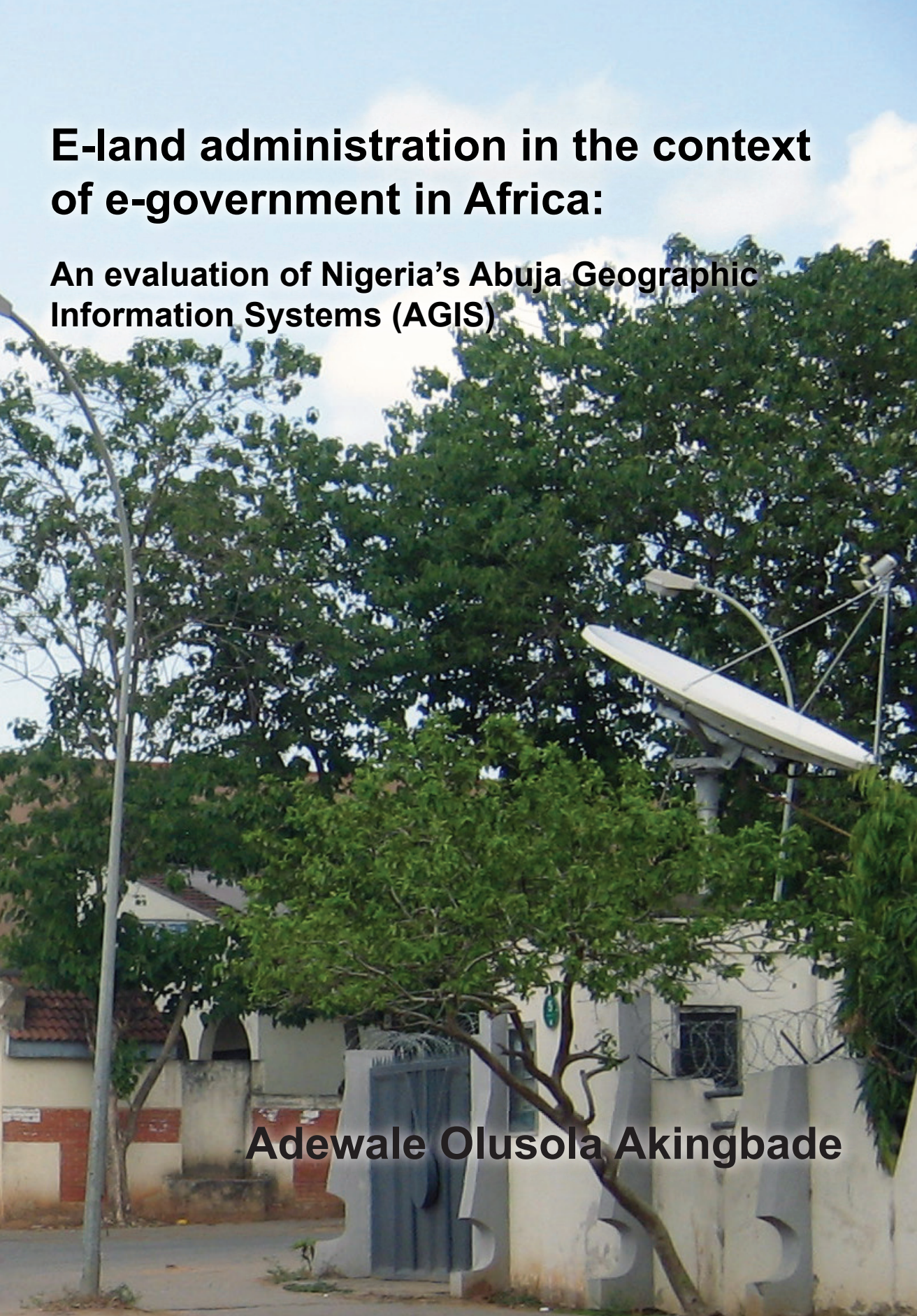
E-land administration in the context of e-government in Africa:

An evaluation of Nigeria's Abuja Geographic Information Systems (AGIS)



Adewale Olusola Akingbade

E-LAND ADMINISTRATION IN THE CONTEXT OF E-GOVERNMENT IN AFRICA: AN EVALUATION OF NIGERIA'S ABUJA GEOGRAPHIC INFORMATION SYSTEMS (AGIS)

Adewale Olusola Akingbade

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FACULTY OF GEO-INFORMATION SCIENCE AND EARTH OBSERVATION

E-LAND ADMINISTRATION IN THE CONTEXT OF E-GOVERNMENT IN AFRICA: AN EVALUATION OF NIGERIA'S ABUJA GEOGRAPHIC INFORMATION SYSTEMS (AGIS)

DISSERTATION

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by

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born on 28 April 1964

in Akure, Nigeria

This thesis is approved by

Prof.dr.ing. P.Y. Georgiadou, promoter
Prof.mr.dr.ir. J.A. Zevenbergen, promoter

To the glory of the Almighty God

and

memory of my late mother

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Chapter 1: General Introduction

1.1 Introduction

This thesis investigates how and to what extent electronic Land Administration (LA), seen as e-government policy intervention, improves public governance in Nigeria. Electronic Land Administration (hereafter referred to as e-LA) "*is a major part of e-government and can be considered as a strong fundament for legal, administrative and technological structure for the entire public administration*" (Schennach, 2004; p 1). The thesis evaluates whether endemic corruption and widespread cynicism regarding the effectiveness of land administration systems in an African context, especially in the domain of urban housing development, can be countered by means of e-LA.

E-government encompasses the integration of Information and Communication Technology (ICT) in *internal* government processes. The purpose is to *externalise* government and enable citizens, public and private sector agencies to access government services through diversified communication channels (McIver & Elmagarmid, 2002).

New ICTs and e-government in general have been hailed for their promise to solve socio-economic problems (Obijiofor, 2009), to improve the capacity of a country to respond to citizens' needs and demands (Gauld et al., 2009) and as a mechanism for government administrative reforms (Helbig et al., 2009).

"*People all over the world have high hopes that these new technologies will lead to healthier lives, greater social freedoms, increased knowledge and more productive livelihoods. […] At the same time, there is great fear of the unknown***"** (UNDP, 2001; p 1).

Geographic Information Systems (GIS), a unique kind of Information Systems (IS) with spatial reference, are now widely used with ICT to respond to citizens' needs and demands. With *GIS* it is easy to correlate and integrate different spatial datasets and gain new insights into geographic and social phenomena, because data can be collected and spatially referenced in a consistent way. Nevertheless, after about five decades of implementation of GIS and ICT in Africa (Hastings and Clark, 1991; Heeks, 2002), few researchers have attempted to quantify and qualify societal benefits from these technologies, especially in developing countries and Africa in particular. Theoretical and empirical studies on the role of geo-ICT in support of Land Administration (LA) as e-government policy intervention in Africa are non-existent.

Set against these considerations, the Abuja Geographic Information Systems (AGIS) from Nigeria was selected as a case study for three reasons. Firstly, there is dearth of empirical studies on the impacts of the use of geo-ICT in the public sector of emerging and developing economies (Akingbade et al., 2009). Secondly, AGIS is the first implementation of geo-ICT in support of LA in the public sector of Nigeria and the only implementation of geo-ICT for urban governance in sub-Sahara Africa with an implementation trajectory of almost 10 years. Thirdly, lessons from the case of AGIS can suggest whether e-government implementation, especially geo-ICT, is more likely to succeed when using domestic financial resources instead of external financial aid (see Gyimah-Brempong, 2002).

Unlike most geo-ICT projects in Africa, which are donor-funded (Hastings & Clark, 1991; Lance et al., 2012), AGIS is motivated and funded domestically, by the Federal Government of Nigeria. AGIS was established in 2003 and is in operation to-date. The significance of the AGIS initiative lies in its nature, which is to strengthen good governance by developing a digital system of cadastral records for e-LA and for the provision of geospatial data and services in the Federal Capital Territory (FCT) of Nigeria. The governments of some states within Nigeria have seen the implementation of AGIS as an example worthy of emulation in the computerisation of land and property related services and are currently at different stages in the implementation of similar projects within these Nigerian states. Hence, they can learn from an independent evaluation of AGIS.

Computerisation of cadastral and land records through GIS is recognised as a solution to the problems associated with manual land records keeping in the FCT. This is evident in the history of GIS in the FCT and can be traced back to 1979, when the need to quickly develop a computerised information system to implement the Abuja Master Plan was proposed (Jatau, 1991). All government efforts to computerise cadastral and land records in the 1980s and 1990s were described as failures. One of the factors hindering the computerisation efforts at that time was lack of political will (MFCT, 2004).

In September 2003, the then Minister of the FCT secured a Presidential approval to computerise the Cadastral and Land Registry of the FCT and the AGIS Agency was set up. The founding of AGIS was justified by the need to *electronically* solve a host of spatial problems, which were difficult to tackle with the analogue working procedures before AGIS. Some of the problems included: delays in processing of land applications, multiple allocations of plots, forgery of land documents, unauthorised land allocation and land use abuses. Thus, AGIS was meant "to provide basic and quality services which every citizen is entitled to, in a quality, fair, honest, effective and transparent manner" (AGIS, 2012). In 2008, AGIS made eight commitments to Nigerians,

including prohibiting the asking and making of additional payments or bribes. The vision of AGIS now is "to become a comprehensive, all-inclusive fool-proof and state-of-the-art computerized geospatial data infrastructure for the federal capital territory Abuja, Nigeria" (AGIS, 2012; Jibril, 2006a).

An official gazette, No. 29, Vol. 92 of 27 April 2005 authorised AGIS as an Agency "with the responsibility for the generation, management and administration of geospatial and land matters in the Federal Capital Territory". The same gazette specified that the Minister of the FCT shall be the Chairman of the AGIS Agency and subjected the Agency to the Land Use Act (1978) for the purposes of carrying out its duties.

The implementation of AGIS over time is studied and described in this thesis by integrating the global and local networks framework with the concept of supply- and demand-sides stakeholders to understand the linkages and interactions that shaped the historical trajectory of AGIS over time.

Thereafter, in the light of the anti-corruption driver for AGIS, the research moved forward to investigate the impact of AGIS on corruption in the provision of LA services and explored the ways e-LA services contribute to good governance and societal well-being. Next, an evaluation framework was developed to examine AGIS's impact on housing development in the FCT, being an important component of the foreseen Abuja Master Plan implementation. The combination of these various approaches as illustrated with Figure 2 (research framework) presents a perspective through which the societal impacts of the e-LA projects can be studied.

This thesis shows how concepts from the social sciences (other academic fields) can be applied to LA research and contributes to the emerging academic literature on geo-ICT and society, and e-government impacts. It offers practical insights into the challenges of development and use of e-LA in Africa. This is necessary because e-government and related organisational and technical concepts were developed in industrialised countries, and should not be assumed as automatically appropriate for Africa (Schuppan, 2009).

1.2 Research Background

1.2.1 Governance, good governance and e-government

The term governance became prominent in the development literature and within the international community and donor agencies in the twentieth and twenty-first centuries (Olowu, 2003; UNESCO, 2006). It is now applied in diverse contexts: global, national, institutional and community levels (Graham et al., 2003). Terms such as corporate governance (Gompers et al.,

2003) and land governance (Palmer et al., 2009) are also widely used in the literature. The perspective of this thesis to governance is a consideration of the mechanisms, processes and institutions for exercising political, economic and administrative authority, and their effects in the management of a country's affairs at different levels (Palmer et al., 2009). This thesis adopts the United Nations' definition of governance as "*the exercise of economic, political and administrative authority to manage a country's affairs at all levels. It comprises the mechanisms, processes and institutions through which citizens and groups articulate their interests, exercise their legal rights, meet their obligations and mediate their differences*" (UNESCO, 2006).

Strategies to foster good governance are ubiquitous in international development agendas (UNESCO, 2006; Weiss, 2000). Good governance aims to protect human rights, non-discriminatory laws, and equitable distribution of resources, transparent public agencies, and accountability for decisions by public officials and meaningful participation by citizens in debating public policies and choices (Weiss, 2000). Good governance also focuses on tackling of corruption and strengthening of public and corporate integrity (TI, 2009). Ciborra & Navarra (2005) pointed out that good governance in relation to developing countries is connected with implementation of good policies that will promote democracy, reduce corruption and increase transparency. Conventional prerequisites for good governance aim to prevent undue influence on democratic decision-making and criminalisation of bribing of public officials and influence-peddling (Zinnbauer, 2009).

There is no universally recognised definition of e-government, due to its dynamic nature in practice (Halchin, 2004). E-government involves the delivery of public sector data, information and services using the internet and other digital or computerised systems (Andersen & Henriksen, 2006; Azad & Faraj, 2009). International Development Agencies view the role of e-government as one of promoting good governance and e-government initiatives should be measured by the degree to which they contribute to good governance (Navarra, 2010). E-government initiatives for modernising and digitising land records aim for better administrative and workflow transparency and for curbing corruption imposed on citizens (Azad & Faraj, 2009).

The main objectives of e-government are to: "*(1) restructure administrative functions and processes; (2) overcome barriers to coordinate and cooperate within the public administration; (3) monitor government performance; and (4) improve the relationship between government and the citizens*" (Ciborra & Navarra, 2005; p 144).

This thesis conceptualises 'e-government' as the 'use of geo-ICT to arrange, nurture and enhance the interaction across the public administration, civil society and formal politics realms of governance and to promote the principles of good governance and improve societal well-being'. This operational definition accentuates the geo (geographic information) aspect, which literatures on e-government often overlook.

No consensus exists on the realisation of the role of e-government in promoting the principles of good governance and researchers may face a tough time if they are asked to show that citizens are really benefiting from the implementation of e-government in Africa. Schuppan (2009) argued that while e-government offers numerous opportunities to resolve administrative problems, it could also lead to more corruption or create additional vulnerabilities to corruption. Schuppan (2009; p 126) argued that "*e-government (in the special context of African public administrations) may run contrary to economic and political development goals*". E-government will have no value in Africa if it runs contrary to economic and political development goals of the continent. However, the transition to good governance through e-government intervention is an endeavour beyond any narrow rhetoric strategy and the pathway to good governance through e-government is not only difficult to achieve, but costly and uncertain (Navarra, 2010).

1.2.2 E-government in Africa and Nigeria

African governments have been implementing Information and Communication Technology (ICT) in the public sector for nearly half of a century. This is before such implementations were referred to as e-government (Heeks, 2002), a little known concept until recent times. The New Partnership for Africa's Development (NEPAD) stressed the relevance of ICT and remote sensing for a wide range of applications, such as environmental management, agricultural and infrastructural planning and impetus to the democratisation process and good governance in the continent (NEPAD, 2001). NEPAD started an e-Africa[1] programme to pursue cross-sector initiatives and embed ICT in all social sectors, enhance the development of e-services in Africa and make Africa digitally competitive.

The applications of ICT and (geographic) information systems are widespread in Africa today, for example in health sector reforms in South Africa and Nigeria (Heeks, 2002; Korpela et al., 2000), community information service in Burundi, Uganda, Malawi, Botswana and Tanzania (Heeks and Molla, 2009), Local Authority Integrated Financial Operations Management Systems

[1] http://nepad.org/regionalintegrationandinfrastructure/infrastructure/ict, last accessed on 11 May, 2012.

in Kenya, Natural Resource Management and Local Development in Egypt (Willard et al., 2005), the land sector of Ghana (Karikari et al, 2005) and the Web Based Database Project[2] in Egypt.

In Nigeria, e-government is considered "*…the backroom engine, which will run good governance* …" that will drive social and economic transformation (Obasanjo, 2004). In accordance with the Nigerian National Policy on Information Technology (NPIT), the National eGovernment Strategies (NeGSt) was launched in March 2004 as a Public-Private Partnership for the coordination and realisation of the e-government programmes. NeGSt aims to build infrastructure to facilitate e-government and promote activities and enhance the delivery of electronic services for the benefit of the citizens.

The NPIT announced that "*the government shall facilitate the development of the Geographical Information Systems (GIS) and its utilization with other IT facilities for urban and rural area development*". AGIS is a prime Nigeria's Federal Government's efforts to articulate this policy statement.

Projects similar to AGIS are at different levels of design and implementation by the governments of many states in Nigeria. Some examples are: Abia Land Information System, Cross River State GIS, Imo State GIS, Kaduna State Land Information System, Benue Land Information Management System, Kwara State GIS, Lagos State Digital Mapping and GIS, Nasarawa State GIS, Niger State GIS, Ogun State GIS, Ondo State GIS and Digital Mapping, Osun State Aerial Mapping and Geospatial/Land Information System and Plateau State GIS.

Ifinedo (2006) observed that the Nigerian government adopted favourable reforms and economic policies such as the deregulation and liberalisation of the telecommunication sector, which can foster e-government implementation. The launch of Nigeria Communication Satellite (NigComSat-1R)[3] in December 2011 can boost the progress of e-government in Nigeria. One of the most recent e-government interventions in Nigeria is an electronic cashless policy introduced by the Central Bank of Nigeria to ensure that banking services reach all citizens (especially in the rural areas, where 78.8% of the population are largely unbanked[4]), to offer a platform for economic integration and reduce risk of doing business in Nigeria. Nevertheless, "*progress occurred on the ICT and e-government fronts in Nigeria only when the President of Nigeria [personally] supported such causes*" (Ifinedo, 2006; p 12).

[2] http://www.esrs.wmich.edu/Egypt.htm, last accessed on 11 May, 2012.
[3] http://nigcomsat.com/, last accessed on 16 April, 2012.
[4] http://www.cpn.gov.ng/index.php?page=shownws&id=20, last accessed on 12 May 2012.

1.2.3 Land administration systems and electronic land administration

Land administration (LA) encompasses "public sector activities required to support the alienation, development, use, valuation, and transfer of land" (Dale & McLaughlin, 1999, p 1). LA Systems (LAS) provide the foundation for implementing land related policies and land management strategies to deal with challenges of social equity, poverty alleviation, reduction of corruption, economic growth, environmental protection and sustainable management of rapidly growing cities (van der Molen and Tuladhar, 2006; Williamson et al., 2010b). LAS combine institutions and technology. Institutions reduce uncertainties in society (North, 1990) and provide a structure for interactions in the development of LAS. Technology in general and especially geo-ICT offer opportunities to improve efficiency of LAS and spatially enable land issues (Williamson et al., 2006).

The growth of Internet and Web technologies in the 1990s facilitated the development of electronically-enabled LAS. Online access to cadastral maps and data became possible, with digital delivery of cadastral data and e-conveyancing (Williamson et al., 2006). Specifically, the development of graphics on the Web in 1994 led to a definition of e-LA as the transformation of LA through the use of ICT (Aldrich et al., 2002; Williamson et al., 2010a). Improvements in data base management systems and modelling, and more precise (terrestrial and satellite) positioning systems were thought to improve the quality, cost effectiveness, performance and maintainability of cadastral systems (Lemmen & Oosterom, 2002).

The integration of GIS into LA has important implications for the development of LAS to support e-government (Enemark et al., 2005). GIS are essential prerequisite for the efficient management of land (Karikari et al., 2005), land tenure, land value, land use and land development (Enemark et al., 2010).

In the context of e-government, in addition to e-LA's contribution to realisation of the objectives of good governance, e-LA should also meet and synchronise specific organisational and individual citizen's expectations. A citizen-focused approach needs to be continuously emphasised in the development of e-LA (Williamson et al., 2010a). Accordingly, Geographic Information Science (GIScience) and LA researchers have to provide more empirical evidence on real impacts of implementation of GIS and e-LA on the citizens.

1.3 Evaluation of IS, e-LA and e-Government: Problem statement

Evaluation is a natural activity for human beings. We carry out evaluative activities on a daily basis at home and at work. Evaluation can also be complex, for example to judge effectiveness of social interventions (Owen & Rogers, 2006) or to gauge how well a project meets expectations and objectives (Hirschheim & Smithson, 1999). This can be achieved by quantitative and/or qualitative means (Dehlin & Olofsson, 2008). The Organisation for Economic Co-operation and Development (OECD) defines evaluation as

"*an assessment, as systematic and objective as possible, of an on-going or completed project, programme or policy, its design, implementation and results. The aim is to determine the relevance and fulfilment of objectives, developmental efficiency, effectiveness, impact and sustainability*" (OECD, 1991; p 5).

The goals of evaluation are to improve policy, programmes and projects through lesson learning, to provide basis for accountability including the provision of information to the public and to find logical explanations and causal linkages (OECD, 1991; Steudler, 2004). The LA research community considered benchmarking (BMK) and cost-benefit analysis (CBA) as evaluation frameworks (Steudler & Williamson, 2002). Camp (1989) cited in (Kaufmann, 2002; p9) defined BMK as "*the continuous process to measure products, services and practices against the strongest competitor or the companies considered as market leaders*". BMK gives attention to collection of performance indicators and use of quantitative techniques, which give impression of accuracy and thoroughness, but often lead to misjudgement of value of Land Information System (LIS) (Steudler, 2004). CBA is commonly used for the evaluation of LIS to determine whether investment in LIS is worthwhile (Dale & McLaughlin, 1988) and to analyse investment in GIS by LA organisations (Karikari & Stillwell, 2005).

Steudler et al. (2004) provided a generic evaluation framework, which considered five possible areas of evaluation of LAS: policy level, management level, operational level, external factors and review process. They suggested possible aspects of evaluation and indicators, which relate to productivity. However, Mitchell et al. (2008) observed that performance indicators used in LA projects in Ghana, Indonesia and Laos failed to state the magnitude of indicators such as 'reduction in land disputes' and noted that it is difficult to confirm improvements such as increase in household's income.

