1986), the technology must be understandable for people without specific or academic training. However, the land administration processes are already requiring highly skilled personnel and thus this guideline can be interpreted as being not applicable in this specific context. Since implementation of ICT will bring new ways of working, new procedures and (organizational) change (Reijswoud & Jager, 2008), attention should be paid to proper training and skill requirements during the development process though.

Finding or training an adequate number of employees may be a difficult task since a shortage of skilled personnel is already reported without taking the introduction of new skill requirements into account. It is expected however that the introduction of ICT will help with these human resource constraints (Abebe, 2006).

The Appropriate Technology guidelines also prescribe that small rural communities should be able to produce and maintain the technology (Darrow & Saxenian, 1986). The ICT land administration implementation is however not focused on small rural communities, but on the governmental institutional across multiple administrational divisional levels. Reijswoud (2008) et al. seem to interpret this guideline in a somewhat broader (organizational) context:

"*A new technology will not be embedded in a sustainable manner into an organization or community if the dependence on the developers of the solution is high and the available resources (financial and human) for maintenance are expensive and scarcely available.*"

From this perspective it becomes clear that indeed the dependence on the developers is of concern, as well as the resources available, and should therefore be considered before contracting software developing parties. However, land administrations are very complex by their nature and their design is suited to the skills of persons with research experience (Williamson, 2000), who may not be at hand.

The third Appropriate Technology guideline concerning knowledge and awareness states that the technology must be fully understandable for the local population, the end-users, resulting into possibilities for them to become involved in the possible innovation and extension of the use of the technology (Reijswoud & Jager, 2008). It can be considered that in this context not the technology itself should be fully understandable for the local population, but the intended impact of the technology should be made clear, *"[…] bearing in mind that users are unlikely to pay for [more expensive] registration unless the benefits they perceive from doing so will exceed the cost"* (Deininger, Ali, Holden, & Zevenbergen, 2008). Concerning the importance of awareness, Williamson (2000) states that *"[t]he key performance indicators for a successful land administration system are whether the LAS is trusted by the general populace, protects the majority of land rights, provides security of tenure for the vast majority of land holders and is extensively used. If these criteria are not generally met then there is a fundamental problem with the system."*

The end-users need proper training for they will be operating the system. Since there are various tasks in the system, there is a need for training at different levels and in different fields (Abebe,

2006). Because of this variety of tasks, and the complexity of the technology as a whole, it might be neither appropriate nor necessary for each employee to fully understand the technology used, but instead to understand it sufficiently to carry out their part of the tasks – on which they have expertise and therefore knowledge on ways in which the system could support them to be carried out.

5.4 Resources and implementation

Darrow and Saxenian (1986) state that it should be possible to realize technological solutions with limited financial resources, and that the use of available resources must be emphasized to reduce the costs and to guarantee the supply of resources e.g., for maintenance.

The high costs involved with using ICT for Ethiopia's land administration are often mentioned in literature as a main obstacle for implementing a nationwide system (Deininger, Ali, Holden, & Zevenbergen, 2008; Toulmin, 2008), however any complete overview of involved costs seems to be lacking. This section lists encountered information on implementation, related costs and issues related with these costs, and is by no means intended as a complete overview, which would go beyond the extend of this thesis.

An ICT land certification pilot in about 25 woredas conducted by ELTAP (Ethiopia Land Tenure and Administration Program) is granted a budget ceiling of $7 million. Nationwide implementation using the same approach as is adhered to during this pilot would require an additional $25 to $30 million and about 15 to 20 years (Bekure, et al., 2005).

Literature suggests that the costs of land administration should be in balance with the value of the registered land (Toulmin, 2008; Marquardt & Bekure, 2006); that the land value is related to demand; and that this demand is lower for rural than for peri-urban or urban land. Based on these assumptions, a distinction is being made – concerning the appropriateness of taking a more costly approach such as by implementing ICT – between high valued land (or high potential land) and lower valued land (or less potential land). Based on this distinction, Toulmin (2008) argues that the pilot program mentioned above is too expensive for the regional level, but "*may be a useful model for the design of registration systems in urban and peri-urban areas, where land has greater monetary value*". The distinction made does however not take into account all the possible benefits (see section 5.1) of both having a good land administration and using ICT for land administration.

The discussion about what land survey method is appropriate is yet another example. As described in section 5.2.2.1 several technologies ranging from rope to satellite are available for measuring land with costs ranging from around 13.12 Birr to 230 Birr[i] (see Table 2 from Marquardt et al. (2006) below). Again, based on these costs a distinction is made between registering rural or urban land ("high potential areas").

[i] 1 Euro was equal to approximately 10.38 Ethiopian Birr at 1 January 2006 (www.oanda.com).

Method	Accuracy (m)	Cost in Birr/ha[i]	Application
Rope	Depends on skill	13.12	Most rural areas
Rope & GPS	Depends on skill	15.71	Most rural areas
GPS on corners	5 – 15	82.95	Most rural areas
High resolution satellite	1^{+}	Depends[i]	Depends on cost
Total station	1^{-}	119.95	High potential areas
DGPS	1^{-}	Unknown	High potential areas
Compass & tape	Depends on skill	292.38	Inappropriate[ii]

Table 2

Toulmin (2008) argues that *"[s]etting up a single unified system may make sense as a long-term goal, but meanwhile it may be better to establish locally tailored procedures that can be upgraded over time. Priority areas need to be identified where systematic registration can be undertaken."* Taking an approach suited for the local context is easier if the land administration is decentralized (Toulmin, 2008), as is the case in Ethiopia (Deininger, Ali, Holden, & Zevenbergen, 2008). Marquardt et al. (2006) state that *"[d]ecisions will have to be made on a case by case basis, bearing in mind that any system can be upgraded to a higher level of sophistication and accuracy as capacity, resources and needs require."*

The swift first-time land certification is being achieved by taking a very low-cost approach, without the use of ICT, and is estimated to cost around $7-28 per certificate. Compared to Madagascar ($150) and Uganda ($40) this seems to be low-cost indeed. Attention should be paid to the updating processes, and it is unlikely that the cost per transfer will fall significantly by computerizing these processes, independent of the institutional level of implementation (Deininger, Ali, Holden, & Zevenbergen, 2008).