Existing IS (including GIS) and LA evaluation approaches have little meaning in the public sector, because the concepts of value, BMK and CBA and productivity are very complex to define in the public sector environment (Jones, 2008). In the GIScience community, research attention to societal well-being aspect of GIS is minimal, especially in emerging and developing economies (Akingbade et al., 2009). The awareness on the need for more research attention to broader societal impacts of geo-information is now greater than ever (Fullen, 2003; Newton et al., 2009). Reviewing GIScience research literature, Elwood (2010; p 354) observed that "*the societal impacts of geographic information technologies have largely been viewed through dialectics of utopia and dystopia, of hope and fear, articulated around concepts such as order, control, surveillance, rationality, and (supposed) transparency*".

Most IS evaluations also concentrated more on the technical than the social aspects of the system, because of the difficulty in evaluating social aspects (Hirschheim and Smithson, 1999). Consequently, "*we tend to spend more and more time and use even more refined technological tools for solving the wrong problem more precisely*" (Bjøm-Andersen, 1984; cited in Hirschheim & Smithson, 1999; p 402). However, the IS and e-government research communities have covered more theoretical and empirical grounds in the study of social implications of IS and e-government implementation in developing countries (De', 2005, 2006; Heeks, 2002; Heeks & Molla, 2009; Prakash & De', 2007). Yet, there are concerns that e-government research lacks theoretical rigour, while a 'hunt and peck' approach to literature review dominates current studies (Heeks & Bailur, 2007).

The implementation of IS in the public sectors of developing countries faces many challenges, and generally have a poor record of success (Qureshi, 2005). Then, there is a need to understand why few e-government projects progress to success while the majority ends in failure (Heeks & Stanforth, 2007). Although, it is difficult to demonstrate that formal evaluation methods work well when evaluating e-government and IS (Irani et al., 2005), the formal methods tend to prevail and there is a paucity of interpretive evaluation approaches in the literature (Jones, 2008).

IS are not non-deterministic; they have social meanings and should be evaluated through a phenomenological approach. A deeper understanding of the nature and the process of IS evaluation, through an interpretive perspective provides a more fruitful basis to understand IS and its evaluation (Hirschheim & Smithson, 1999). Irani et al. (2005) emphasised that many e-government decisions are political and its evaluation is always subjective and suggested interpretive user assessments in evaluating e-government investments.

There is a recognition that a more focused approach is needed to ensure that citizens derive true benefits from e-government projects. A host of aspects relating to society-wide critical issues in developing countries (Walsham et al., 2007) have hitherto been neglected. The aspects include demand-side impacts; socio-economic benefits of the e-government projects; motivation and active participation of stakeholders; considerations of societal values, beliefs and political factors and historical trajectory of e-government implementation. Researches on e-government are not considering these important perspectives (Helbig et al., 2009) and the demand-side assessments have been relatively unexplored (Reddick, 2005). However, there are some studies in which issues of long-term impacts on human development have been raised (De', 2006; Harris et al., 2003; Madon, 2004; Prakash & De', 2007). Notwithstanding, there is still a weak academic/scholarly link between e-LA (as a major part of e-government) and socio-economic progress in Africa. The link can be strengthened by carrying out thorough, empirically grounded interpretive studies.

Finally, LA is essentially about good governance (Williamson et al., 2010b). Therefore, e-LA should be evaluated on the basis of the extent to which the systems contribute to good governance. The aim of e-LA should be "*to protect the property rights of individuals and enterprises as well as of the state by introducing such principles as transparency, accountability, rule of law, equity, participation and effectiveness into land-related public sector management*" (Zakout et al., 2006; p 3). This thesis proceeds to make a case study of an e-LA implementation in Nigeria, Africa's most populous country and its second largest economy[5].

1.4 Research aim, objectives and questions

1.4.1 Research aim

The aim of this research is to evaluate the societal impacts of the implementation of e-Land Administration in the context of e-government in Africa through a case study of Nigeria's Abuja Geographic Information Systems (AGIS).

[5] The New York Times: http://topics.nytimes.com/top/news/international/countriesandterritories/nigeria/index.html, accessed on 01 May 2012.

1.4.2 Research objectives and questions

Objective 1

To propose a series of considerations to develop a '*lens*' for analysing Geographic Information Systems (GIS) impact issues as reported in academic literature published between 1998 and 2008.

Main research question

1. To which extent are existing approaches in the IS, public administration and e-government literatures suitable for the evaluation of the implementation of GIS in the public sector?

Sub research questions

(a) Which evaluation approaches are available in the IS, GIS and e-government evaluation literatures and how can they be systematically characterised and classified?
(b) How relevant are these frameworks for evaluating the impact of GIS in governmental and non-governmental organisations as a development intervention?
(c) Which approach can be adopted to classify GIS impact issues from the literature?
(d) What is the contemporary aspect of attention in GIS impact research, which aspects need more research attention and what are the research implications of the findings?

Objective 2

To analytically trace the historical trajectory of Abuja Geographic Information Systems (AGIS) for the benefit of its stakeholders and other GIS initiatives evolving within Nigeria, and Africa in general.

Main research question

2. How did AGIS become what it is now?

Sub research questions

(a) How has AGIS over time been able to build and maintain a supply-side network that provides resources in the expectation of an ultimate return?

(b) How has AGIS over time been able to build a demand-side network that will ultimately offer economic and social returns to actors lodged in the supply-side and demand-side networks?

(c) How has AGIS over time been able to impose itself as the obligatory point of passage (OPP) between the two networks?

(d) Which insights can be gained from the history of AGIS that can improve the success rate of similar projects in other locations, particularly in Nigeria and other parts of Africa?

Objective 3
To ascertain the impact of AGIS on corruption in the provision of land administration services in the Federal Capital Territory (FCT) of Nigeria and explore how e-land administration services contribute to good governance and societal well-being.

Main research question
3. Does automation reduce corruption in the provision of land administration services?

Sub research questions
(a) How does AGIS support land administration services in the FCT of Nigeria?

(b) Which forms of corruption in the provision of land and property related services in the FCT of Nigeria do AGIS intends to reduce?

(c) How has AGIS reduced the various forms of corruption in the provision of land administration services in the FCT of Nigeria?

(d) How to evaluate the contribution of AGIS to society well-being from the perspective of the services supported with geo-ICT?

Objective 4
To examine how AGIS delivers on the theoretical promise of e-land administration for urban housing development in the FCT, Abuja, Nigeria.

Main research question
4. How is AGIS supporting housing development in the FCT of Nigeria?

Sub research questions
(a) What are the theoretical promises of e-land administration for urban housing development?

(b) How do we logically evaluate the role of e-land administration in urban housing development?

(c) To which extent are the expected results realised through AGIS and why are there differences between the expected results and realised outcomes, if any difference exists?

(d) Which strategies can be adopted to lessen the differences between the expected results and realised outcomes?

1.5 The research focus and framework

This research begins with a methodical review and analysis of IS, GIS, ICT, LA and e-government academic literatures. The review provides the background for the research and indicates the need to pay attention to the societal impact of geo-ICT. After the review, the historical trajectory of AGIS is traced to provide credible and useful evidence to improve the implementation of similar projects in Africa through lesson learning. The research then moves to investigate the impacts of AGIS on societal-wide critical issue of corruption in the provision of LA services and link between e-LA and housing development in the FCT.

The implementation of e-LA in the context of e-government encompasses complex interactions and the implementation does not originate from a neutral source of innovation. Rather, it is born into social, economic and technical relations that are already in place, grows in the milieu of the relations that emerges in the course of the implementation and paybacks the stakeholders equally or unequally and fairly or unfairly (Bijker & Law, 1992). Therefore, tracing the historical trajectory of AGIS is necessary to understand the complex interactions associated with the implementation of e-government projects (Sarker et al., 2006). The outcome of historical trajectory in evaluation research is lesson learning: to provide a good knowledge of e-government in a specific context and to offer lessons that can be applied to e-government efforts in other places (Jaeger & Thompson, 2003).

AGIS is evaluated on its effects on corruption in the provision of LA services for three reasons. Firstly, the Transparency International (TI) Corruption Perceptions Index[6] (CPI), which measures the perceived levels of public sector corruption around the world, indicates that public sector corruption is seen as endemic in Africa. For example, merely three African countries score up to 5 out of 10 (very clean) in the TI 2009 CPI and only Botswana, Cape Verde, Mauritius and Rwanda score above 5 in the TI 2011 CPI. Observe that countries confronting pervasive public sector corruption are also suffering from a corrupt land sector (TI-FAO, 2011a). Secondly, high levels of corruption in the land sector lower growth, investment, development and agricultural output (TI-FAO, 2011b). Thirdly, the well-being of the majority of citizens in African countries can be enhanced and desired economic performance can be achieved by reducing corruption (Gyimah-Brempong, 2002). In Nigeria, President Goodluck Jonathan emphasised that "… *the fight against corruption would be pursued with great vigour*" (Ikuomola, 2010). The need to fight corruption is also realised by the civil society and individual citizens in Nigeria. Figure 1 shows a town hall meeting with the theme:

[6] http://cpi.transparency.org/cpi2011/, last accessed on 29 April 2012.

"*Endemic Corruption: The bane of Good Governance*" held in Lagos, Nigeria in January 2012 and citizens' anti-corruption campaign.

Figure 1: Citizens' coalition against corruption in Nigeria[7]

The focus on housing is based on two reasons. The first reason is that the Abuja Master Plan developed by the International Planning Associates in 1979 stressed that *housing represents the most basic of human needs* and has a profound impact on the health, welfare, and productivity of citizens. The Abuja residents will judge the City not only on how the organisation of the City matches their everyday needs, but also on *how their demand for housing is met* (COHRE-SERAC, 2008). The second reason is the provision in Chapter II, Section 16 (2d) of the 1999 Constitution of Nigeria that the State shall direct its policy towards *ensuring suitable and adequate shelter for all citizens*.

The overall perspective of this thesis to the evaluation of societal impact of AGIS as e-government intervention in Africa is illustrated with Figure 2.

[7] Image sources: http://m.saharareporters.com/gallery/photonews-save-nigeria-group-pushes-ahead-occupynigeria-movement-way-townhall-meeting and http://29.media.tumblr.com/tumblr_m0dlsg6Gvg1row2d3o1_500.png, last accessed on 23 March 2012.

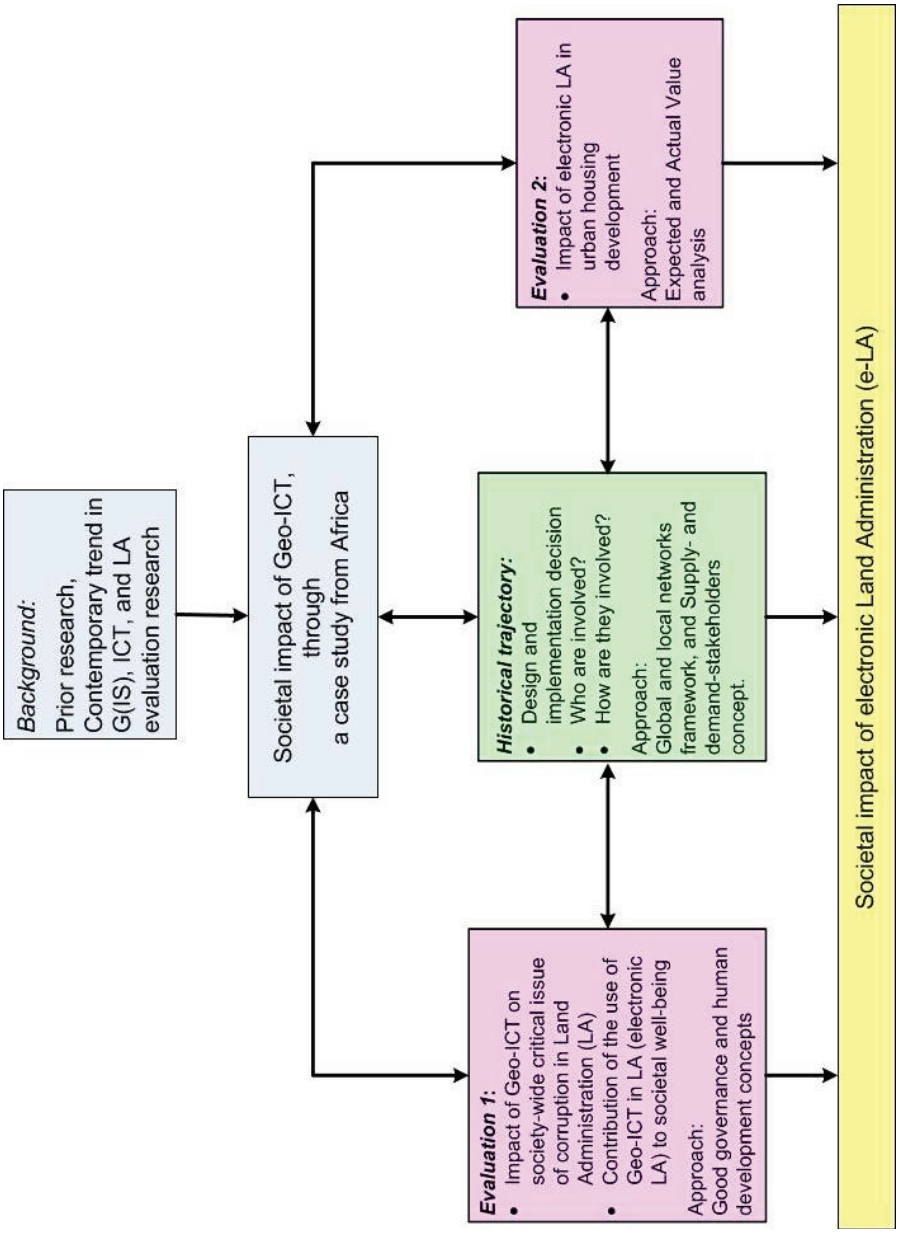

Figure 2: Research framework

The double-headed arrows in Figure 2 are used to indicate that the historical trajectory and two evaluations (Evaluation 1 and Evaluation 2) are linked together to give a distinct, but integrated view of societal impact of e-LA as e-government initiative for promoting good governance in the case study.

On the left in Figure 2 is Evaluation 1 to reveal a socio-economic impact of e-LA in the context of e-government. E-government can help to reduce corruptible human intervention, for example, businesses which can find bid and tender details on the Web will not need to bribe an intermediary to get tender information and transactions, and automated auction e-procurement sites can remove payment of kickback to secure selection (Heeks, 2004). However, Heeks (2004) cautioned that ICTs are no magic solution to sub-standard behaviour in government. While e-government can reduce the opportunities for corruption, it can also open new corruption opportunities for self-seeking behaviours (Wescott, 2001). Wescott (2001; p 3) argues that "*in a sense, ICT permits an intergenerational shift in corruption and rent seeking*". The research of Reddick (2004; p 61) concluded that e-government has not revolutionised the way government functions. Therefore, this thesis examines the ways in which AGIS fundamentally affected corrupt practices in the provision of LA services offered by the Federal Capital Territory Administration (FCTA) of Nigeria.

On the right side in Figure 2 is Evaluation 2 to reveal once more a socio-economic impact of e-LA in the context of e-government. E-LA offers some theoretical promises in urban housing development and can spatially enable urban governments and citizens to meet the challenges of urban housing. The Actual Value of AGIS in housing development in Abuja is evaluated with respect to theoretical promises, referred to as Expected Value of e-LA. The evaluation enunciates the reasons for differences between the expected outcomes and actual outcomes in terms of Institutions, Organisation and human resources, Infrastructures and Finance.

1.6 Methods and context

1.6.1 Methods

This thesis follows an interpretive research philosophy. The foremost principle of the interpretive philosophy is that "*people, and the physical and social artefacts that they create, are fundamentally different from the physical reality examined by natural science. Unlike atoms, molecules, and electrons, people create and attach their own meanings to the world around them and to the behavior that they manifest in that world*" (Schutz, 1973; p 59; cited in Lee, 1991; p 347). This epitomises the judgment that one's comprehension of reality is a social construction by human actors (Walsham, 1995). The interpretive school of thought allows the collection of evidences describing the purely objective, clearly observable features of human behaviour and the subjective meaning of human behaviour (Lee, 1991). This is achieved in this research through a case study methodology to explain the

complex presumed causal links between AGIS, LA and societal impacts in the FCT of Nigeria.

The interactions in the implementation of e-LA are social realities and can only be interpreted. While recognising the positivist belief in relatively orderly interaction, the case study methodology allows researchers to study the reality as a social construction. The literature and previous evaluation studies for example, Serafeimidis & Smithson (2003) and Yin (2003) favour the use of the case study methodology for the evaluation of IS and public interventions. The methodology supports the investigation of issues concerning the context, social processes of evaluation and subjective meanings attributed to these processes by stakeholders (Serafeimidis & Smithson (2003). Ciborra & Navarra (2005) also studied e-government initiatives within the context of Jordanian public administration in its natural setting with the case study methodology. They observed that other methods of research would have said little about how to evaluate the developmental impact of the Jordanian e-government initiatives. Adopting the case study methodology to study LAS in Switzerland, Sweden, Latvia and Lithuania, Steudler (2004) remarked that the methodology provided a valuable test for his evaluation framework.

It is however worthy of note that this research encompasses surveys. The case study methodology does not object to this approach, rather, it accommodates the use of multiple sources of evidence. This is perhaps the most important advantage derived from the use of the methodology for this research, because the multiple sources of evidences allow the corroboration of evidence from at least three sources (Akingbade, 2005) in each aspect of the empirical study presented in Chapters 3, 4 and 5. This is imperative to manage misinformation and misinterpretations and reach better and well informed conclusions.

The modest ingenuity of case study methodology as applied in this research is from a perspective of '*contributing elements'*. The contributing elements are groundwork, primary data, secondary data, analysis and presentation of results. The contributing elements are presented in Table 1.

Table 1: AGIS' case study research methods

Contributing element	Source	Description
Groundwork (base)	Literature survey, review and analysis. Research skills.	Study of books and scholarly articles on research methodology, e-government, IS and IT, GIS, LIS and program evaluation. Acquisition of skills on: (i) *Information Management Research Methodologies* from Center for Economic Research (CentER) and Erasmus Research Institute of Management, (ii) *Case Study* and *Interviewing* from Doctoral programme in Organization and Management Education (DOME), (iii) *Land Governance* from Training and Capacity Building Branch, United Nations Human Settlement Programme, Kwame Nkrumah University of Science and Technology and Faculty of Geo-Information Science and Earth Observation (ITC) of the University of Twente and (iv) *Scientific Writing* from ITC.
Primary data	Interviews	Semi-structured interviews across supply- and demand-sides networks at different (management, middle and operational) levels in AGIS, Federal Mortgage Bank, ASO Savings PLC, National eGovernment Strategies (NeGSt) and other private companies, and individual citizens.
	Surveys	Four sets of surveys to: (i) discover how AGIS actors perceive corruption in LA and to find out forms of corruption in LA prior to AGIS; (ii) explore causative factors of corruption in LA and impact of AGIS on identified corrupt practices; (iii) investigate the impact of AGIS on corruption in the delivery of land and property related services in the FCT and (iv) ascertain the impact of AGIS' e-LA on housing development in the FCT.
	Direct observation	Direct observation and photographing of processes, technology and people at work in AGIS: from the reception desks and waiting hall to back offices.
Secondary data	Documents	Laws, acts and official gazettes of the Federal Republic of Nigeria, briefs, reports and terms of reference (TOR) of the AGIS project, and extracts from national newspapers.
	Archival records	Digital and hard copy maps, guidelines and procedures, rates, revenue generation, workflows and old photographs.
	Physical artefacts	Hardware, software, computer networks and the office premises (AGIS' building, parking space and waiting room).
Analysis	Primary and secondary data	Transcribing, coding and précis in Tables. Data triangulation, spreadsheet analysis and ranking of survey opinions. Review and qualitative analysis of interviews.
Presentation of results (communication of research findings)	Academia	Publications in Journals: Nordic Journal of Surveying and Real Estate Research, Habitat International, Survey Review and Computers Environment and Urban Systems.
	Practitioners	Presentation of results at conferences: (i) 9th AfricaGIS Conference 26-30 October 2009, Kampala, Uganda; (ii) ICT and Development - Research Voices from Africa. International Federation for Information Processing (IFIP), Technical Commission 9 – Relationship Between Computers and Society. Workshop at Makerere University, Uganda. 22-23 March 2010; (iii) International Federation of Surveyors (FIG) 2013, Abuja, Nigeria (proposed); (iv) Submission of research findings (copy of thesis) to AGIS and the Federal Capital Territory Administration (proposed).

The roles of the contributing elements vary with each research question. This is summarised in Table 2. However, it suffices to state that literature review and analysis are carried out to answer all the research questions. The first research question is answered solely through literature review and analysis. The contributing elements are broken down in Table 2 to show the methods adopted to answer each research question.

Table 2: Research methods for the four research questions

	AGIS case study research methods and sources of data									
	Base	Primary sources			Secondary sources			Analysis		
Objective/ Research question	Liter-ature review	Interv-iews	Surveys: Question-naires	Direct obser-vation	Docu-ments	Archival records	Physical artefacts	Transcrib-ing, Coding and Précis	Spread-sheet analysis	Data triang-ulation
1	✓				✓					
2	✓	✓		✓	✓	✓	✓	✓		✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

1.6.2 Study area: Federal Capital Territory of Nigeria

Nigeria is located along the Western coast of Africa. The country is a Federation consisting of 36 States with 768 Local Government Areas and a Federal Capital Territory (FCT) (FGN, 1999). The FCT Act of 1976 established the FCT. The establishment of the FCT is an implementation of the report of the Capital Relocation Committee set up by the Federal Government of Nigeria (Jatau, 1991). The committee reported that Lagos, the former capital city of Nigeria can no longer perform effectively the dual role of Federal and State Capital, due to several reasons, among which is inadequate land space for development. The physical development of the Federal Capital City, Abuja began in the early 1980s after the approval of the Abuja Master Plan by the Federal Government and the capital was finally moved from Lagos to Abuja in 1991 (Jibril, 2006b).

The FCT is located in the central part of the country, as shown in Figure 3 (AGIS sample map). While the capital city covers about 250 km^2, the whole FCT has a land area of approximately 8,000 km^2. The FCT is made up of six area councils and the Federal Capital City, with a population of about 1,406,239 (NPC, 2010). The area councils are Abaji, Abuja Municipal, Bwari, Gwagwalada, Kuje and Kwali. The map in Figure 4 shows the six area councils and the four phases of the Federal Capital City.

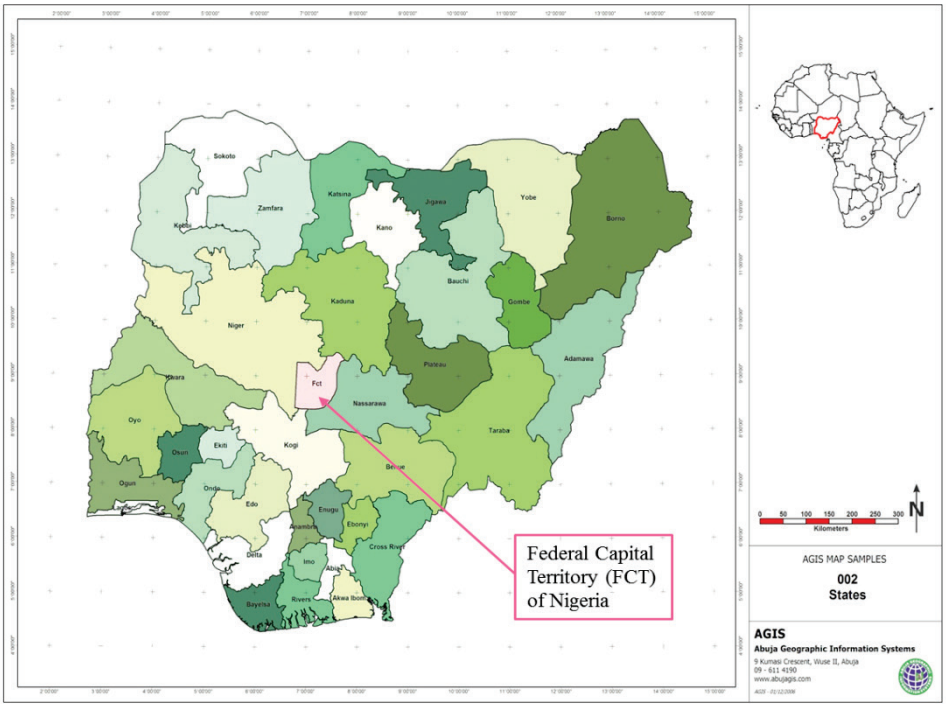

Figure 3: Location of the Federal Capital Territory (FCT) in Nigeria, Image Source: AGIS Map 2006[8]

The President of the Federal Republic of Nigeria nominates a Minister to administer the FCT who will occupy office of the Minister with the confirmation of the Senate of the National Assembly of Nigeria. The Minister is the overall political head of all government departments and agencies under the Federal Capital Territory Administration (FCTA). The FCTA was set up in December 2004 after the scrapping of the Ministry of the Federal Capital Territory.

[8] The map originally drawn on a scale of 1:5,000,000 is one of the geospatial data produced by AGIS.

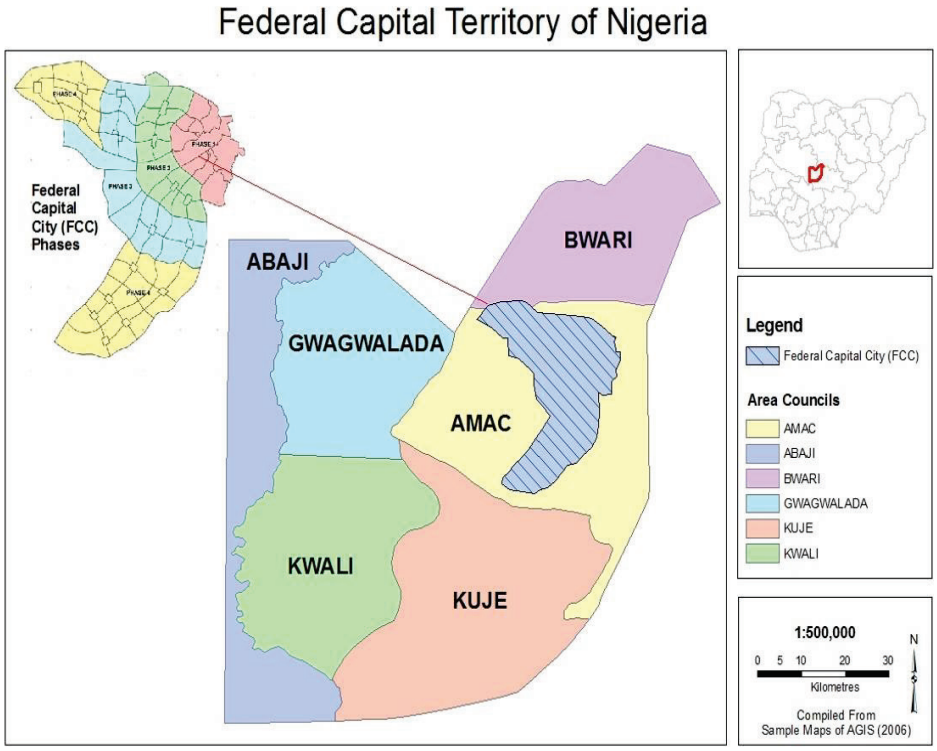

Figure 4: Federal Capital City and the Area Councils of the FCT

1.6.3 Land Administration in the FCT

The term LA is used in this case study of AGIS to refer to the processes of recording and disseminating information about the ownership, value and use of land and its associated resources. The processes include the determination of rights and other attributes of land, survey and description of land, provision of authoritative land information to support reduction of corruption, security of tenure, access to land and housing, and other goals that can enhance individual and collective well-being of the people of the FCT, Abuja, Nigeria (UN-ECE, 1996; Enemark et al., 2010). The application of geo-information and communication technology to support the processes required for administration and use of land is referred to as e-Land Administration.

The land use decree promulgated in 1978 is one of the military decrees entrenched in the Nigerian constitution. The decree is now known as the Land Use Act (LUA) Cap.202 (Laws of the Federation of Nigeria), 1990. The LUA is the major standard (Bowker & Star, 2000) that shapes administration and use of land in the FCT and Nigeria. The LUA vests all land comprised in the territory of each State (except land vested in the Federal Government or its agencies) solely in the Governor of the State, who holds the land in *trust* for

the *use and common benefit* of all Nigerians. The Governor of a State grants statutory rights of occupancy to individual citizens and groups and issues a certificate of occupancy in evidence of such right of occupancy. The LUA prohibits the alienation of statutory right of occupancy issued in evidence of land allocated by the Minister of the FCT, without the consent of the Minister (and Governor for States).

The LUA seeks to ensure equity, fairness and justice in the use of land for common benefit of all Nigerians.
"This ideal cannot be achieved without adequate and efficient land administration tools. One of those tools of course is a reliable and up-to-date land records. All the Land related departments of the Federal Capital Development Authority (FCDA) and the Federal Capital Territory Administration (FCTA) have been maintaining manual record keeping right from inception […] This has been a serious limitation on good governance within the FCT".

-http://www.abujagis.com/aboutabuja.html[9]

It is essential to state that the FCT Act 1976 vests all the land in the FCT in the Federal Government. In essence, the President of the Federal Republic of Nigeria holds the powers to administer land in the FCT. The Minister of the FCT acts on delegated powers of the President by the virtue of Section 18 of the FCT Act and Section 148 (1) of the 1999 Constitution. Under the delegated powers of the President, the Minister is directly responsible for the management and use of land in the FCT and he/she is the only person that has the authority to allocate land and grant statutory right of occupancy in the FCT.

1.7 Structure of the thesis

This thesis has six chapters, including this introductory chapter as depicted in Figure 5. Chapters 2 to 5 converge to evaluate the impact of AGIS on good governance and societal well-being in the FCT. Chapter 6 sums up the impacts and ends the thesis.

Chapter 2 answers research question one through a review and analysis of the literature on the impact of GIS in public sector. The chapter categorises the impacts of GIS in a taxonomy that designates GIS contributions to efficiency, effectiveness and societal well-being. The trend of GIS impact research efforts in terms of research philosophies, methodologies and geographic focus is also delved into in the second chapter. The chapter suggests that the appropriate use of theories, concepts and testing of

[9] Accessed on 15 August 2010

existing GIS evaluation frameworks could serve as building blocks for more rigorous studies on the impact of GIS. As shown in Figure 2 and subsection 1.5 (research focus and framework), research findings from Chapter 2 reinforce the need to focus on the societal impact of geo-ICT in emerging and developing economies and to draw a case study from Africa.

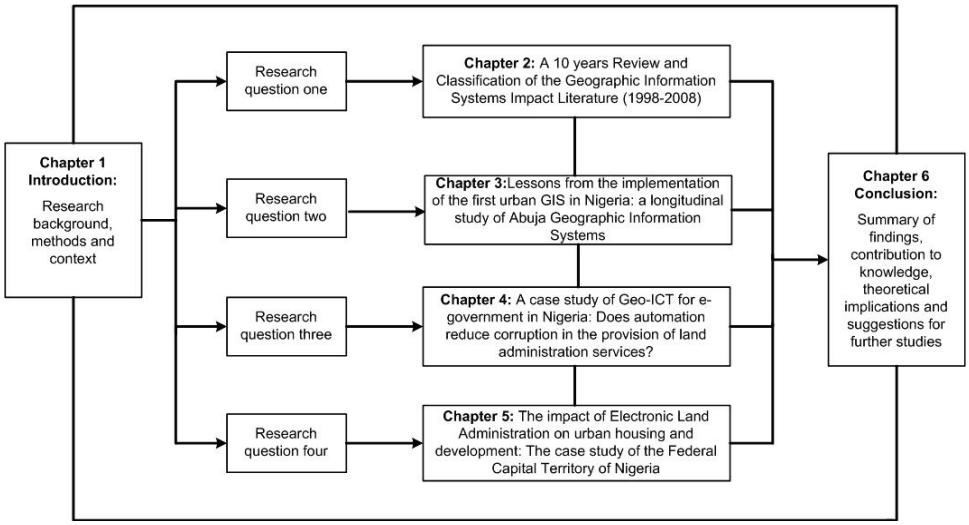

Figure 5: Structure of the thesis

Chapter 3 traces the historical trajectory of AGIS and examines AGIS from 2003 to 2009 by analysing the ways in which social, economic and political environment shaped the implementation of the project in terms of the degree of attachment of supply-side stakeholders and the degree of mobilisation of demand-side stakeholders. The analysis typifies the uncertainties surrounding the implementation of geo-ICT in Africa, where most of the projects end up as either total or partial failures.

Chapter 4 examines the role of AGIS as an e-government policy intervention for promoting good governance and the reduction of corruption in the provision of LA services in the FCT of Nigeria. Some concepts of good governance and human development provide the theoretical background to explore the contribution of e-LA services to societal well-being. The chapter reveals that corruption was reduced in the provision of some e-LA services in the FCT and one form of corruption became persistent and increasing.

Chapter 5 completes the empirical study of AGIS with a conceptual analysis of differences between the expected and actual value of AGIS in housing development in the FCT. The analysis is situated in the context of e-LA as an e-government policy intervention for urban housing development. The chapter clearly shows that the overall impact of AGIS on housing

development in the FCT is below expectation due to hindrances traceable to Land Use and National Housing Acts, inequitable access to land, inconsistent resettlement policy, poor community participation and financial misconducts.

Chapter 6 gives an overview of the thesis, summarises the research findings, deliberates on the findings and presents its theoretical and empirical implications. This final chapter also offers general recommendations and makes suggestions for further academic research, with an overall conclusion that emphasises the thesis' contribution to knowledge.

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Chapter 2: A 10 years Review and Classification of the Geographic Information Systems Impact Literature (1998-2008)

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A 10 years Review and Classification of the Geographic Information Systems Impact Literature (1998-2008)

Abstract

Our objective in this paper is to review the literature on the impact of geographic information systems (GIS) in governmental and non-governmental organizations by analyzing 53 articles published between 1998 and 2008. The impacts of GIS are categorized in a taxonomy which designates GIS contributions to efficiency, effectiveness and societal well-being. According to this taxonomy, 38 articles are examined in-depth and their results reported. The focus of GIS impact research efforts in terms of research philosophies, methodologies and geographic focus is also presented. We suggest that the appropriate use of theories, concepts and testing of existing GIS evaluation frameworks could serve as building blocks for more rigorous studies on the impact of GIS, including Land Information Systems (LIS) and Spatial Data Infrastructure (SDI).

Key words: GIS, evaluation.

2.1 Introduction

The aim of this paper is to propose a series of considerations which may serve as a '*lens*' for looking at GIS impact issues as reported in the academic literature published between 1998 and 2008. Our goal is to review the impact literature on GIS and ascertain the 'level of attention' paid to the categories designated in terms of GIS contributions to efficiency, effectiveness and societal well-being. In particular, we aim to extend the work of Nedović-Budić (1998) by providing a 10 years review and classification of the GIS impact literature as reflected in articles published until 2008 in five academic journals. The journals are Environment and Planning B: Planning and Design, International Journal of Geographical Information Science, Urban and Regional Information Systems Association Journal, Transactions in GIS and Land Use Policy. We also show in the appendixes to this paper the focus of GIS impact research efforts in terms of research philosophies, methodologies and geographic focus.

Nedović-Budić (1998) reviewed the impact of GIS technology between 1990 and 1998 in planning agencies and local governments in United States of America (USA), United Kingdom (UK) and Scandinavia. According to Nedović-Budić (1998; p 683) consideration for the societal impact of GIS is important "because the ultimate goal of all technologies introduced in public sector agencies is to benefit society". Nedović-Budić's (1998) research revealed mixed outcomes and conflicting empirical findings. For example, GIS had both positive and negative effects on society and it was also found that GIS

could intensify existing societal problems. In the midst of these mixed indicators and contradictory findings, the need to explicitly address the role of GIS in their social context was recognized, especially with respect to the social implications of GIS.

The rest of this paper is as follows. In the next section, we delineate our methodology; thereafter we discuss the nature of impact of GIS and degree of attention to GIS impact research. From prior literature, we offer an approach to classify GIS impact literature based on similarities of impact issues and present a review of literature on impacts of GIS. The penultimate section analyses and discusses our findings and outlines a classification of GIS impacts based on the literature reviewed followed by the conclusions and suggestions for future research.

2.2 Methods of survey of GIS impact literature

This section provides a concise discussion on the methods and techniques used and how these were applied in this paper. The initial technique consisted in a review and characterization of the literature, providing the foundation for our research through an output that enabled us to categorize reported impacts of GIS in the literature. Next, we examined the titles of 1,840 articles in all issues and volumes of the journals from January 1998 to July 2008. From the examination of titles, we selected 53 articles, which address GIS use and impacts. After a review of the abstracts, introduction and conclusion of the 53 pre-selected articles; we restricted our sample to 38 articles, which documented GIS impacts in governmental and non-governmental organizations mainly from primary sources of evidence. We conducted an in depth study and content analysis of the 38 articles, and assessed each of the articles reported contribution and attention to the taxonomic designations of efficiency, effectiveness and societal well-being.

The last step was to conduct a thorough examination and sensible interpretation of the results of the 38 articles selected for this literature review. The seven techniques used for this literature review are summarized in table 1. We define the techniques before the literature review to reduce subjective factors to a minimum and apply a replicable methodology for the review and classification GIS impacts.

Table 1: Summary of literature review methodology

No.	Technique	Description	Output
1	Literature review and characterization.	Study of academic literature on impacts of information systems, information technology and geographic/land information systems (G/LIS) for a scheme to catalogue G/LIS impacts.	An approach to categorize reported impacts of G/LIS.
2	Capturing of orientation of journals.	Survey of scope and focus of scholarly journals emphasizing G/LIS research to identify journals that report GIS use and impact issues.	Candidate journals. (Academic research outlets to explore for G/LIS impacts).
3	Examination of titles of articles.	Online review of titles of articles in each issue of the candidate journals and pre-selection of articles reflecting on G/LIS adoption, implementation and use.	Articles selected for further study.
4	Preliminary study of articles.	Review of abstracts, introduction and conclusion of pre-selected articles.	Articles with clear impacts issues, from mainly empirical investigations.
5	In-depth study and content analysis.	Content analysis of selected articles using the approach to categorize reported impacts of GIS derived from the first technique.	Thematic representation of reported G/LIS outcomes.
6	Assessment of '*contribution*' and '*attention*'.	Appraisals of reported G/LIS effects (contribution), academic papers of G/LIS impact issues (attention), approaches and focus of G/LIS impact research.	Contribution and attention under three taxonomic designations. Basis and focus of researches.
7	Scrutiny, interpretation and sense-making.	A thorough examination and sensible interpretation of results.	Enhanced research findings and indication of limitations.

2.2.1 Selection of journals and articles

We started by studying a list of "some scholarly journals emphasizing GIS research" (Longley et al., 2001; p 27) and list of journals by Caron et al. (2008) to identify journals relevant for this survey. We limit our selection to five journals based on our interpretation of aims, scopes, target audience and mission statements of the journals. The selected journals (see table 2) publish research covering applications of GIS in areas such as public health, crime analysis, housing and cadastral mapping in both developed and developing countries. They also focus on practical and theoretical issues influencing the development of GIS. One of the journals (Land Use Policy) aims to provide policy guidance to governments. The selected journals, number of articles examined for each journal during the period of review and the number of articles selected for review are in table 2. In appendix 1, we provide the list of articles reviewed in the five journals.

Table 2: Review period, and number of articles published in selected journals and number of articles selected for review

Journal	Period	No. of articles	No of selected articles
Environment and Planning B: Planning and Design	Volume 25 (1998), Issue 1 to Volume 35 (2008), Issue 6.	538	8
International Journal of Geographical Information Science	Volume 12 (1998), Issue 1 to Volume 22 (2008), Issue 8.	503	6
Land Use Policy	Volume 15 (1998), Issue 1 to Volume 25, (2008) Issue 4.	418	4
Transactions in GIS	Volume 3 (1999), Issue 1 to Volume 12 (2008), Issue 3	255	7
Urban and Regional Information Systems Association Journal	Volume 10 (1998), Number 1 Volume 19 (2007), Number 2	126	13
Total		1,840	38

2.2.2 In-depth study and content analysis

The approaches applied in each article to ascertain impacts were analyzed by identifying their basis, methodology and level of analysis. By basis, we mean the framework of knowledge applied in an article, these are theory, framework, model, schema, concept, category, and non-framework based studies (Heeks and Bailur, 2007). We examine the methodologies used in each of the articles reviewed in this paper, which have used either positivist or interpretive approaches. The interpretive approaches of case study and ethnography are more frequent (76%) than the positivist approaches of experiment and surveys. The level of analysis considers an article's object of study, which can be at different levels, such as "individual, group, organization, sector, national or international levels" (Sahay and Walsham, 1995; p 114). The majority of the researches (about 70%) were carried out at different levels in public service, such as country, state, local, academia, environment and military. The remaining 30% focused on non-governmental organizations and community based organizations.

2.2.3 Assessment of GIS documented impacts

The assessment of the nature of the contribution of GIS included a consistent judgment of whether an article documents positive (+), mixed (±) or negative (−) impact. We recognize that an observer can perceive the same impact as positive or successful and by another as negative or failure (Heeks, 2002). To attain consistency, we base our judgment of +, ± and − on definitions from previous studies by Danziger and Andersen (2002) and Heeks (2002) as shown in table 3.

Table 3: Definitions of positive, negative and mixed impacts of GIS

	Positive (+)	Mixed (±)	Negative (−)
Heeks (2002)	Success: most stakeholder groups attain their major goals and do not experience significant undesirable outcomes.	Partial failure[10]: major goals are not accomplished or significant unfavorable outcomes.	Failure: initiative never implemented or implemented but immediately abandoned.
Danziger and Andersen (2002)	Enhance the provision of public goods and services.	Both positive and negative impacts on the same category of outcome.	Opposite effect of positive impact, for example worsen the provision of public goods and services.

Set against these considerations, we categorize impacts reported as major goals achieved, for example by enhancing the provision of public goods and services without significant undesirable outcomes as +. In contrast, impacts reported with significant undesirable outcomes and do not achieve their major goals are in the category of – impacts, for example, a GIS that is never fit for proper functioning and latter collapsed. Impacts reported with desired and adverse effects are in the category of ± impacts.

2.2.4 Contribution of GIS to efficiency, effectiveness and societal well-being

The nature of contribution (+, ± or –) of GIS varies across the three taxonomic designations.

Efficiency is typically a ratio of outputs to inputs, which can be expressed in terms cost savings, cost avoidance, or productivity gains (Nedovic-Budic, 1999). Tulloch and Epstein (2002; p 197) described effectiveness as "improvement in the performance of an organization's fundamental duties or activities because of the organization's use of GIS". Contribution to societal well-being draws on how GIS technology has transformed society and its way of dealing with human problems. The review of the contribution of GIS to societal well-being is necessary because, technology in general has been described as a set of tools, machines, materials that has transformed or holds the potential for transforming society in positive directions (Berman and Tettey, 2001; Prakash and De, 2007).

Figure 2.1 illustrates our findings. About 45% of the articles in our review reported positive contributions to efficiency impact issues, 32% are mixed, 18% are negative and the remaining articles do not report on efficiency

[10] This can also mean partial success.

aspects of GIS. The percentage of articles that reported positive contribution of GIS to effectiveness issues is 26%. We analyzed 18% of the impacts reported as mixed and another 18% as negative and the rest do not pay attention to effectiveness impact. The positive and mixed contributions of GIS to societal well-being are 3% and we considered 5% as negative contribution to societal well-being.