The debate about cost recovery has been significantly changed in developing countries; the recognition that the government is responsible for the majority of the initial costs in establishing a cadastre. According to Williamson (2000), the benefits being returned to government include:

a) Development of a spatial information marketplace;
b) Subsequent dealings within the land administration system;
c) Economic development;
d) Social stability;
e) Reduced land disputes;
f) Improved environmental management.

As estimated by ELTAP, costs of a nationwide implementation would be around $25 to $30 million, which goes beyond the capacity of the Ethiopian government; therefore ELTAP suggests that donors should be found. It should be taken into consideration that:

[i] *"Cost can be brought down substantially if data (maps) can be ordered for large areas"* (Marquardt & Bekure, 2006).

[ii] Marquardt et al. (2006) explain that the use of compass and tape is *"[…] inappropriate given time, cost and skills required"*.

"While donor funds are often necessary for preparing, designing and implementing the reform, relying on them for land administration systems would impede sustainability. On the other hand, too heavy a reliance on user fees may discourage poor people to enter legal procedures, excluding them from the benefit of the law, leading to unregistered land transactions, and to a rapid obsolescence of land information systems." (EU Task Force on Land Tenure, 2004)

6 Conclusion

Numerous opportunities and complexities regarding the use of ICT for Ethiopia's land administration can be found in literature. Based on the combination of the benefits of good land administration and its computerization, and based on the related issues, as described throughout this thesis, these opportunities and complexities are summarized in Table 3 below. The complexities are categorized into "Financial", "System Requirements" and "Implementation", based on their implications.

Currently, introducing ICT into Ethiopia's land administration may be considered impossible or unwanted due to the described complexities, however it should be taken into account that:

a) these complexities may be outweighed by the opportunities described;
b) the current land administration may prove to be hard or even impossible to sustain without the benefits of ICT;
c) the government has stressed the need for improving the land administration, therefore pilot projects implementing ICT are already being carried out;
d) computers are already increasingly applied across various administrations, generally for supporting simple administrational tasks such as writing letters or creating and printing forms, thereby using only very little of the computers' valuable potential.

Taken these conclusions into consideration, the following way forward is recommended. Before a decision can be made regarding the appropriateness of the implementation and use of ICT for Ethiopia's land administration, issues concerning the necessity and finance should be researched first:

a) **Necessity**: given the increasing volume and complexity of the stored data, it is not clear whether the current paper-based administration will prove sustainable and will be able to meet the increasing future demands at all; and if it can be enhanced with other options than by introducing ICT, such as organizational change or a different archive structure.
b) **Finance**: the actual value of the benefits remains unclear, as well as the costs involved, including possibilities for cost recovery; they must be quantified before any sound decision on if, what and how to implement such a system can be made.

If the application of ICT is decided to be appropriate, implementation needs to be planned, for which the implementation issues listed in Table 3 can be a guideline. Reijswoud et al. (2008) have proposed a framework for implementing ICT in developing countries, for this process requires special attention in this context, which goes beyond the scope of this literature study. While gathering the system requirements during the implementation's design phase, the proposed system requirements (see Table 3 below) should be taken into account.

In this thesis the implications of availability of electricity, appropriate security measures, and the enforcement of women rights policies have been interpreted as implementation specific issues, each raising enough questions for a full research on its own.

Opportunities	Complexities
- Strengthen tenure security - Provide security for credit - Support land and property taxation - Manage and protect the common property resources - Reduce land disputes - Facilitate land reform - Improve urban planning and infrastructure development - Support environmental management - Force standardization in the collection and processing of land information - Decrease the cost and space required for storing land records - Prevent unnecessary duplication - Simplify the preparation of "disaster" copies of registers - Facilitate access to land-related data and improve their distribution - Reduce the time and cost involved in transferring property rights and in processing mortgages - Produce statistical data - Facilitate the monitoring and analysis of market and rental values of land and property - Provide built-in mechanisms for quality control	**Financial** - The financial costs of computerized land administration are considered to be high, although a clear overview of costs seems to be lacking. - It is suggested that the costs of land administration should be in balance with the (potential) value of the registered land; however this approach does not take into account all the possible benefits of having a digital land administration. - Due to the high costs the question arises how to appropriately balance government investments, donor funds and user fees in order to recover the costs. **System Requirements** - Ethiopia's land policies have been the subject of controversial discussion for decades and it is not unlikely these policies will be changed again in (near) future. The system should support these policy changes. - Land policies and the implementing institutional structures vary from region to region. The system should be able to support all institutions throughout all administrative divisional levels in all regions. - Future compatibility with other systems should be taken into account during the system's design process, as well as the increasing volume and complexity of data, digital sustainability, multiple data transfer options and connectivity problems. **Implementation** - The language used in the land administration varies from institution to institution. This may be an obstacle to standardization and integration of the data across institutions.[i] - When implementing, it is advised to take a phased approach; this however requires some flexibility of the system. - In order to operate, maintain and develop the system special skills are required. Some necessary skills (such as to design the system) may not be available and attention needs to be paid to proper training. - Any implementation is likely to fail if people are not aware of its benefits.

Table 3

[i] The way in which this language problem will be "solved" will likely result in language specific system requirements as well.

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