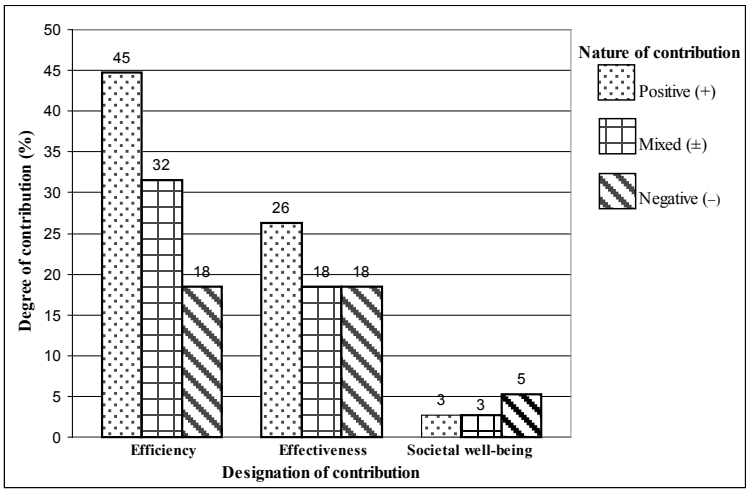

Figure 1: Nature of contribution of GIS

2.2.5 Attention to efficiency, effectiveness and societal well-being aspects of GIS

From figure 1, we see that the level of positive, mixed and negative contributions of GIS to societal well-being is very low. The near absence of a clear positive contribution in this designation corroborates this comment. The proportion of attention to each taxonomic designation is analyzed across the articles and illustrated graphically in figure 2.

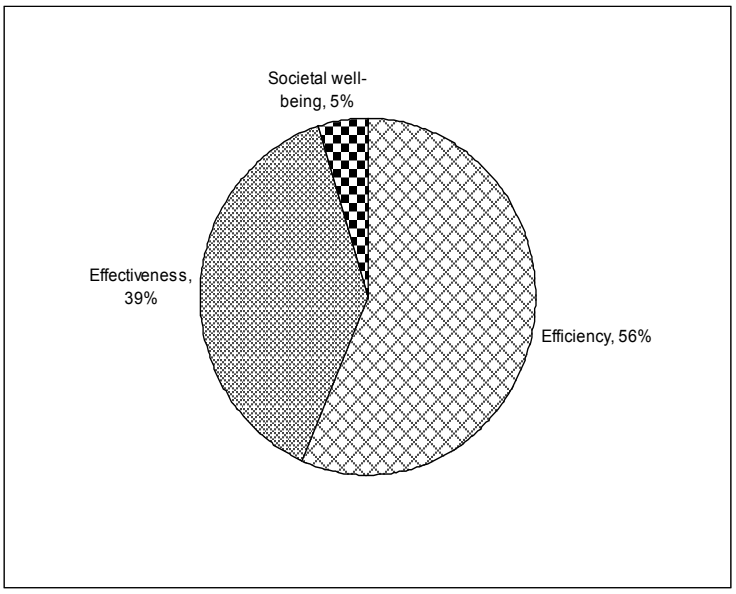

Figure 2: Level of attention to GIS impact research

2.2.6 Limitations

Our methodology, of course has some limitations. The restriction of our review to five journals is a limitation. However, it provides a population from which to draw samples and give all the members of that population equal chance of selection based on a predetermined condition of use and applications of GIS. This can also enhance generalisibility and replicability. In a similar way, the exclusion of non G/LIS academic outlets such as Public Administration Review, Journal of Management Information Systems and MIS Quarterly, reduced the coverage of our review. We also excluded other sources, such as working papers and international agencies' reports, which are usually joined at the hip of sponsors. The journals reviewed are published in developed countries in English language, thus producing already an Anglo-Saxon biased review and neglecting local publications in developing countries and non-English publications. In addition, this paper does not review the contributions of integration of location based services and internet search engines, such as the Google Earth and MapQuest. Only one of the articles reviewed –Campagna and Deplano (2004)– discussed the impact of Web-based application. However, most of the findings in the articles reviewed are based on evidence gathered by the authors from real-life experiences or observations (Kumar, 2005), suggesting a positive impression on conclusions drawn in this paper from their findings.

2.3 Classification of the GIS impact literature

To advance the knowledge on the impacts of GIS we lay out a plan in table 4, which will be used later for the literature review. Traditionally, the use of a Cost and Benefits Analysis (CBA) an assessment of the advantages of a specific GIS application and allows matching benefits of a GIS to organizational goals and to determine the potentials of a proposed GIS with respect to financial benefits (Karikari and Stillwell, 2005). The CBA could serve as a tool to evaluate tangible benefits such as easily measurable efficiency benefits over competitive solutions and traditional work procedures not utilizing a GIS. Nevertheless, the impacts issues highlighted in table 4 provide a pedestal for evaluating also intangible and not easily measurable benefits as well. In the next section, we present the literature review on the use and impact of GIS as reported in the articles reviewed (see appendix 1) in terms of the three taxonomic designations presented in table 4. The plan defines each taxonomic designation, which considers GIS contributions and impact issues in terms efficiency, effectiveness and societal well-being. Impact issues for each taxonomic designation are based on previous researches done by Clapp et al. (1989) and Danziger and Anderson (2002).

Table 4: A classification of GIS impact literature based on similarities of impact issues

Taxonomic designation	Definition	Impact Issue
Contribution to efficiency	The degree to which GIS operates with minimum waste, duplication, and expenditure of resources (Stone, 2002).	1. Availability and accessibility to products and services 2. Cost (monetary and nonmonetary costs associated with utilizing a service or buying a product) 3. Coverage and completeness 4. Data acquisition capability 5. Data storage capability 6. Time-saving
Contribution to effectiveness	The extent to which GIS has contributed to the satisfaction of information needs, in adequate quantity and quality of data and decision-making process.	1. Adequacy of service relative to need 2. Improved planning, coordination and cooperation 3. Improved products and services 4. Job satisfaction 5. Potentials for conflict resolution 6. Support for quicker, more explicit articulation of decisions (improved decision support) 7. User satisfaction
Contribution to societal well-being	The degree to which GIS helps in the realization of collective goals of a society or impact of GIS on broad societal objectives such as "individual integrity, social justice, distribution of wealth and fulfillment of human aspirations" (Clapp et al., 1989; p42).	1. Citizen-public sector interactions (participation) 2. Economic benefits 3. Enhancement of principles of a democratic society, for example, freedom from constraints such as corruption 4. Improved standard of health and safety 5. Protection of legal rights, such as privacy (surveillance and confidentiality) 6. Social justice: fair treatment and a just share of benefits, for example equal availability of information to citizens when needed and equal ease of access

Based on Clapp et al. (1989) and Danziger and Anderson (2002)

Clapp et al. (1989) adapt Jordan and Sutherland's (1979) program evaluation framework to develop a model, consisting of four interrelated levels of evaluation: operational efficiency, operational effectiveness, program effectiveness and contribution to well-being, in a means-end hierarchy. The first level of operational efficiency measures a system's capability in acquiring and storing data in an accessible way. This component comprises quantifiable measures such as cost. The second level in the model is operational effectiveness, which measures "… how well information needs are satisfied, and what adverse effects are created" (Clapp et al., 1989; p 42). Our interest is on operational efficiency, which economists have described as technical or productive efficiency, meaning the use of productive resources in the most technologically efficient manner or maximum possible output from a given set of inputs (Worthington and Dollery, 2000). The third level referred to as program effectiveness considers how information is employed in decision process. The fourth and ultimate level evaluates benefits to citizens with respect to individual integrity, social justice, and distribution of wealth and fulfillment of human aspirations. We observe four domains in the model of Clapp and colleagues and identify some impact issues in table 5.

Table 5: Summary of impact issues, based on Clapp et al. (1989)

I.	Operational efficiency	• Data acquisition capability • Data storage capability • Data accessibility • Data collection time
II.	Operational effectiveness	• Adequacy of services relative to need • Quality • Adequate coverage (level and scale) • Specificity • Availability • Response time • Equity of service and sharing of cost
III.	Program effectiveness	• Quicker and explicit decision making • Conflicts resolution • Facilitation of GIS activities across organizations
IV.	Contribution to well-being	• Equal availability and accessibility of information • Participation by public in decision process • Enhancement of principles of a democratic society • Contribution to a positive feature

According to Nedovic-Budic (1999), Clapp et al's (1989) model has facilitated a more explicit discussion among researchers studying LIS evaluation models, see Budic (1994) and Sieber (2000b). However, Clapp et al (1989) model did not consider capabilities and functions for interaction and cooperation for exchange of data and services, which have become significant

in recent times. GIS, especially LIS, are largely accomplished through collaborative efforts, involving many GIS nodes (Tsou and Buttenfield, 2002), and across multiple public and private agencies involving complex systems. Nedović-Budić and Pinto (2000) discuss mechanisms and behavioral factors that can facilitate or impede GIS activities across multiple organizations.

Danziger and Andersen (2002) put forward a conceptual framework to categorize IT impacts in the public sector. They hypothesized impacts of IT at individual and collective levels. The individual impacts are on public employee, manager, client or citizen and collective impacts shape a wider range of actors in workgroups, organizations and different levels of public service. Through an inductive logic, the authors present four spheres of influence (*capabilities, interactions, orientations and value distributions*) of IT in public administration and politics. The four domains comprise of 22 categories of impacts discerned in terms of information quality, efficiency and effectiveness. Danziger and Andersen analyzed IT impacts reported in 49 articles published in 15 journals from 1987-2000 and presented the effect of IT on each domain.

Danziger and Anderson's review consolidates previous research efforts on IT impacts. The authors provided a scheme for classifying the different measures of IT success, which can serve as a framework for further empirical study. Some of Danziger and Anderson's specific categories of IT impact such as citizen-public sector interaction, protection of legal rights and improved standard of health, safety and well-being can be considered as societal impacts. However, the conceptual domains and specific categories of IT impacts suggest that capabilities are measurable in three dimensions of information quality, efficiency and effectiveness and the three other domains (interactions, orientations and value distributions) are measured in terms effectiveness. The research shows that 73% of IT applications in public sector are positive, 19% are negative and 8% are neither positive nor negative across the four domains. The highest proportions of positive impacts are associated with efficiency effects and lower proportion of positive impacts and negative impacts emerge across the more subjective impact of IT on people as they relate to public service. The research recorded highest percentage of negative impacts in value distribution domain.

2.4 Literature review on impacts/benefits of geographic information systems

2.4.1 Contribution to efficiency

The definition of efficiency by Nedovic-Budic (1999) is not at variance with Stone (2002) adopted for GIS in table 4. These definitions and impact issues

in table 4 guide our review of reported contributions of GIS to efficiency in the articles of this review.

The USA's Urban Information Systems Inter-Agency Committee (USAC) efforts to develop a large-scale computing capacity at municipal level, was reported to have "computing capacity increased by 2,500 percent and the number of computer terminals increased by 550 percent in USAC project cities over the same time period" (Greenwald 2000; p 36). A case study by Kellogg (1999) shows that GIS helped community-based organizations (CBOs) to analyze the community's environmental problems by improving their knowledge of the spatial distribution of a set of environmental hazards and examples from grassroots organizations (GROs) reveal GIS as a useful tool in conveying spatial information to target audience (Sieber, 2000a).

Using cartographic and photographic data sources, Oetter et al. (2004) developed a GIS to map active channels, side channels, islands and tributaries at different points in time, and made comparisons between past and present conditions in the Willamette River flood plain in Oregon, USA. They analyzed spatial data from four dates spanning 150 years and built a model to quantify conservation and restoration potential for each flood plain. The authors recognized the advantage using a GIS in terms of flexibility of digital data. However, they noted the extensive manual effort required for conversion of spatial information from analogue to digital forms required careful manipulation and detailed attention, which implied increase in expenditure of resources. Conversely, their testimonies that it is difficult to realize the reported accomplishments without using a GIS, ability to analyze huge amount of data, and application of GIS techniques to data creation and analysis for a complex historical flood-plain environment are positive contributions to operational efficiency issues of timesaving and availability of information.

In an investigation of the capabilities of GIS as a tool to enhance participatory planning in three neighborhoods in Chicago, Al-Kodmany (2000) found that most of the available GIS data were not at a resolution suitable for neighborhood planning. The structure of available data and frequency of revision were also inadequate for neighborhood planning. It is clear from the case study that access to housing information was very difficult; however, positive efficiency contribution was reported in terms of in geo-referencing and combination of datasets regardless of their conceptual/theoretical model. From the findings of his research, Al-Kodmany (2000) argued that "present "user-friendly" GIS programs are actually not so friendly, as they require substantial skills and expertise to operate" (p 35).

A survey of utility companies on data availability shows that "only a few applications in the specific urban area studied reported data of sufficient detail and control for use in a GIS" (Ellis et al., 2003; p 15). Recently, Elwood (2008) illustrated difficulties in access to local level geospatial data by community development organizations in Humboldt Park, a neighborhood in northwest Chicago (USA). On cost, Rushton et al. (2000; p 33) remarked that "many current applications of GIS in health are extremely wasteful of resources in that their ad hoc nature requires costly GIS resources to be developed to support single project plans."

However, we found extensive evidence of positive contribution from sharing of geographic information (GI) and geo-processing tools (services). Empirical studies in France shows that inter-municipal approach to GIS was yielding efficiency gains of access to data and updated information in the GIS Project of District Urbain d'Angers (DUA) and "the project has allowed participants to pool information and minimize costs" (Roche and Humeau, 1999; p 12). Direct financial costs are reported as typically low for participating organizations, when GIS facilities are shared (Leitner et al., 2000) and Nedović-Budić and Pinto (2000) reiterated the benefits of joint GIS activities and asserted that "clearly, coordinating and sharing databases improved operational efficiency" (p 468).

It is obvious today that the Internet has enormous impact on sharing of GI and databases. The use of Internet to access remote GI and services can have effect on efficiency in terms of data access, GI processing and dissemination (Peng, 1999). Zhong-Ren and Ming Hsiang (2003) noted that Internet GIS provides an efficient means to advertise, publish and distribute data, and using geo-processing tools. Campagna and Deplano (2004) cited the diffusion of map-based GIS such as MapQuest as an example of Web-based application. They found from a survey of public administration GI websites (PAGIwebs) in Italy that users had access to data in common CAD or GIS formats and "PAGIwebs have embedded applications developed with a client-server architecture. Spatial and thematic query and other GIS functions can be found here. The user can browse, retrieve, and analyze data on the client side; the server supplies data or portable applications on demand" (Campagna and Deplano, 2004; p31).

To assess the advantages and disadvantages of the different modes of providing GIS to community organizations, Leitner et al. (2000) adopted measures such as responsiveness to community organizations' needs, and financial, political and human capital costs of implementation and maintenance. They found in their survey that centralized nature of public access to GIS facilities in libraries lower costs by reducing the need for duplication. The use of Internet Map Servers (IMS) as a mode of GIS

provision in another case reduces monetary and nonmonetary costs associated with utilizing the GIS. Nevertheless, Leitner et al. (2000) observed that specific needs of community organization were not considerably met with the different modes of providing GIS.

Cutter (2003) observed some GIS capabilities classifiable as contribution to efficiency in the terrorist events of 11 September 2001. The author found from published notes on the events that "… the use of GIS was extensive during the initial rescue and relief operations […] used to develop preliminary damage assessments – at gross scales and by individual building and/or infrastructure. One of the noteworthy uses of GI Science was communication to the public on the availability of services (electricity, subway, telephone), which were visualized in the form of daily maps published in the in the *New York Times* and in other outlets" (Cutter, 2003; p 441). This is a positive contribution in terms of GIS capability to integrate and handle large amounts of data quickly. On the monetary aspects, Lee et al. (1999) observed that the initial costs are usually high, but the long-term benefits such as provision and access to information, and efficiency of data manipulation normally compensate the initial costs.

2.4.2 Contribution to effectiveness

The wider IS research community noted that measuring the effectiveness of IS is a difficult task (Miller and Doyle, 1987), because IS effectiveness is a multidimensional construct (Pitt et al., 1995). Thus, different effectiveness measures have been used in the past by different researchers (Seddon et al., 1999). The GIS research community discussed effectiveness in terms of satisfaction of information needs and relevance in decision-making process (Budic, 1994; Clapp et al., 1989). The effectiveness impact issues listed in table 4 guide our survey of reported effectiveness of GIS.

We identify the effort of a neighborhood (St. Clair-Superior, USA) with varied land use (residential, industrial and retail) to use GIS to tackle environmental problems such as air pollution, storage of hazardous materials and access to the lakefront as positive contribution to effectiveness. GIS helped in solving the community's problems by improving their knowledge of the spatial distribution of a set of environmental hazards. GIS produced meaningful information, improved communication and helped in the analysis of air discharges and health concerns of the residents to support better decision-making (Kellogg, 1999). Positive contribution to effectiveness is also reported in the GIS Project of District Urbain d'Angers (DUA) in France in terms new and improved working relations between technicians, suggesting contribution to job satisfaction (Roche and Humeau, 1999). The case studies by Roche and Humeau (1999) revealed improved coordination/cooperation, as the authors concluded that "the three case studies show that a multi-partnership

GIS project can increase and promote collaboration between different municipalities" (p 13).

Craglia and Signoretta (2000), in their research on geographic data-sharing experiences at local-level in UK, remarked that that "… it is still going to take a long time before government agencies restructure their way of operating to become more responsive to the needs of citizens and customers" (p 787). This is an effectiveness impact issue of adequacy of service relative to need or users' satisfaction. Sieber (2000b) presents GIS implementation patterns by grassroots conservation organizations in northern California through four case studies. The cases rated GIS use almost uniformly poor, "… with isolated nature of GIS knowledge within cases" (p 23). If we link user satisfaction with successful system use (Igbaria and Nachman, 1990), this is again is a negative contribution to users' satisfaction issue of effectiveness. Greenwald (2000) examines multi-jurisdictional applications of GIS in USA with the examples of Urban Information Systems Inter-Agency Committee (USAC) and Southern California Association of Governments (SCAG) Access Project (ACCESS). The study revealed total and partial failures, as USAC collapsed and ACCESS was in need of serious revision because it did not achieve its goals.

Ramasubramanian (1999) observed that efforts to develop and implement a LIS in Mauritius with the support of an international institution, yielded no progress, because some officials did not appreciate the benefit or goals of the project and did not support the project. On the positive side is PROgrama para el Manejo del Agua y del Suelo (PROMAS), a GIS project of University of Cuenca, Ecuador (Deckmyn et al., 1999). Ramasubramanian (1999) reported that PROMAS took a multi-disciplinary approach to land and water resources management, provided a structure to collect and manage information for problem solving and provided customized applications that met the requirements of end users.

Karikari et al. (2005) analyzed the application of GIS in the lands sector of Ghana, and found that nearly all cadastral and land registration systems focused on record management, rather than information exploitation. The Lands Commission Secretariat (LCS), the leading agency in LA in Accra only used GIS for static map displays and had not used GIS for any analytical purposes. This signifies at best a mixed outcome. Researchers have suggested service quality as a measure of IS effectiveness (Kettinger and Lee, 1997; Watson et al., 1998), a comparison between what users believe should be offered and what is provided is a criterion for such measurement (Pitt et al., 1995). When the gap between users' expectations and perceptions is high as reflected in the inadequacies and inconsistencies of existing data and GIS provision in Ghana, especially "…deficiencies in the

data held by some agencies with regard to format, accuracy and coverage" (Karikari et al., 2005; p 359), our judgment is that of a negative contribution.

In Papua New Guinea (PNG), a Resource Information System (PNGRIS) was established to meet the informational, resource, and personnel limits of resource management and planning agencies in the country (Montagu, 2000). But, "PNGRIS remains external to the planning process rather than achieving its intended role as an integral component of the process" (Montagu, 2000; p 191). The intended products and services were not realized, the system was inaccessible to units responsible for environmental planning and management, contributing negatively to effectiveness issues of conflict resolution, decision support and other environmental planning functions. de Vos (2007) carried out a longitudinal case study of GIS development in the Costa Rican forestry sector from 1995 to 2002. The GIS directed towards environmental monitoring with satellite technology was considerably deficient, due to poor data exchange arrangements. The reported outcomes include difficulties in managing forests, protests by environmentalists, open disputes and court cases, culminating into total disruption of relationships.

Sieber (2000a) assessed effective use of GIS through interviews and document reviews and found that GIS played a prominent role in the depiction of open space at risk, reinforced support for greenbelt and helped to scrutinize and understand decisions. In her conclusion, she remarked that the researched groups "… apply GIS to goals loftier than efficiency, such as the transformation of meaning" (p 789).

The result of the survey by Campagna and Deplano (2004) shows mixed impact of GIS on the issue of effectiveness in decision support. They found that that in most cases GI websites focused mainly on the supply of information or services (usually for general information purposes), rather than to supporting real participatory or planning processes. This study illustrated the limitations of PAGIwebs (Public Administration GI Websites) to function effectively as planning-support systems.

2.4.3 Contribution to societal well-being

Clapp and colleagues (1989) emphasized that any public program should be evaluated in terms of potential benefits to citizens. We consider contribution to societal well-being with respect to the real impacts of GIS on the society (Goodchild, 2006) through the impacts issues in table 4. It is worthy of note at this moment that there is overt dearth of empirical discussions and findings on societal impacts in the articles reviewed.

Ghose (2001) observed that effective access to information creates more opportunities for both government and community empowerments and evaluated the use of GIS by the inner city neighborhood of Metcalfe Park in Milwaukee, Wisconsin for community empowerment. The societal goal of the project is noticeably "to promote empowerment of citizens traditionally excluded from the decision-making process in neighborhood planning" (Ghose, 2001; p 147). The project "… helped to redistribute socially significant measures of the analytic power of GIS from the elite user group of planners and corporations to disadvantaged sectors of the public" (p 155). Ghose reported that the project did not achieve the goal of establishing a community in-house GIS in the Metcalfe Park neighborhood, because the Metcalfe Park Residents Association (MPRA) did not have funds to employ a GIS specialist. According to Ghose, the MPRA engaged in collaboration with established organizations to solve the problem of funding. The effect, which the use of GIS may have on citizens in this neighborhood, is not obvious in its entirety; nevertheless, we consider the account rendered by Ghose as a positive contribution to well-being, through citizen-public sector interactions reported as stronger citizen participation in local governance.

In their research on modes of provision of GIS with examples from Minneapolis and St. Paul neighborhood organizations, Leitner et al. (2000) noted that legal and ethical concerns may arise within the various modes of provision of GIS. The concerns include threats to the privacy of community members, which may result from the use of GIS for neighborhood surveillance and access to sensitive community-generated data, such as health information. The article of Leitner and colleagues do not suggest a negative or positive contribution, but clearly shows that GIS can undermine the privacy of citizens in the community investigated. This bears testimony to the plethora of societal concerns raised by Rushton et al. (2000) in application of GIS to public health. They contend "… the desire to see health data in its geographic context is in conflict with protecting the confidentiality of individuals." (Rushton et al., 2000; p 38).

2.4.4 Foundation and focus of GIS impact research

Table 6 shows the frequency with which six types of frameworks of knowledge are applied in the articles surveyed. The methodology adopted in each article and other details (such as research sites) are in appendix 2. Half of the 38 articles do not make clear use of a framework of knowledge and only 8% of the articles make clear use of a theory. Theory can help accomplish three major tasks of discovery, explanation and prediction in a scientific endeavor (Liao, 1990), for example, the *performance gap* theory, according to Chan and Williamson (1999; p 270) "provides the theoretical base to identify scenarios of GIS diffusion according to the nature of problems being addressed". There is insignificant use or testing of existing

GIS evaluation frameworks such as Gillespie (2000); Karikari and Stillwell (2005); Nedovic-Budic (1999); Obermeyer (2005); Tulloch (1999); Tulloch and Epstein (2002). Finally, the high percentage of papers, which have no clear use of a discernible framework of theoretical knowledge mean less rigor and indicates that the most of the articles surveyed could have missed the advantages of use of theories as illustrated by Sahay and Walsham (1995) and demonstrated by Bhattacherjee (2001).

Table 6: Framework of knowledge used in GIS impact research

Knowledge framework	Frequency	Percentage
Theory-based: clear use of a theory.	3	8
Framework-based: use of a framework explicitly derived from a body of theoretical work.	3	8
Model-based: use of a model that is presented without reference to any deeper framework of knowledge.	10	26
Concept-based: use of a particular concept, such as 'concept of data sharing'.	2	5
Category-based: use of a list of factors such as features to be found on GI websites	1	3
Non-framework based: no clear use of a framework of knowledge (indiscernible).	19	50
Total	38	100

The use of case study methodology by over 70% of the articles surveyed raises some methodological issues, such as making controlled observation and deductions, and allowing for replicability and generalizability (Lee, 1989). Worse still was the treatment of case study methodology. Yin (2003) argued that "any finding or conclusion in a case study is likely to be much more convincing and accurate if it is based on several different sources of information, following a corroboratory mode" (p 98). Only one paper (Ellis et al., 2003), which in fact used ethnographic data collection and analysis, carried out data triangulation. However, the literature and previous evaluation studies such as Serafeimidis and Smithson (2003) and Yin (2003) favor the use of the case study methodology for the evaluation of IS and public interventions.

2.5 Analysis of findings and discussion

From this literature review we observe that the clearest positive impact of GIS is its contribution to efficiency. Also, the degree of negative contribution to efficiency appears to tally with the degree of negative contribution to effectiveness. However, a negative contribution to efficiency will not lead mechanically to negative effectiveness and positive efficiency contributions will not certainly lead to positive effectiveness. Leitner et al.'s (2000) research revealed that efficiency gains do not readily lead to effectiveness.

Georgiadou and Stoter (2008) recently noted that efficiency is not a value-neutral technical term, but a political claim, requiring assumptions about correct outputs and inputs reckoning. However, Nedovic-Budic (1999) considered efficiency an important organizational management objective, but not as best way to assess planning activities. She suggested that GIS evaluation measures should involve organizational goal achievement, public policy and decision-making effectiveness and societal effects. It follows that efficiency and effectiveness are multidimensional constructs, which depend on who is defining them. The discourse on GIS and society emphasizes decision support, public participation, privacy assurance, fairness and equity (Dobson, 2004). A clear perspective to assess these objectives is relevant to discover whose benefits GIS are serving. An investigation of challenges to community empowerment in participatory GIS (PGIS) applications in Ghana revealed that "those who gained most from the opportunities offered by the PGIS applications tended to be men rather than women and the better off and well-connected rather than those worse off" (Kwaku Kyem, 2001; p 10).

We found from our review that the responsiveness of GIS to its intended purpose is shaped by factors, which are not rooted only in the technology. Various studies have shown that such factors include funding (de Vos, 2007); requisite training or well-qualified professionals (Karikari et al., 2005; Puri and Sahay, 2003); individuals and institutions that have interest in GIS and modes of provision of GIS (Leitner et al., 2000); user participation in GIS design (Puri and Sahay, 2003); political-economic and cultural processes (Montagu, 2000; Sikor, 2006).

The Internet is also shaping the access and use GIS. Peng and Tsou (2003) remarked that the progression of GIS technology is closely mirroring development of computer technologies. They observed that GIS "evolved from mainframe GIS to desktop GIS, to distributed GIS, which includes Internet and mobile GIS" (Peng and Tsou, 2003; p5). Access and use of GIS resources through mobile and wireless devices such as personal digital assistants (PDAs) and mobile phones is becoming widespread. The Internet has been described as the "… infrastructure that will define the 21st century …" (Ainsworth, 2002; p A; Peng and Tsou, 2003; p 447) and indisputably, it is shaping access to GIS data, processing and dissemination. A land administration example can be found at http://www.eulis.eu/ (European Land Information Service), which provides direct online access to official land and property registers (GI) from participating countries. Recently, Chow (2008) adopted Google Maps Application Programming Interfaces (APIs) to develop a web prototype that disseminates GI on urban sprawl in Mundy Township of Michigan, USA. The research made known some limitations of Maps APIs, such as less spatial and analytical functionality for Internet Mapping Services. However, Chow (2008) demonstrated that the web prototype from his

research is valuable in providing users with a dynamic interface for data exploration. He also proposed a framework to use Maps APIs to visualise and present GI.

Using the World Economic Outlook (WEO), which divides the world into two major groups[11]: advanced economies, and emerging and developing economies (IMF, 2008), our analysis of research sites (locations of study area) of the articles surveyed shows that the majority (76%) of the researches took place in the WEO advanced economies, with 19 out of the 38 articles focusing on USA and four from UK. About 21% of the articles investigated impacts in the emerging and developing economies and the research sites of the remaining 3% is not obvious. Furthermore, analysis of the 30 most popular research papers in Environment and Planning B: Planning and Design website in May 2009 reiterate that GIS research efforts are concentrated in the advanced economies. About two-fifth of the most popular papers focused on GIS use, applications or modeling. All the GIS related researches took place in the advanced economies, with only two (Liu and Zhu, 2004; Luo and Wang, 2003) focusing on issues (primary health care and urban transportation) that may have direct benefits to the society.

Among academics in general and GIS scholars in particular, there appears to be a growing interest in what can be broadly termed as the 'social construction of technology', which is a conception of a two-way relationship between technology and people (Harvey and Chrisman, 1998). The books of Pickles (1995), Campbell and Masser (1995) and Reeve and Petch (1999) mark a significant shift in this direction. According to Harvey and Chrisman (1998), "GIS technology, like any other technology, is more than a tool; it connects different social groups in the construction of new localized social arrangements" (p 1683).

An evaluation of interpretive research in IS by Klein and Myers (1999) shows that historical factors affect organizations implementing IS and the key finding of Myers (1994) is that IS implementation can only be understood as part of the broader social and organizational context. Law and Callon (1992) have also shown that a technological artifact is conceived and shaped within the context of a number of global and local actors. de Man and van den Toorn (2002; p 51) remarked that "Social conditions will shape the application of a technology. Technology at the same time will have social impacts".
GIS outputs such as maps could either be a privileged knowledge or bring everybody's knowledge to a similar point (Duncan, 2006). The research of Martin (2000) suggests that an explanation to why similar GIS implementations produce different outcomes may be sought by detecting

[11] http://www.imf.org/external/pubs/ft/weo/2008/01/weodata/groups.htm#me

differences in the constituent actors and their interactions. Social and management theories, such as actor network theory (ANT) and stakeholders' theory can be useful in investigating the differences in outcomes. Nevertheless, theories should be used to explain and predict the phenomenon under study with adequate attention to the motivating problems of a research (Robey and Markus, 1998). In essence, evaluation research must be rigorous and relevant to the practitioners' audience; the support from theory has to be accompanied with a credible evidential base (Robey and Markus, 1998). While serving "socio-political needs related to legitimacy and recognition of an academic discipline" (Sahay and Walsham, 1995; p112), theories will also support the rigorousness of academic research and application of appropriate methodology can enhance the relevance of the outputs.

This review indicates a dearth of theoretically and empirically grounded research on the contributions of GIS to societal well-being, with relatively few studies from emerging and developing economies.

We argued that without theories and without taking the research efforts closer to real world situations; GIS researchers are inadequately equipped to decide how GIS benefits public administrations and citizens. GIS impact research therefore needs theories, which enable us to pass judgment between the outcomes of GIS implementation and their intended goals, and state with acceptable confidence positive and negative outcomes. The use of theories can also help GIS researchers to give reasons for positive and negative outcomes.

In conclusion, there is insignificant use of social and economic theories to analyze organizations and impacts of GIS on important aspects of a society's interests (see table 4). The concentration of the research efforts in the so-called advanced economies could be a reflection of the countries where the journals are published, but the journals surveyed are international and not regionally biased. Therefore, the result of our analysis can signify less attention to GIS impact research in emerging and developing economies.

2.6 Future research suggestions and conclusion

In this paper, we build on works of IS, IT, GIS, LIS and public administration scholars to propose an approach to classify GIS impacts in terms of the contribution of the technology to efficiency, effectiveness and societal well-being. To realize our substantive goal, we review and analyze GIS impacts in five academic journals using three taxonomic designations based on similarities of impact issues. Our review largely agrees with Tulloch's (1999) observation that efficiency and effectiveness benefits have been the object of attention in GIS impact research and confirms Sheppard et al. (1999) remark of limited research attention to societal context influencing GIS

implementation and societal effects of GIS. Overall, there is no serious departure from the findings of Nedović-Budić. This review reveals that the mixed outcomes observed in 1998 for advanced economies (USA, the Scandinavia and UK) persist, and findings from emerging and developing countries (Costa Rica, Ecuador, Ghana, Mauritius, Moldova, Papua New Guinea and Vietnam) are also mixed, with clearest positive impacts only in the area of efficiency.

The first research implication of our findings is the need for rigorous empirical research; by this we mean apposite use of research philosophies and theories. As Georgiadou et al. (2005) pointed out, IS "implementation analysis is best guided by an interpretive philosophy where the different social meanings constructed by various stakeholder groups are emphasized, as contrasted to a positivist approach where assumptions are made about objectivity of data and the generation of statistical generalizations" (p 1126). GIS as an IS type (Walsham and Sahay, 1999) can benefit from the interpretive approaches, because these emphasize human agency (Georgiadou, 2005). The fact that the same institution, or the same human action, can have different meanings for different human actors and even for researchers (Lee, 1991) explains why similar GIS projects produce different outcomes. Human and other contextual factors that shape the impacts of GIS can be better understood by applying theories to understand how a system is configured and introduced for a particular application. From our literature review, we observe that this is a fundamental issue in determining the nature of contribution of GIS to efficiency, effectiveness and societal well-being.

Our second inference and suggestion is the need to connect to existing GIS evaluation methods and frameworks. The current situation can hinder the theoretical development of an academic field, as frameworks already developed are rarely tested or applied in different settings. We concur with Sahay and Walsham (1995) remarks that "an important element in the progress of any academic discipline is a periodic stock taking of the status of the research" (p 111) and give an analysis of status of the GIS impact research regarding basis or framework of knowledge and methodologies. From the body of knowledge reviewed we find that a classification of the effects of GIS into *taxonomic designations in terms of contribution of GIS to efficiency, effectiveness and societal well-being* can be a basis to explore the impacts of GIS in the academic literature.

Thirdly, there is a need to fill the gap in geographic focus, through an international and multidisciplinary research on society-wide impact issues in emerging and developing economies. We suggest longitudinal interpretive approaches (such as case studies and ethnographies), involving single-case, multiple-case and comparison of cases. A step further is to use theories to

inform research design and data collection, outline correct operational measures for the concepts being studied, triangulation of data sources and specifying the extent to which research findings can be generalized.

Finally, the nature and degree of contribution of GIS in all the taxonomic designations, especially to societal well-being, raises some concerns on the nature of the relationship between `the technology' and `the process' which it is intended to serve and there has been little rigorous analysis of GIS impacts. This update on the impacts of GIS points to the need for more research built on a credible evidential base and on the effects of GIS in dealing with society-wide issues in developing countries.

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Appendix 1: Reviewed articles by journal

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Appendix 2: Country of interest of each research, basis, methodology and level of analysis

	Author(s)	Year	Basis	Methodology	Level of analysis	Country
	Environment and Planning B: Planning and Design					
1	Lee et al.	1998	Indiscernible	Case study	County	USA
2	Montagu	2000	Indiscernible	Case study	National	PNG
3	Nedovic-Budic and Pinto	2000	Framework	Case study	National	USA
4	Ceccato and Snickars	2000	Indiscernible	Case study	National	Sweden
5	Carver et al.	2001	Indiscernible	Case study	Local/ regional	UK
6	Campagna and Deplano	2004	Category	Survey	National	Italy
7	de Vos	2007	Theory	Case study	Projects	Costa Rica
International Journal of Geographical Information Science(IJGIS)						
8	Hendriks	2000	Model	Case study	Private sector	Not stated
9	Martin	2000	Theory	Case study	NGO	Ecuador
10	Keating et al.	2003	Model	Not obvious	NGO	USA
11	Karikari et al.	2005	Indiscernible	Case study	NGO	Ghana
12	Harvey and Tulloch	2006	Concept	Ethnography	Local govt	USA
13	Elwood	2008	Indiscernible	Case study	NGO	USA
Land Use Policy						
14	Feder and Nishio	1998	Model	Case study	Multi national	Dev countries
15	Lee et al.	1999	Indiscernible	Experiment	County	UK
16	Cashin and McGrath	2006	Concept	Case study	National	Moldova
17	Sikor	2006	Indiscernible	Case study	Project	Vietnam
Transactions in GIS						
18	Ramasubramanian	1999	Framework	Case study	Academia	Dev countries
19	Ghose	2001	Indiscernible	Case study	NGO	USA
20	Cutter	2003	Model	Case study	WTC	USA
21	Field and Beale	2004	Model	Experiment	National	UK
22	Oetter et al.	2004	Indiscernible	Experiment	Flood plain	USA
23	Beckler et al.	2005	Indiscernible	Experiment	Township	USA
24	Proctor et al.	2005	Indiscernible	Case study	Military	USA

	Author(s)	Year	Basis	Methodology	Level of analysis	Country
Urban and Regional Information Systems Association (URISA)						
25	Roche and Humeau	1999	Indiscernible	Case study	Municipality	France
26	Chan and Williamson	1999	Model	Case study	Nation/state	Australia
27	Kellogg	1999	Indiscernible	Case study	NGO	USA
28	Craglia and Signoretta	2000	Model	Case study	Local	UK
29	Greenwald	2000	Indiscernible	Case study	Counties	USA
30	Sieber	2000b	Model	Case study	NGO	USA
31	Leitner et al.	2000	Model	Case study	NGO	USA
32	Rushton et al.	2000	Indiscernible	Review	Academia	USA
33	Al-Kodmany	2000	Indiscernible	Case study	NGO	USA
34	Sieber	2000a	Indiscernible	Case study	NGO	USA
35	Harvey	2001	Theory	Survey	NGO	Switzerland
36	Caron and Bédard	2002	Model	Case study	Municipality	Canada
37	Ellis et al.	2003	Indiscernible	Ethnography	State	USA
38	Esnard A-M	2007	Framework	Survey	States	USA

Chapter 3: Lessons from the implementation of the first urban GIS in Nigeria: a longitudinal study of Abuja Geographic Information Systems

Submitted to Computers, Environment and Urban Systems

Lessons from the implementation of the first urban GIS in Nigeria: a longitudinal study of Abuja Geographic Information Systems

Abstract
This paper studies the trajectory between 2003 and 2009 of Abuja Geographic Information Systems (AGIS), the first implementation of a large GIS in the Federal Government of Nigeria. The aim of AGIS is the provision of cadastral records, related land administration services and other geospatial data. We mobilise the concepts of global and local networks to study and describe the network of supply and demand stakeholders involved in the project, their linkages and interactions that shaped the implementation of AGIS over time. The case study typifies the uncertainties surrounding the implementation of urban GIS in Africa, where most computerisation projects end up as either total or partial failures. The study sheds light on the importance of a more nuanced contribution for studying ex post what shapes the trajectory of projects like AGIS as a way to forestall potential pitfalls in the implementation of similar projects in Africa in the future.

Keywords: Abuja Geographic Information Systems, Global and Local network, Supply- and Demand- stakeholders, History

3.1 Introduction

This paper studies the implementation of Abuja Geographic Information Systems, the first extensive Geographical Information System (GIS) initiative for urban development to support electronic land administration in the Federal Government of Nigeria. Our goal is to analytically trace the historical trajectory of Abuja Geographic Information Systems (hereafter referred to as AGIS or the project) for the benefit of its stakeholders and other GIS initiatives evolving within Nigeria, and Africa in general.

While in general the biggest concern for the implementation of similar computerisation projects in Africa is their low success rate (Heeks, 2002), seldom have researchers focused on how the projects become what they are over time. Our interest is not to add to the catalogue of the frequent failures, rather to analyse empirically the evolution of a computerisation project that adopts GIS in the administration of land. The historical evolution of the project can teach researchers and practitioners how GIS in particular and Western technological artefacts in general fit into African public organisations (Karikari et al., 2003). The lessons can help not only to foster more context-sensitive approaches for GIS implementation in other Nigerian cities but also

address the challenges of applying GIS in the land sector in Africa (Karikari et al., 2005).

According to AGIS website (http://www.agis.fct.gov.ng/index.html[12]), AGIS aims to provide quality geospatial data and services to all Federal Capital Territory (FCT) departments, Federal Ministries and Agencies, the private sector, professionals and citizens in the FCT, Abuja, Nigeria in an *honest*, *effective* and *transparent* manner. While most GIS implementations in African public sector, are financed by donors (Lance et al, 2012), the AGIS project is funded by the Federal Government of Nigeria with main technical and material support contracted to a private company. AGIS is a sophisticated public sector GIS for urban governance, brought about by the mobilisation and interaction of two main networks—local and national—involving politicians, public administrators, service providers, the private sector and various users at the national and local (city) level. We adapt the global and local networks framework (Law & Callon, 1992) to study and describe the network of actors[13] involved in the project, their links and the interactions that shaped the implementation of AGIS over time. The global and local networks framework has been used successfully for the analysis and study of complex computerisation initiatives in developing countries (Heeks & Stanforth, 2007). Also, Gasson (2006) used the framework to analyse the trajectory of actions and interactions engaged in by a team of seven organisational managers involved in the co-design of business and information systems. The global and local networks framework seems to not have been used to date in GIS implementation analysis.

We further analyse AGIS in terms of demand-side and supply-side stakeholders. This consideration compliments the global and local networks framework to provide a richer understanding of the evolution of the project over time (De', 2005) by examining:

- How has AGIS over time been able to build and maintain a supply-side network that provides resources in the expectation of an ultimate return?
- How has AGIS over time been able to build a demand-side network that will ultimately offer economic and social returns to stakeholders lodged in the supply-side and demand-side networks?
- How has AGIS over time been able to impose itself as the obligatory point of passage (OPP) between the two networks?

The rest of the paper is organised as follows. Section 2 (Literature review) presents our review of literature. We present our approach to data collection

[12] Accessed last on 14 May 2012

[13] The term actor is used in this paper in consistent with Law & Callon (1992) and stakeholders corresponding to De' (2005) to make room for practical and logical comparison of the two concepts

and provide background information about AGIS in Section 3 (Case study). Section 4 (AGIS project trajectory) dissects the case study data and presents a trajectory of AGIS. Section 5 (Discussion) considers how the implementation of AGIS transforms socio-political and economic relationships both at the local and national levels (vis-à-vis supply- and demand-side stakeholders), the main contribution of this paper, which is typically lacking from existing studies and literature on the implementation of GIS. Section 6 (Conclusion) summarises what shapes or affects the trajectory of AGIS and offers suggestions on how to forestall potential pitfalls in the implementation of similar projects in Africa, as well as recommendations for further research.

3.2 Conceptual framework

GIS are useful tools, helping scientists and citizens to solve geographic problems, with widespread implementation in the public sector (Longley et al., 2005) and potential uses in urban governance (Rakodi, 2003). It is an increasingly mature technology and a strategically important meeting place for researchers and practitioners. Like many other kinds of tools and technologies, such as computers themselves, the use of GIS raises questions that are sometimes frustrating and profound (Longley et al., 2005). The value, impact, use, effectiveness of GIS implementation is not self-evident (de Man, 2000; de Man and van den Toorn, 2002).

Generally, claims about computerisation are not worked out with scholarly care and it is difficult to identify substantial social changes due to computerisation in thoroughly defined empirical studies (Kling, 1991) and technological solutions sometime end up as disappointments (Caron and Bédard, 2002). The contributions of Information and Communication Technology (ICT) to development are not always seen and researches on implementation issues are few (Heeks, 2010). Yet, there are numerous questions for researchers who study the implementation of ICTs in the public sector (Danziger and Andersen, 2002).

A growing body of literature has looked at effectiveness of GIS implementation (Budic, 1994; Zerger & Smith, 2003), GIS adaptation and diffusion (Cavric et al., 2003; Ceccato and Snickars, 2000) and social realms of GIS (Chrisman, 2005; Elwood, 2010; Harvey, 2000). However, Caron & Bédard (2002) found out through case studies that unforeseeable pathway predominates the implementation of geospatial information technology. Therefore, it is important to understand the pathway (referred to as trajectory in this paper) of GIS implementation and what influences the trajectory. This section offers a conceptual framework based on global and local networks framework to analyse the trajectory of GIS implementation and the notion of supply- and demand-sides stakeholders to examine those who are involved in GIS implementation and their interactions.

3.2.1 The notion of supply- and demand-sides stakeholders

As GIS is generally considered to be the result of collaboration between human minds and machines (Goodchild, 2006), the trajectory of a GIS project is determined by the events that occur in the process of the collaboration. Researchers (e.g. Chan, 1999; Leitner et al., 2000) have shown that the events, e.g., choice of GIS design and implementation, largely affect and are affected by the interests of supply- and demand-sides stakeholders. A GIS is traditionally initiated to address a set of problems perceived by stakeholders, who are commonly classified by the nature of their relationship with the problems. The different interests of the stakeholders underpin their interaction in the GIS implementation (Chan, 1999), which in turn affects the trajectory and success of a GIS project.

Leitner et al. (2000) described stakeholders in the provision of GIS as providers of GIS technology, training, and/or spatial data, as well as other individuals and organisations with their own priorities and interests. Leitner et al. (2000) observed that the role of stakeholders will depend on their degree of involvement and their relationship. Then, '*it is useful to view the stakeholders that impact the eventual success of a system as belonging to either the demand-side, those who will consume the services of the system, or to the supply-side, those who fund, design, implement and maintain the system. Individuals, groups and organizations belong to either stakeholder group according to their relationship to the system*' (De', 2005; p 29).

3.2.2 Global and local networks framework

Law & Callon (1992) used the concepts of global network, local network and OPP to analyse the implementation process of Tactical Strike and Reconnaissance project, a British military aircraft project. A global network in the global and local networks framework is described as 'a network that is built up, deliberately or otherwise, and generates a space, a period of time, and a set of resources in which innovation may take place' (Law & Callon, 1992, p 21). A local network typically is 'the development of an array of the heterogeneous set of bits and pieces that is necessary to the successful production of any working device' (Law & Callon, 1992, p 22). A project must have the capacity to impose itself as an OPP between the global network and the local network. Otherwise, the project will not have control over the use of global resources and the resources may be misused or withdrawn. In addition, the project will not be able to claim responsibility in the global network for the achievements attained in the local network and will not be a position to profit from the local network (Law & Callon, 1992). The OPP is an inevitable path that has to be taken by key stakeholders to carry out their responsibilities and achieve their goals (Azad & Faraj, 2009).

Connecting the two networks over time, the degree of attachment of actors in global network and degree of mobilisation of local network actors determine both the trajectory and success of a project. This provides a framework, which allows the tracing of the historical trajectory of any project on a two-dimensional graph, as presented in Figure 1. The *y* axis measures the degree of attachment of actors in the global network and the *x* axis measures the degree of mobilisation of local actors.

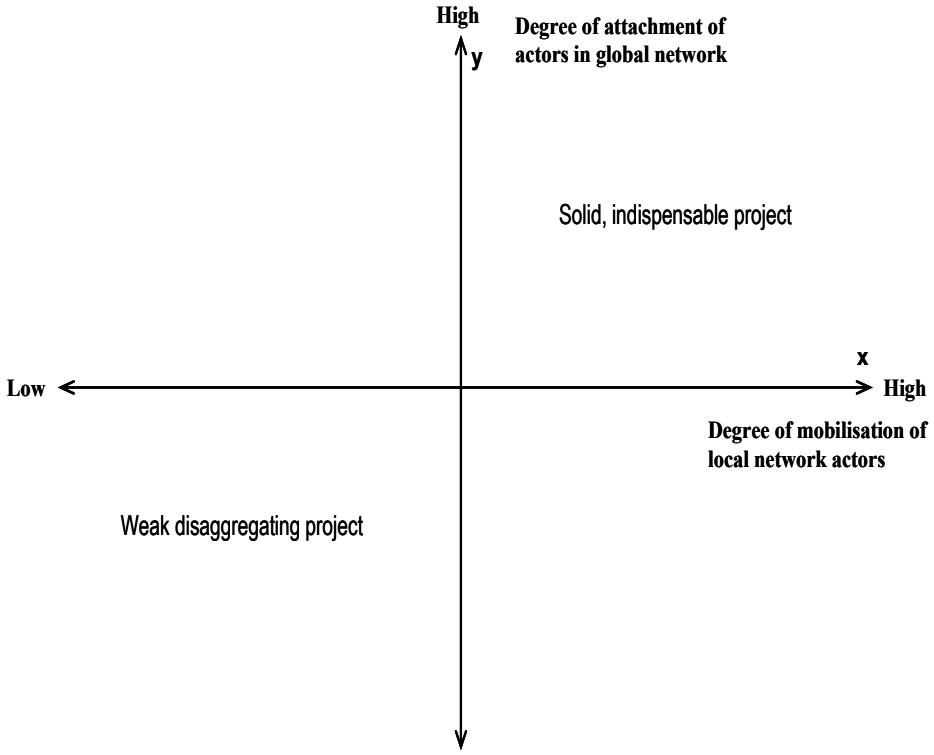

Figure 1: Mobilisation of local and global networks (Law and Callon, 1992; p49)

Heeks and Stanforth (2007) argue that global and local networks framework can help explain project trajectories and tackle the shifting focus, actors and fortunes of a project over time. Ochara (2010) used the global and local networks framework to analyse the implementation of a Local Authority Integrated Financial Operations Management Systems (LAIFOMS), an e-government project in Kenya. The analysis shows the progress of the LAIFOMS over years based on the degree of attachment of global actors and extent of mobilisation of local actors. Ochara (2010) presented a general classification of actors that played the roles of *designer and/or user* in the LAIFOMS implementation and referred to actors involved in the implementation of LAIFOMS as global actors and the local authorities and the

public who depend on the LAIFOMS services as local actors. Ochara (2010) concluded that *standardisation* of service delivery influence the trajectory of LAIFOMS and local actors are marginalised in the LAIFOMS implementation process. Korpela (1996), when studying the adaptation of Western (or in other words global) systems in Nigeria, observed already in 1996 similar problems in the development and implementation of ICT, advancing a world-system approach as an alternative explanation of the organisational obstacles of information technology in developing countries.

3.2.3 What affects the trajectory of a GIS project?

Walsham & Sahay (1999) analysed the tension between the Western developers who initiated a GIS for district-level administration in India and the local Indian setting, and found that the new system mismatched the local setting. This implies that the different interests of the (Western) supply- and (local) demand stakeholders were not met. Madon et al. (2004) examined the interplay of various stakeholders in the Bangalore City's initiative to reform its property tax system within a context of multiple global, national and local networks and show how the stakeholder groups and technologies interact over time to influence the systems of property tax assessment. The concepts of supply- and demand-stakeholders, degrees of attachment and mobilisation of actors in the global and local networks framework focus on issues surrounding project implementation and achievement of stability to make a project a coherent entity for success. Based on these considerations and building on Law & Callon (1992), the degrees and structures of mobilisation of the stakeholders lodged in supply and demand sides, and the ways in which they are connected will determine the historical trajectory of a GIS project. This is considered in terms of degree of attachment of stakeholders in the supply-side network and degree of mobilisation of demand-side network stakeholders. We refer to the way stakeholders are tied to one another and linked for the purpose of a GIS project as attachment. By mobilisation, we mean alliance to strengthen and stabilise a network in the interest of the GIS project and symbolise the priorities, interests and purpose of the project.

Adapting Law & Callon's (1992) framework in Figure 1, we propose in Figure 2, a technique to analyse the trajectory of GIS implementation from the perspective of supply- and demand-side stakeholders. We shall use the term actor (Law & Callon, 1992) interchangeably with the term stakeholders of De'? (2005).

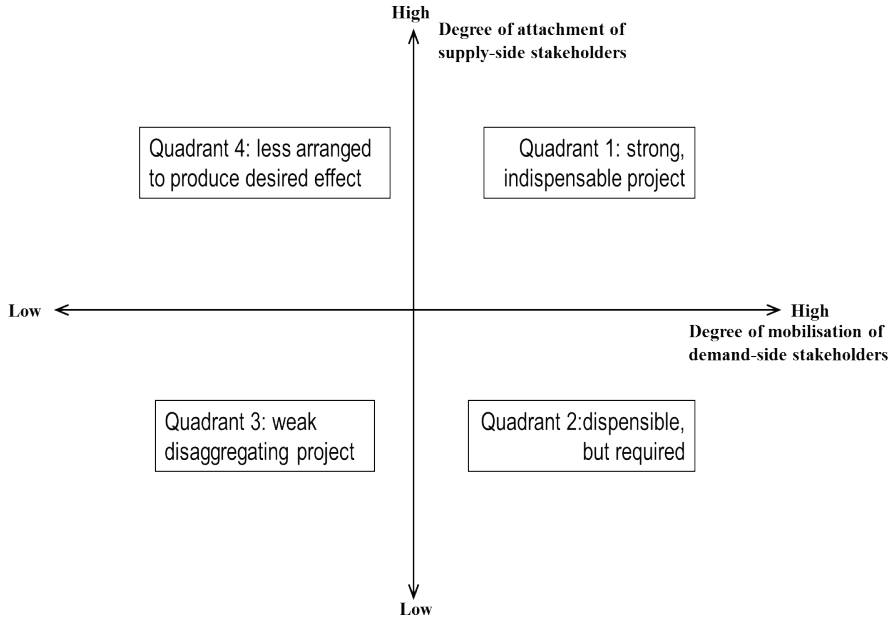

Figure 2: A framework to analyse a GIS project trajectory (Based on Law & Callon, 1992; De' 2005)

The application of the technique is simply based on a representation of momentous events, which have important consequences on the stakeholders in the two sides. The degree of attachment of supply-side stakeholders and the degree of mobilisation of demand-side stakeholders will determine the trajectory. There are four quadrants in Figure 2. The *y* axis measures the degree of attachment of supply-side stakeholders; the *x* axis measures the degree of mobilisation of demand-side stakeholders. This provides a conceptual guide to trace the AGIS' implementation trajectory later in the paper.

3.3 Case Study

3.3.1 Data collection

The preliminary fieldwork for this research took place in December 2007 and January 2008 and the main data collection took place between 01 February and 01 May 2009. Before the commencement of the data collection, a list was drawn of candidate organisations and individuals and potential interviewees. The list was refined using a formal categorisation of stakeholders by AGIS and other data collected during preliminary fieldwork. The stakeholders were classified as service provider and primary, secondary, tertiary and occasional users. This already puts some actors on the supply-side (service provider) and others on the demand-side (users). Letters of

introduction were sent to the organisations by courier service in advance and also delivered by hand on the spot during the data collection. Additional data collection was carried out in April 2010.

Primary data was collected through 17 semi-structured interviews of supply-side stakeholders at the Federal Capital Territory Administration and AGIS (including personnel of the Contractor). The demand-side stakeholders interviewed were 27; they were professionals, individual citizens, and personnel of public and private organisations (such as Federal Mortgage Bank of Nigeria, Primary Mortgage Institutions and National eGovernment Strategies) that use the services of AGIS. The roles of the actors[14] and/or stakeholders[15] were observed primarily by direct observation of people, technical materials and processes at work in AGIS. The observations, which started from the reception desks and waiting hall to back offices, were recorded by taking photographs of the actors and noting their roles in a field book.

Secondary data offered us another basis to trace the history of AGIS and the roles of the actors. The sources of the secondary data, which are in three categories also allowed us to corroborate the opinions and claims from interviews conducted solely with human actors. The first group of secondary data are documents, such as laws, acts and official gazettes of the Federal Republic of Nigeria, briefs, reports and extracts from national newspapers related to the case study. The second group is archival records, consisting of digital and hard copy maps, guidelines, rates, revenue generation data, workflows and old photographs. The third category is physical artefacts comprising hardware, software, computer networks (intra and inter) and the office premises (building, parking space and waiting room). In total, 75 pertinent secondary items of data were collected.

The data analysis started with transcribing of digital voice files and field notes from interviews. The transcribed texts were assembled into seven categories of issues and events related to why AGIS was set-up, and how the project progressed over time. The seven categories were coded as Background/history, Stakeholders involvement, Impacts of AGIS, AGIS personnel, The GIS, Malpractices, forgery and abuses, Finance and Online services. The transcribing and assemblage of the interviews into the seven categories was followed by reading and analysis of documents and archival records. All the secondary data were summarised in a Table with emphasis on historical events and political developments around the implementation of AGIS. The coded interviews were also summarised in Tables, which portray

[14] National and local actors
[15] Supply- and demand-sides' stakeholders

key opinions of the interviewees and significant events from primary and secondary data at various data points in time (year).
The use of two sources of primary data (interviews and direct observation) and three sources of secondary data (documents, archival records and physical artefacts) and categorisation of the interview data allow an analysis of the eventual moments in the history of AGIS in a series of distinct stages, without missing both salient and hidden events.

3.3.2 Abuja Geographic Information Systems (AGIS)

AGIS was planned to be "the only official source of geospatial data for the FCT […] to operate as a commercial outfit to enable it to generate adequate revenue for its sustenance and for the benefit of the Ministry and its Agencies' (MFCT 2004, p38). The project is a public sector initiative administered by the Federal Capital Territory Administration (FCTA). The implementation of the project encompasses substantial use of GIS and ICT, ranging from the Internet and Intranet to the use of mobile phones to send text messages to contact customers. Thus, we consider AGIS as an e-Government project par excellence.

In September 2003, a former Minister of the FCT (FCT Minister) secured a Presidential approval to computerise the Cadastral and Land Registry of the FCT. Events followed each other rapidly. A 16-member taskforce on computerisation of cadastral and land registry of the FCT (from now on referred to as 'the Taskforce') was inaugurated on 04 September 2003. The contract for the computerisation project was awarded to Julius Berger Nigeria (JBN) Plc on 29 September 2003. The primary objective of the project and responsibility of the Taskforce was to computerise the land registry and cadastral maps of Phases I and II of the Federal Capital City (FCC). The Taskforce submitted its report to the FCT Minister in July 2004; the activities of the Taskforce from 04 September 2003 to 30 June 2004 were recorded as Stage 1 of the project.

Stage 2 started with the objective to continue with the work accomplished in Stage 1 and establish a geospatial data management system, which will cover the four phases of the Federal Capital City and the entire Federal Capital Territory. During Stage 2, a bill for an Act to establish the AGIS Agency and matters connected therewith was sent to the National Assembly (NASS) of the Federal Republic of Nigeria.

The Land Administration services supported by AGIS in the FCT include: a) granting of statutory Right of Occupancy (RofO); b) support of area councils' title regularization; c) recertification of plots of land allocated before the establishment of AGIS; d) issuance of new Certificate of Occupancy (CofO); e) provision of legal search to confirm property status before commitment of

actors into mortgage; f) lease; g) power of attorney; h) deed of assignment; i) deed of surrender; l) purchase; and m) other transactions.

The creation of AGIS' national/Nigerian network

In the case of AGIS, the global network in the global and local networks framework is a national/Nigerian network of actors spearheaded by the former Ministry of the Federal Capital Territory. It was the Nigerian Ministry and not foreign donors—a common phenomenon in Africa (Lance et al., 2012)—who presented the definition of the problems in land administration in the Federal Capital Territory of Nigeria and suggested a solution through computerisation to promote good governance. This involved first securing intermediaries, fitting processes, technology, people and funds from neighbouring actors, and most importantly, national funds and people from a Nigerian network. The national network of AGIS is thus a set of interactions that provided the resources for the project to take place. Such resources include funds, and legal and political support. In the words of the then FCT Minister, 'receiving Mr President's directive in August 2003, we came to the painful realisation that the major bottleneck in land allocation and administration is the general reliance on manual records that were prone to abuse and manipulation from within and outside of the Ministry and its parastatals, with faulty and confusing manual records, certificates of occupancy, which are the only legal instrument to validate title to land, became easy to forge, because it lacks adequate security features and a reliable database for its generation'.

The creation of AGIS' local network

The creation of the local network began with the provision of resources, especially funds to start the project. The Federal Capital Territory Administration placed some staff members in the network and hired some project workers on a temporary basis. Julius Berger Nigeria (JBN) was enrolled to offer some project deliverables in return for the resources provided. The expected returns included trained staff, tools, data and information-products, Geographic Information and Communication Technology (Geo-ICT) applications and workflows. To deliver the returns, a local network emerged (see Table 1 and Figure 2). Essentially, the local network is constituted by interactions of actors that actually implement and use the services of AGIS to promote their own interests.

Supply- and demand-sides' stakeholders

Table 1 presents a broad and twofold group of actors and stakeholders in the project. On the supply-side are stakeholders responsible for the funding, political support, design and implementation of AGIS. Demand-side stakeholders are users of the products and services of AGIS.

Table 1: A classification of AGIS actors and their roles

Supply-side stakeholders			
Role	**Actor**	**Local**	**National**
Institutional Framework	• Constitution, Acts, Gazettes and Regulations		✓
	• National Assembly		✓
	• Economic and Financial Crimes Commission (EFCC): Anti-corruption		✓
Computerisation and Communication Components	• Tasks and workflows	✓	
	• Organisational structure	✓	
	• AGIS personnel	✓	
	• Data	✓	
	• Tools: hardware, software and networks (internet and intranet), mobile phones	✓	
	• Information products	✓	
	• Infrastructure (for example power supply and AGIS building)	✓	
Capacity Development	• Julius Berger Nigeria (JBN) Plc	✓	
	• AGIS personnel (Nigerians)	✓	
E Payment	• SocketWorks	✓	
	• Zenith Bank	✓	
	• eTranzact	✓	
Political, Funding and Administrative	• The Presidency		✓
	• Federal Capital Territory Administration (FCTA)		✓
Project Implementation	• The Taskforce	✓	
	• Contractor (JBN)	✓	
	• AGIS Departments/Units	✓	
Demand-side stakeholders			
Role	**Actor**	**Local**	**National**
Internal Demand Side Stakeholders (IDSS)	• FCTA Departments and Agencies	✓	
	• Area Councils: Abaji, Abuja Municipal Area Council, Bwari, Gwagwalada, Kuje and Kwali	✓	
	• Federal Ministries, Departments and Agencies		
External Demand Side Stakeholders (EDSS)	• Banks and Primary Mortgage Institutions	✓	
	• Professionals (Land Surveyors, Lawyers, Estate Valuers, Town Planners, Engineers)	✓	
	• Individual citizens		

The set of interactions (national network) that provided the resources for the AGIS project to take place are all on the supply-side. The interactions of actors (local network) that implement or use the services of AGIS are either on the supply-side or demand-side, because they play two kinds of roles: design and implementation or use. These disclose that while national network corresponds to supply-side, local network encompasses both supply- and

demand-side stakeholders. As shown in Table 1 and Figure 2, no national network actor is on the demand-side.

National network actors	Local network actors	
▪Constitution, Acts, Gazettes and Regulations ▪National Assembly ▪Economic and Financial Crimes Commission ▪The Presidency ▪Federal Capital Territory Administration (FCTA)	▪Tasks and workflows ▪Organisational structure ▪AGIS personnel ▪Data ▪Tools: hardware, software, etc. ▪Information products ▪Infrastructure, e.g. building ▪Contractor: Julius Berger Nigeria (JBN) PLC ▪AGIS personnel (Nigerians) ▪Socket Works ▪Zenith Bank ▪eTranzact ▪The Taskforce ▪AGIS Departments/Units	Supply-side stakeholders
None	▪FCTA Departments and Agencies ▪The six Area Councils ▪Federal Ministries & Departments ▪Banks and Primary Mortgage Institutions ▪Professionals: Lawyers, etc. ▪Individual citizens	Demand-side stakeholders

Figure 3: National and local network actors' vis-à-vis supply- and demand-sides stakeholders

The correlation between the national and local networks and the supply- and demand-side stakeholders' notion is established in Figure 2 based on case study data. The correlation shows that all the national actors interact on the supply-side and a local actor can be on either supply-side or demand-side. The AGIS situation shows the dilemma in categorisation, for example De' (2005) explained that "*these categories are not water-tight, that is, there could be individuals or groups who belong to both categories*" (p 29).

3.3.3 Land administration standards in the FCT and AGIS

Bowker and Star (2000, p. 13) described a 'standard' as 'any set of agreed-upon rules for the production of (textural or material) objects'. The provision of services by AGIS is conceived and built within the context of standards, and social relations that were already in place, for example the Land Use Act 1978 and 1999 Constitution of the Federal Republic of Nigeria. Other standards evolved during the implementation of AGIS. Some examples can be found in the official gazettes of the Federal Republic of Nigeria, No. 29,

Vol. 92 of 27 April, 2005 (Government Notice No. 53) and No. 15, Vol. 94 of 10 April, 2007 (Government Notice No. 12). The Government Notice 53 subjects AGIS to the Land Use Act for the purpose of carrying out its duties and obliges AGIS to comply with the directives of the FCT Minister in the performance of its functions. In accordance with the Land Use Act and as authorised by the 1999 Constitution, the FCT Minister exercises the power of granting statutory Right of Occupancy (RofO) in the FCT, on behalf of the President. This is the nucleus of control of other stakeholders and it is clearly inscribed in the technical materials and processes. The Government Notice 12 stated authoritatively that: (1) the land use cadastral plan, which is the final legal document, shall be binding for all stakeholders. (2) All maps shall be printed only from the digital data. (3) Surveyors shall reference their work to layout names from the digital data only. (4) Only unallocated plots shall be allocated. (5) All Rights of Occupancy shall be printed from the official digital data repository at AGIS. (6) Official digital data shall be made available for browsing on *www.abujagis.com* with effect from April 2007.

The granting of a statutory RofO is evidenced by a Certificate of Occupancy (CofO) issued under the legal authority of the Land Use Act for a term of typically 99 years. Each instrument (that is CofO) issued is registered in the CofO Register at the Land Registry in Abuja. The CofO is signed by the Deed Registrar and the FCT Minister. The CofO contains the file number used for processing a RofO and a unique identifier called CofO number, which is automatically generated during actions of interacting to grant a RofO. The land in and over which a RofO is granted is graphically described with a survey plan called 'schedule'. The file number, district, Cadastral zone (Cadzone) and plot number are contained in the schedule. In the FCT, the survey plan is drawn on the UTM coordinate system zone 32N and signed by the Director of Surveying and Mapping of the FCTA. The scale varies with the size of the plot and routinely in the range of 1:1000 and 1:5000. Grants to organisations for mixed use (comprehensive development) are on smaller scales, such as 1:7000.

These standards impose a kind of classification system in the progression of AGIS. The digital data repository of AGIS is classified into *master plan, general land use plan, detailed land use plan and land use cadastre*. Five subclasses of residential, commercial, industry, public and green area are discernible on the Master Plan of Abuja published by AGIS in 2006. Seven classes of commercial, mixed use, open space/green area, public institutions, public utility units, residential, and transportation/circulation are also published on AGIS maps. *Yet, how did AGIS become what it is now?*

3.4 Tracing the AGIS Project Trajectory

In this section, we extend the global and local networks framework to incorporate the notion of supply- and demand-side stakeholders to trace the trajectory of the AGIS project and roles of the stakeholders involved in its implementation. We trace the historical trajectory of AGIS by locating and fixing the consequence of first momentous event in the right quadrant and thereafter fixing others as they happen at subsequent points in history. The points are represented by small circles, and a path can be found to directionally connect all the points. To begin with, we summarise momentous events in Table 2, and subsequently chart the effects of the events on the attachment and mobilisation of stakeholders in Figure 4. The positioning of the points A to I in Figure 4 is only topologically important and not quantitatively determined. Figure 4 is entirely descriptive and is better interpreted in terms of the relative positions of the points and the quadrant in which they are located.

The AGIS project was motivated by the need to *electronically* control spatial problems, such as land use abuse, forgery of land documents and multiple allocations of plots of land, which were difficult to control manually. The Taskforce, comprised of only government officials and the contractor's employees, was inaugurated in 2003 to solve the problems. The AGIS project trajectory started here (point A in Table 3 and Figure 5). A puissant supply-side with immense political and financial support emerged. This led to a strong attachment of stakeholders on the supply-side, but to the neglect of the majority of the demand-side stakeholders. According to a management staff of AGIS, 'the external users were not consulted, because of the level of complexity involved'. Whereas, the degree of attachment of supply-side stakeholders was reasonably high at the onset, the mobilisation of demand-side stakeholders was low. A demand-side interviewee remarked that 'there was no users' requirement survey, at least to the best of my knowledge. What we had was a taskforce'. The demand-side network was not mobilised to participate in the project. Professionals outside the Ministry of Federal Capital Territory were rarely consulted. Some interviewees felt that 'you know this is a government agency and government itself they have their own policy makers. So, this thing [AGIS] is solely done by government'. 'It's like all the stakeholders, professionals alike, were not really consulted. It was like a kind of wishy-washy style'.

However, the success of stage 1 increased enthusiasm of the supply-side stakeholders; they became more attached to the project and consolidated the network. Correspondingly, more stakeholders from the demand-side were mobilised. In the words of one of our interviewees, '… they now realise that they need to get all the necessary stakeholders, after the setting up'. The mobilisation of External Demand Side Stakeholders (EDSS) aligned the EDSS

to care for the project. In view of the achievements of stage 1 and a promising stage 2, the supply-side also became more attached. At this moment in history, we trace the project to the right along x axis and up the y axis to position (B).

The functions, composition, funding and other matters related to the AGIS Agency were authorised by official gazettes, such as Government Notices 12 and 53. The autonomy of the agency was sought through a Bill for an Act to legally establish AGIS as an independent government agency. These actions strengthened the supply-side network, further increased stakeholders' enthusiasm and increase their attachment to the project. On the contrary, stakeholders lodged on the demand-side had no definite role and were not mobilised to participate in the event. The consequence is a lesser degree of mobilisation of demand-side stakeholders represented by a slight horizontal shift to the left. Notwithstanding, we trace the project up to the highest peak (C) because of the enthusiasm of supply-side stakeholders and eventual increase in their degree of attachment to the project.

Table 2: Main events in AGIS implementation

Point	Event (Year)	Consequences	
		Supply-side (National and local networks)	**Demand-side (Local network)**
A	Approval to computerise and inauguration of the Taskforce, with resources (money and political support) (2003).	*Unanimity* on solution to problems and strong commitment.	Exclusion of external stakeholders.
B	Completion of the Taskforce job and commencement of stage 2 (2004).	Clear purpose and structure, and consolidation.	Partial recognition of external stakeholders.
C	Official gazette of AGIS Agency and Bill for an Act (2005/2006).	Strive for constitutional recognition and autonomy.	No definite role.
D	New President and new Minister (2007).	Changes in leadership and funding.	*New payment option.*
E	Submission of progress report for stage 2. Unmet deadline and pending bill (2007).	Technical artefacts acquired with insufficient technical skill transfer. Unclear status.	Some doubts. Slower than desired.
F	Provision of additional resources: AGIS building and e-payment (2007).	More suitable working environment.	More accessible and convenient business premises. Extra payment option.
G	AGIS open-house and compact to deliver quality services (2008).	Opportunity for feedbacks and performance measurement.	A chance for involvement.
H	Senate probe and Economic and Financial Crimes Commission investigations (2008).	Attention to provision of oral and documentary evidences.	Politicisation and cynical view of project. Weakened confidence in the project.
I	Request for extension and increase in fees (2009).	Weaker cohesion, but a period of time to deliver.	Interests not represented. Increase in doubts.

After the swearing in of a new President in May 2007, a new FCT Minister was appointed. A former project manager became the General Manager of the project. The influence of JBN, the private company responsible for technical support, on actors in Ministry of Federal Capital Territory became marginal. The code of behaviour shifted to typical civil service ethics, but AGIS was neither recognised by an Act as a public agency nor registered as a limited liability company. Earlier, a special account operated to support AGIS had been closed in line with public financial regulations before the former Minister left office. The FCT Minister at that time changed from the use of bank teller to bank draft for payments for all land transactions with the AGIS Agency. We asked an (EDSS) whether he was involved in the determination of how to pay to AGIS, he answered 'no, as a matter of fact, I just heard that we have to pay by bank draft. They do not carry the people along'. Likewise, alliance with public sector agencies relevant in order to avoid duplication of efforts, especially in e-payment options and use of ICT is not evident. Such agencies include the National Information Technology Development Agency (NITDA) established to plan, develop and promote the use of ICT in Nigeria and the National eGovernment Strategies (NeGSt). A senior employee of one of these organisations asked if they have any cooperation with AGIS replied, 'no relationship. Nigeria is yet to recognise the importance of one government, eGovernment. AGIS is yet to appreciate the importance of partnership in realising their goals'. The attachment and mobilisation declined on both sides, as the Bill for an Act was still pending. The standpoint of a demand-side actor is that 'personal and political differences prevented the bill from been passed'. The changes in political leadership and funding, uncertainties surrounding the legal status of AGIS, weak mobilisation of demand-side stakeholders and other public sector organisations that were supposed to be allies in the project slipped down AGIS to point (D) in quadrant 4.

These situations arise as a result of inability of AGIS to impose itself as an OPP. The revenue generated from payments made by EDSS between September 2004 to November 2008 was over ₦22.0 billion (approx. US$145.0 million). The project also earned foreign currency of up to US$ 2.2 million during this period. Then, if AGIS is an OPP, the funds would have been used directly for the in interest of the project.

A progress report in 2007 shows that some technical resources had been acquired and several workflows were computerised. However, the registration of AGIS as a company to enable it to operate as a commercial outfit was put on 'standby' and the critical aspect of building local human capacity to use the technical resources was missing. There were also bureaucratic delays on the path of AGIS to hire requisite permanent personnel for the project. The delay is caused by AGIS dependence on FCTA (or Federal Government) to hire new personnel, in compliance with civil service regulations.

Here we observe that AGIS is not sufficiently protected legally and faces difficulties to become an OPP. The project is subjected to some influential politicians and decision-makers on the supply-side network. Through their selection of senior management staff members, the politicians and decision-makers have direct access to every member of the senior management, which in turn influences their (AGIS' senior management) interactions with the demand-side stakeholders.

The mobilisation of the network for training of Nigerians seems to be problematic and represented different things to different actors. An interviewee recognised that 'you have to have permanent staff to train them. The truth is that not everything is on the proficiency. We do not want to invest in project staff who then moves to work for someone else'. A senior civil servant believed that the '… technical consultants should have a genuine programme to do what they have to do, train Nigerians […] but they are seeing AGIS as an opportunity to employ their people and occupy a permanent basis'. The requests for regularisation of plots acquired by EDSS from the area councils became an issue for the future. An area council EDSS remarked that '… up till now, some of the documents submitted to AGIS, we've not been able to see the CofO, up till now. They have not been able to give anybody from all the area councils […] up till now nothing'. The account of this interviewee is that he has waited long without getting the CofO for regularisation of his plot in an area council. The project slowed down and was running behind schedule, expectations remained unfulfilled for both supply- and demand-side networks, the co-ordination of the two networks for the purpose of the project declined. Thus, the project was weakened to point (E).

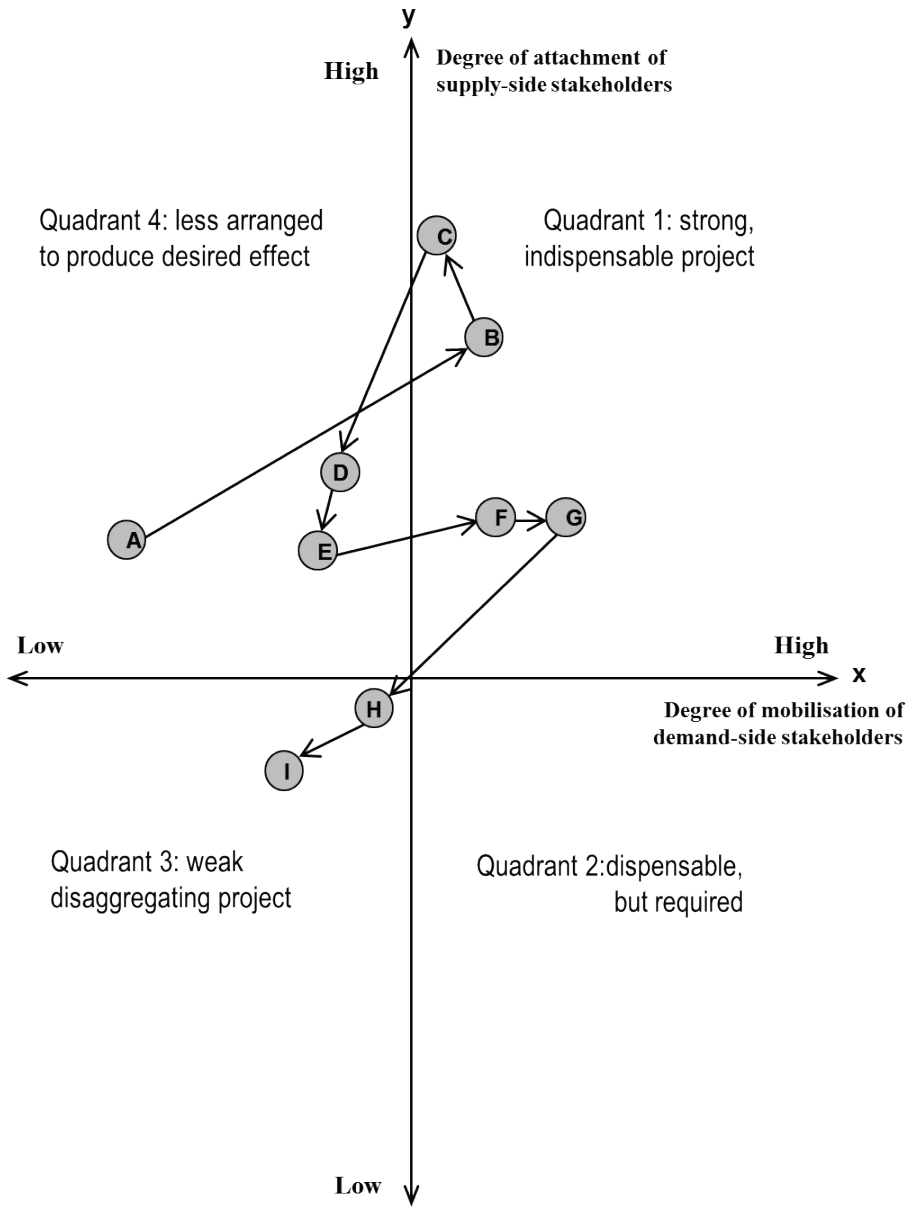

Figure 4: AGIS project implementation trajectory

AGIS' more accessible and specially designed building proved to be an advantage, as a demand-side interviewee noted that '… their former office was not good, you can't have space to park. But now, you can park and when you get in, you have a reception where people, some AGIS people can attend to you'. With the provision of this and other additional resources such as e-

payment at 20% level in December 2008, the project renewed its strength and waxed stronger on both sides to point (F) in quadrant 1. Efforts to enrol more stakeholders on the demand-side, for example through 'AGIS open house event' increased the degree of mobilisation of demand-side stakeholders and advanced the project horizontally to point (G).

The senate probe, Economic and Financial Crimes Commission (EFCC) investigations and judicial procedure against some AGIS administrators made AGIS popular on the pages of Nigerian newspapers. A former Minister was accused of use of office and position to gratify and confer corrupt or unfair advantage on relations in land matters (Alli, 2009). At that moment, the supply-side efforts shifted to the provision of oral and documentary evidences to probe panels and law enforcement agencies. Of course, the focus of the civil servants was more on defending themselves to keep their jobs. This weakened the supply-side and gave the demand-side a cynical view of the project, bringing the project down to point (H) in quadrant 3. The demand-side stakeholders became sceptical and less mobilised. Obviously, the supply-side stakeholders were no longer able to speak with one voice. The alliance became weak and supply-side stakeholders were less attached to the project. The project has to struggle with problems such as server and power failures, and the delay of disbursement of funds. The FCTA announced a 900% increase in fees payable for AGIS services in August 2009 (Adamu, 2009). The online edition of The Daily Trust newspaper reported on 28 August 2009 that 'While a 900 per cent hike is bad enough, the retroactivity of its implementation is totally incomprehensible […] it is punishing the wrong class of people'. The people in this class are the EDSS. The strength of the project was depleted more by these events to point (I) at the end of our study (2009). We confirmed during the additional data collection in April 2010 that the project is yet to be completed.

3.5 Discussion

We studied the development and implementation of AGIS over time and showed how the various stakeholders shaped the historical trajectory of the project. It should be highlighted that, although the technical resources were delivered according to the standards of national actors, the power to direct the implementation of the project resided outside the technical resources. At the beginning, a supply-side network backed with political and economic resources was built, and a contractor was hired to give technical support. This only endured for a while, as the political support dropped with changes in national government. While the contractor maintained a project manager since the commencement of the project, the heads of AGIS appointed by the Federal Capital Territory Administration occupied their positions at the pleasure of the Minister in office. This may have been due to several reasons,

but a political undertone cannot be completely ruled out. In short, AGIS was not able to build and maintain a stable supply-side network.

AGIS offers economic benefit of increasing government revenue (Akingbade et al., 2012) with notable financial returns evidence for the Nigeria public service, and this probably explains why many state governments in Nigeria are interested in embarking on similar projects. The demand-side network indeed offered this economic return to stakeholders lodged in the supply-side network. Conflicting with the plan of AGIS to generate adequate revenue for its sustenance, the project does not have control over the use the economic return and does not profit the demand-side stakeholders. AGIS cannot incontestably claim the credit for the economic return. Perhaps, because it is the federal government machinery including funds that sustain the project therefore the economic returns go directly into the federal government treasury. None of the stakeholders, including the FCT Minister legitimately have direct access to such money, government funds are accessed by Ministries, Departments and Agencies through budgetary allocation. The benefit of this economic return was neither to stakeholders lodged in the supply-side nor demand-side networks. In terms of financial matters AGIS is not an OPP between the two networks, because of existing standards, which mandates the payment of all revenues generated by government agencies into government treasury.

The bill for an Act to establish the AGIS as an independent government agency is yet to be passed. If AGIS autonomy had been realised, the payment for services could have strengthened the demand-side network, because the funding of the project would have come directly from the demand-side. Since the funding comes from government, the project is not answerable to the demand-side stakeholders and not open to their scrutiny. Thus, a practical challenge for implementation of GIS in Africa is to govern such projects by public sector laws and the delivery of the products and services, to be driven and financed by the demand-side for accountability reasons.

The social returns ultimately offered by AGIS are mixed. The design, location and construction of an accessible and convenient building for production and transaction of business in an orderly manner and the implementation of AGIS offered social returns to stakeholders lodged in both supply- and demand-side networks. In particular, the provision of online services, and especially e-payments, delivered socio-economic returns and improvement of governance in terms of speeding up of services such as legal search and tracking of applications. The provision of online services uniquely transformed the AGIS network by allowing users to submit some requests from any

location at any time. This reduced the need to travel to the AGIS office in Abuja, which is the only location for physical interaction with AGIS.

Some supply-side stakeholders were able to make decisions that affected the overall structure of the supply- and demand-sides' networks, for example in the selection of the heads of the project. Then, there is 'seepage' between the two networks. AGIS was powerless to impose itself as the OPP even if by the virtues of the Land Use Act, FCT Act the Constitution, and land use regulations in the FCT published in official gazettes, AGIS should be an OPP for the two networks.

It is important to emphasise that the trajectory of AGIS over time was largely shaped by the social context in their unfolding. For example, the change in government in 2007 had direct influence on the trajectory and made the project to be 'less arranged to produce the desired effect'. The Senate probe and Economic and Financial Crimes Commission investigations (see Table 3), which weakened the project, are not directly related to technology. The project had also not been able to acquire constitutional power to function as a public sector company and independent geo-services provider.

In summary, the historical trajectory of the project shows that there was lack of consistency in the attachment of supply-side stakeholders to the project. However, AGIS was able to build a demand-side network (EDSS) that pays for services; this offers economic benefits only to a section of supply-side: the Federal Government of Nigeria via the Federal Capital Territory Administration. The usability of the return to other stakeholders lodged in the supply-side network and demand-side network is uncertain. The capacity of AGIS to establish itself as the OPP between the supply-side and demand-side networks that could provide resources in the expectation of an ultimate return has been weak.

3.6 Conclusion

The trajectory of AGIS implementation shows that supply-side stakeholders progress unsteadily in their attachment to the purpose of AGIS and the demand-side stakeholders are poorly mobilised. The implication of this trajectory is instability to make the project a coherent entity to realise its aim. This is not hidden in Figure 4, as the project move forth and back from quadrant four (less arranged to produce desired results) to quadrant one (strong indispensable project) and end up as weak and disaggregating. From our case study of AGIS, we concur with Latour (1991) that 'technology is society made durable'. This is a cautionary advice in the implementation of GIS for urban governance.

If the standards, political, social and economic situations have nothing wrong with them, AGIS progression would have been smooth and steady. A visible syndrome is dominating role of national actors or supply-side stakeholders and lack of concern for external demand-side stakeholders, for example as evidenced in the modes of payment and delivery of services. While a body of literature (e.g. Brautigam and Knack, 2004; Gichoya, 2005) do not favour donor-funding of development projects in Africa, the national funding of AGIS does not seem to positively affect the fortune of the project. Rather, the national funding may possibly contribute to the supremacy of the influential stakeholders on supply-side, because '*he who pays the piper calls the tune*'.

The standards, stakeholders' integration, personnel development policy, financing, political and legal support, and attaining OPP affect the historical trajectory of AGIS.

This paper has provided a new set of empirical evidence on implementation of GIS for urban governance in Africa through first-hand information from interviews and on-the-spot observation of GIS at work in Abuja, Nigeria. This fills a gap in knowledge identified by Akingbade et al. (2009) and may start to help to address the challenge of achieving success and avoiding failure in the implementation of similar projects in Africa (Heeks, 2002). This research establish through the case study data a relationship between the global and local networks framework and the supply- and demand-side stakeholders' notion. This is not common in the GIS literature. The empirical facts also show that national funding of GIS projects (rather than donor-funding) does not guarantee the realisation of desired goals. This can be expressed in a simple and general sense: 'government funding does not guarantee success of GIS projects'.

Our case study of AGIS points to the need to keep steady political backing, entrenching stakeholders -centred policy and self-sustaining financial policy through funding by the demand-side stakeholders and development of home-grown personnel right from the onset of GIS projects.

The lesson for the states that are now embarking on GIS implementation in Nigeria and in Africa in general is that the place of AGIS in history is pragmatically directed by socio-political and economic relations that are already in place and those that emerge during its implementation, which include a number of policy challenges and contextually specific governance challenges.

To forestall potential pitfalls in the implementation of similar projects in Africa**,** future projects have to first of all identify the national and local networks in the design and implementation of a GIS project, discern their

roles as supply- and demand-side stakeholders and involve all the stakeholders in the implementation of the project from the beginning. Our take-home message from the AGIS case study is that GIS technology is not an 'island' and cannot be implemented in isolation of the social milieu. The interest, stake and involvement of all stakeholders should be clearly defined from the onset. Putting in place the appropriate standards based on the goals and interests of the stakeholders will also help to prevent disservice in the adaptation of Western technological artefacts, especially the design and application of GIS to manage complex land administration activities in African cities. The standards should reinforce public policies and actions for improving urban development in Africa.

Finally, based on our case study we suggest further research on the actual impact of AGIS, especially on the demand-side network. We propose that such research be aligned to the aim and goals planned for AGIS, the impact of the project on EDSS and society-wide significant issues and policy interventions. The effects of AGIS on the implementation of Abuja Master Plan and Housing are direct examples. There is also the need to develop 'non-mechanistic' frameworks to evaluate the impact of GIS as public sector policy intervention to improve administration of land to support appropriate management of rights, restrictions, responsibilities and risks in relation to property, land and environment to deal with challenges of poverty, corruption, housing, environmental protection and sustainable management of rapidly growing African cities.

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Chapter 4: A case study of geo-ICT for e-government in Nigeria: does computerisation reduce corruption in the provision of land administration services?

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A case study of geo-ICT for e-government in Nigeria: does computerisation reduce corruption in the provision of land administration services?

ABSTRACT
This paper examines the role of Abuja Geographic Information Systems (AGIS) as an e-government policy initiative for promoting the reduction of corruption in the provision of e-land administration services and good governance in general. The paper explores the contribution of e-land administration with regard to the different forms of corruption (i.e. fraud, forgery, multiple applications, bribery, nepotism and favouritism, and white collar malpractice) as well as with the different services (i.e. legal searches, recertification of titles, granting rights of occupancy, consent to alienate and regularisation of titles). Generally, our findings suggest that corruption was reduced with the introduction of electronic services for the verification of land records through legal searches and the recertification of land titles. Yet, other forms of corruption, such as nepotism and favouritism, are persistent and increasing.

Keywords: Nigeria, AGIS, Corruption, Geo-ICT, Land Administration.

4.1 Introduction

Geographic Information and Communication Technology (Geo-ICT) initiatives in the public sector for the provision of Land Administration (LA) services are part of e-government policy initiatives for promoting good governance and development [**14**]**, [23], [32**]. Examples of the application of the principles of good governance for land administration affecting societal well-being include: equitable access to land and natural resources, security of tenure for all members of society, gender equality in access to land, transparency in decision making regarding land and natural resources, rule of law and decentralised, efficient and effective LA **[25]**.

However, to date, there is a dearth of empirical studies on the impacts of geo-ICT on societal well-being **[3]** (such as the reduction of corruption) in the public sector in general and in particular in the provision of LA services in the developing world. Abuja Geographic Information Systems (AGIS) is a public sector geo-ICT project of the Federal Capital Territory Administration (FCTA) of Nigeria, launched in 2003. The project is intended to curb some problems of 'poor governance', including corruption, which is a critical societal problem in Nigeria **[1]**, **[17]**. AGIS has the potential to improve the overall quality of governance **[25]** in Africa's most populous country and the political and economic powerhouse of West Africa, yet, with 70% of the

people living below the poverty line **[12]**. AGIS presents us thus with an excellent opportunity to tackle the empirical gap in a theoretically sound manner.

In the Federal Capital Territory (FCT) of Nigeria, problems in the provision of LA services before AGIS was implemented included unattended applications, multiple land allocations, illegal and unclear situations of land allocation, mismatches in land use and forgery of land documents **[19]**. To solve these problems, AGIS computerised the processes of land allocation, property search and verification of land records as well as the preparation and issuance of Rights of Occupancy (RofO) and Certificate of Occupancy (CofO), evidencing title to land **[2]**.

The aim of this paper is to ascertain the impact of AGIS on the reduction of corruption in the provision of LA services in the FCT of Nigeria and explore how electronic LA (e-LA) services contribute to good governance and societal well-being.

The rest of the paper is organised as follows. The next section presents our methodology. It is followed by a review and analysis of the literature providing the theoretical background for the paper. Thereafter, we analyse the case study and present our findings on the effects of AGIS on corruption and its contribution to promoting good governance, followed by conclusions.

4.2 Methodology

We adopt a case study methodology to examine AGIS in its natural setting and to explain the causal links between AGIS as a geo-ICT intervention and as an enhancer of societal well-being. Preliminary fieldwork was carried out in December 2007 and March 2008 to obtain first-hand knowledge and collect secondary data about our case. Acquiring the first-hand knowledge involved direct observation of AGIS activities, asking questions from the staff members of AGIS and users. Comprehensive data collection took place between 01 February and 01 May 2009. Additional data were collected in April 2010. Before the commencement of the data collection, principal organisations for primary and secondary data collections, potential interviewees and respondents to surveys were identified based on official stakeholders defined by AGIS. The official stakeholders are: (i) *service providers* (public administrators, designers of the AGIS project, people who are directly involved in the implementation of the project) on the supply-side and (ii) the *users* of the services on the demand-side. Other organisations, such as anti-corruption and e-government agencies, were selected based on their relevance to our research goal. Letters of introduction were sent to individuals in the organisations by courier service before the data collection and also delivered by hand on the spot during the data collection. The

number of the interviewees and respondents on the supply- and demand-sides are listed in Table 1. Data on what AGIS' stakeholders actually do with the services provided with geo-ICT; about what they are substantially free to do with the services and contribution of the AGIS intervention to promoting good governance (focussing herein in terms of corruption and transaction costs reduction) are not easily accessible and available. This obliged collection of data from primary sources (surveys, interviewing and direct observation) and secondary sources (documents, archival records and physical artefacts).

Primary data collection through surveys was carried out in three sets. The aim of the first set of surveys was to discover how AGIS stakeholders perceive corruption in LA and to find out corrupt practices in LA prior to AGIS. Some of the questions used for the first set of surveys were adapted to our case from the 'corruption-IQ test' proposed by [**15]**. The second set of surveys was carried out to identify corrupt practices in LA and their causes before AGIS. The third set of surveys considered the impact of AGIS on corruption and malpractices in the delivery of land and property related services in the FCT. While the first two sets of surveys cut across both supply- and demand-side stakeholders, the third set of surveys involved only demand-side stakeholders. The supply-side stakeholders include the Federal Capital Territory Administration (FCTA) and AGIS, Julius Berger Nigeria (JBN) PLC, Zenith Bank and eTranzact. On the demand-side are FCTA Departments, mainly Planning, Land Administration, Survey and Mapping, which can be described as internal demand-side stakeholders because they are within the FCTA. The Federal Mortgage Bank of Nigeria (FMBN), Primary Mortgage Institutions (PMIs) and Professionals (Land Surveyors, Lawyers, Estate Valuers, Town Planners, and Engineers) and Individual citizens are external demand-side stakeholders who use the services of AGIS outside the FCTA. In total, 300 questionnaires were distributed and 156 were returned, giving a response rate of 52%.

Table 1: Primary data collection from supply- and demand-side stakeholders

Interview Group	**Number of interviewees**
Supply-side	20
Demand-side	28
Total	48
Survey Group	**Number of respondents**
Supply-side	42
Demand-side	114
Total	156

We drew an explicit list of forms of corruption from the literature, e.g. **[7]**, [**19]**, **[22]**, and **[36]**. The pertinence of the list of forms of corruption to LA in the FCT was discussed with both supply- and demand-side stakeholders

and refined during the preliminary fieldwork and comprehensive data collection. For example, multiple land allocations was not identified as a form of corruption in the literature but was observed and endorsed by both supply- and demand-side stakeholders as a form of corruption during these discussions. Generally, about 93% of the respondents strongly agree or agree that corruption is an issue, which deserves attention in the provision of land and property related services in the FCT. This approach is collaborative, visible, defensible and revisable **[4]** and has been tested and applied in previous empirical studies **[26]**.

Data were also collected primarily through 48 semi structured interviews of supply- and demand-side stakeholders and at different (management, middle and operational/junior) levels in organisations/departments. Some of the interviews were digitally recorded with the consent of the interviewees and notes were taken in all cases. Additional primary data were derived from direct observation of GIS (processes, technology and people) at work in AGIS.

Secondary sources are in three categories. The first category are documents, such as laws, acts and official gazettes of the Federal Republic of Nigeria, briefs, reports and terms of reference (TOR) for the AGIS project and extracts from national newspapers related to the case study. The second category is archival records, consisting of digital and hard copy maps, personnel records, guidelines, rates, revenue generation, workflows and old photographs. The third category is physical artefacts comprising hardware, software, computer networks (intra and inter) and the office premises (building, parking space and waiting room). In total, 83 pertinent secondary evidences were collected.

The analysis started with the transcription of digital voice files and field notes. The transcribed texts were assembled into six categories using *codes* prepared from the literature **[11]**, **[19]** before the fieldwork and revised after the fieldwork. The codes are: Background/history; Actors' involvement; Impacts of AGIS; The GIS (personnel, data, procedures and IT); Malpractices, forgery and abuses; Finance and Online services. All the secondary evidence was summarised with emphasis on corruption, LA services in the FCT and use of GIS and ICT. The coded interviews were also summarised in tables, which portray key opinions of the interviewees and the impact of AGIS on corruption in LA services. The data from surveys were recorded and analysed using Microsoft Excel® for closed questions. Open questions were entered and classified into groups of similar opinions.

The primary and secondary data and coding allows us to corroborate evidence collected from one source with another. We searched for contrary

evidence from other sources for any piece of evidence collected in each code. For each code, evidence collected from one source is either substantiated or refuted with evidence from other sources. A piece of evidence, which we cannot substantiate from at least one other source, is nullified.

We compare the demand-side stakeholders opinion after their consideration of the prominence of forms of corruption in the provision of LA services in FCT, before AGIS (meaning before September 2003) and after AGIS (2009-2010). This was accomplished by asking the respondents to rank the prominence of each form of corruption before AGIS and after AGIS. We used a scale from 1 (strongly disagree), 2 (disagree), 3 (agree) and 4 (strongly agree), see **[15]**. The idea here is that the higher the value of a form of corruption in a period, the higher its occurrence for the period. It is important to note that these values are practically perceptions of corruption at two time periods (i.e. before and after AGIS), which were further verified with other data from interviews and written documents.

4.3 Case background and history

Abuja Geographic Information Systems (AGIS)

The history of AGIS can be traced back to 2003, when the computerisation of the cadastral and land records of the defunct Ministry of the Federal Capital Territory (MFCT), now Federal Capital Territory Administration (FCTA), started. Gazette No. 29, Vol. 92 of the Federal Republic of Nigeria of the 27th of April 2005 officially established AGIS as an Agency charged with the responsibility for land matters in the FCT and the generation, management and administration of geospatial data. The Agency was restructured in August 2008 to avoid what the then Minister described as functional overlaps with some departments of the FCTA. The overall idea was to realign AGIS to its goal of serving the geospatial needs of all departments of the FCTA and the citizens. However, more than 80% of the efforts of AGIS are meant to support LA and all fees payable to AGIS (in April 2010) are directly connected to LA.

The relevance of studying AGIS as an interesting geo-ICT intervention for the reduction of corruption is confirmed by the mission[16] of AGIS and the assertion by the Minister who spearheaded its establishment that 'reliance on manual land records by the defunct MFCT was prone to abuse, manipulation and forgery'.

The innovative elements of AGIS include the use of GIS, networks (intra and inter) and use of mobile phone and mass media to contact external demand-

[16] "to provide basic and quality services which every citizen is entitled to, in a quality, fair, honest, effective and transparent manner" – http://www.abujagis.com/, accessed 27 April 2011

side stakeholders. AGIS plans to enhance transparency and good governance within Nigeria, with a computerised front and back office ("one stop shop"). Thus one can consider AGIS as a geo-ICT project or e-government intervention par excellence. The case of AGIS is unique also in the sense that, unlike most of the e-government or ICT for development projects in Africa **[21],** AGIS is entirely funded by the federal government of Nigeria, and not donors.

Land administration services before AGIS

In line with the 1999 constitution of Nigeria and the Land Use Act (1978), the Governor of each state grants a right, called statutory right of occupancy (RofO), to a citizen for land situated in urban areas. As specified in the Land Use Act, the right is usually witnessed by a Certificate of Occupancy (CofO) [**29]**. The power to grant RofO within the FCT is delegated by the President to the FCT Minister. The LA department of the defunct MFCT was responsible for the processing of the statutory right of occupancy before the establishment of AGIS.

Another LA service operating before AGIS (and to date) is the processing of consent to alienate land. This is a process to secure the consent of the Minister of FCT to alienate (for example, through transfer or sublease) a statutory right of occupancy. The Land Use Act stipulates that during the term of a statutory right of occupancy, the holder of the right shall have the sole right to absolute possession of all the improvements of the land. However, the transfer, assignment and mortgage of the improvements on the land are subject to the approval of the Governor. In the case of the FCT, the Minister grants his/her consent. An alienation of statutory right of occupancy is null and void in the FCT without the consent of Minister.

4.4 Literature review on e-government, corruption and e-land administration

This section reviews the literature on good governance in land administration and how computerisation ostensibly contributes to societal well-being by promoting good governance, human development and the reduction of corruption in the provision of core public sector services.

Good governance in land administration and computerisation

LA is described as

> *"public sector activities required to support the alienation, development, use, valuation, and transfer of land"* **[11**, **p 1]**.

The processes of LA such as registration of property rights, transfer of title, acquisition of land information, cadastral survey, land use planning, granting and issuance of property rights are vulnerable to various forms of corruption,

such as bribery, nepotism and favouritism, fraud, and white colour malpractices **[22]**, **[36]**. Nevertheless, their incidence depends on the political and institutional environment of the country in question **[39]**. Researchers and the international donor community have argued that e-government and geo-ICT can potentially improve the delivery of government services in LA organisations, and support effective land administrations systems **[14], [9]**.

Generally, it is expected that computerisation will solve

> "*problems of administrative inefficiency and financial haemorrhaging of the state apparatus, help define socio-economic visions, and enhance economic productivity*" **[31**, **p 59]**.

Another expected benefit of computerisation of the public services or e-government is the curtailing of corruption through proper record keeping **[30]**, especially in the wider context of electronic Land Administration (e-LA) **[36]**. E-LA

> "*is a major part of e-government and can be considered as a strong fundament for legal, administrative and technological structure for the entire public administration*" **[27; p1]**.

Geo-ICT is central to the development of e-land administration and Land Administration Systems (LAS) will increasingly be serviced by geo-ICT to implement e-government **[14]**.

Reflection on e-government and human development

The United Nations 2001 Human Development Report anticipates that new technologies will lead to healthier lives, greater social freedoms, increased knowledge and more productive livelihoods. The developmental opportunities of geo-ICT as part of e-government therefore include overcoming corruption **[6]**, **[9]** and ultimately bringing benefits to society. However, research on geo-ICT and development is still dominated by unpersuasive and uncertain arguments about geo-ICT enabled socioeconomic development **[6] [37]**.

The provision of LA services involves costs on citizens, in terms of money, time, and travels, queue, making payment, customising a product by users to personal requirements and being able to use a computer. These are referred to as 'consumer' transaction costs **[33]**, which can be reduced due to the use of geo-ICT and the introduction of e-LA. But how can this be associated with a concomitant reduction in corruption? For example, if queuing is reduced through the use of geo-ICT in the collection and processing of requests, bribery to move a person's request ahead of others is also likely to be reduced together with other resources spent by citizens on economic and political corruption. The capacity of e-LA to support freedom from corruption, reducing transaction costs arising from misallocations, forgeries and frauds

can improve the security of property rights and therefore be considered as a measure of socio-economic progress. For example:

> "*secure property rights encourage people to invest their resources and protect their investments against expropriation*" **[20, p 1234]**.

Evaluation research is necessary to understand how geo-ICT as an e-government intervention can contribute to the realisation of the principles of good governance and to societal well-being. The evaluation can begin with a consideration of contemporary social and economic problems or what can be considered as "*society-based critical issues*" **[37**, **p 18]** in the country under study. Society-based critical issues, for example poverty and corruption, are serious and possibly dangerous problems, which demand attention. Corruption emerges from the literature as a serious issue in the provision of public services and as a societal menace in Nigeria **[17]**, **[24]**. Former President Olusegun Obasanjo's declared on 29 May 1999 that

> "*Corruption, the greatest single bane of our society today will be tackled head on; no society can achieve anything near its full potential if it allows corruption to become the full blown cancer it has been in Nigeria*".

A reduction in the various forms of corruption can contribute positively to societal well-being, especially in Africa, where corruption is regarded as a major stumbling block in the path to successful economic progress **[28]**. The research of Gyimah-Brempong on corruption, economic growth, and income inequality in Africa **[16]** explicitly disclosed that: (1) African countries can increase economic performance by reducing corruption and (2) the growth effect of corruption reduction is higher than the growth effect of foreign development assistance. **[16**, **p 207]** submitted that

> *"… increasing the well-being of the majority of citizens in African countries can be enhanced by reducing corruption"*.

The reduction of corruption is pivotal to good governance and the development process of a country. Good governance contributes to societal well-being, because

> *"… an effective state is vital for the provision of the goods and services –and the rules and institutions– that allow markets to flourish and people to lead healthier, happier lives …"* **[38**, **p 824]**.

International agencies claim that e-government initiatives should be measured by the degree to which they contribute to good governance, empowering people, raising human capabilities and increasing people's access to life choices and opportunities **[34]**. Likewise, independent and sustainable institutions for land administration defining the nature of land and

property and the rights and obligations recognised by the law **[33]** are essential for individuals to realise their freedoms and entitlements.

We distil three major claims from our literature review. The first is that corruption slows down social and economic development and lowers growth. Secondly, the processes of administering land, which is of fundamental importance in every society, are vulnerable to corruption. Thirdly, e-government and e-land administration have the potential to reduce corruption and contribute to societal well-being. **The problem hitherto is the lack of conceptual clarity and dearth of empirical evidence on the role of e-government and geo-ICT in curbing corruption in land administration services and how this contributes to promoting good governance.**

4.5 Land administration services and AGIS

Granting of statutory right of occupancy

The processing of granting of statutory right of occupancy (RofO) as discussed under 'Land administration services before AGIS' is now supported with geo-ICT by AGIS. Prospective applicants (individuals and organisations) for a statutory RofO can download an application form online or fill the form online, print it and submit to AGIS office in Abuja. It is also possible to follow a process tagged "1 easy step", for a complete online application procedure. This eliminates the need to travel to AGIS office to submit a new application.

The processing of statutory RofO includes the seeking of approval of the Minister of the FCT. The step of seeking the approval is not automated and involves discretion on the part of the FCT Minister who holds the 'land in trust for the people' and is responsible for allocation of land comprised within the FCT.

Area councils' title regularisation

AGIS supports regularisation of 'customary titles' to land in the six Area Councils of the FCT. These are plots not issued by the authority of the Minister of FCT. They include the so-called 'customary letters of grants' ('Customary Rights of Occupancy' and 'Customary Certificates of Occupancy'). A judicial pronouncement has declared such 'customary titles' in an urban centre as illegal. One of the respondents to our survey, described regularisation as a way of correcting the mistakes made in the past:

> *"… hitherto defective 'customary titles' are now getting regularised with proper valid statutory rights and certificates of occupancy. In a way it is an attempt to harmonise title issuance and a return to Statutory as well as ensuring proper land title security within the FCT".*

The completion and issuance of CofO for area council regularisation was estimated at 30% in December 2008. Our supplementary fieldwork in April 2010 does not show any significant improvement.

Recertification

This is the use of geo-ICT to authenticate all plots of land allocated within the Federal Capital City (FCC) before the establishment of AGIS and issuance of new CofO from a geo-database to ensure their correctness and protection from forgery. The process involves the withdrawal of all the old land title documents issued since the inception of the FCT and replacement with new ones that have more security features and are difficult to replicate illegally without been easily discovered. The completion and issuance of CofO for recertification was estimated at 90% in December 2008. Our supplementary fieldwork in April 2010 reveals that the recertification is as good as complete.

Legal searches

A legal search is a process whereby individuals and organisations or their representatives (for example Lawyers, Land Surveyors and Estate Valuers) are allowed to ascertain the genuineness of landed properties before committing their resources into land transactions. The law enforcement agents can also conduct a search in the process of discharging their official responsibilities. The searches provide first hand and reliable information about the validity of any title document emanating from the land office. The information from the process includes name of land occupier, history, restrictions, responsibilities and encumbrances.

Consents to alienate

The process of seeking the consent to alienate statutory right of occupancy (RofO) or any part by assignment, mortgage, and transfer of possession, sublease and subdivision of a plot of land into two or more parts, e.g. on devolution by death of the occupier of land, in the FCT is partially supported with geo-ICT. According to a supply-side stakeholder, not all the processes are computerised: "*not yet. We still do some manual operations*". Another claimed that "*emphasis is less on this now, because of other responsibilities like regularisation, Federal Housing Land, and so on*".

Computerisation of critical modules for e-land administration

These are tasks that are crucial and facilitate the transition into e-land administration (e-LA). The tasks are computerised to different levels to aid the services listed above. The Urban and Regional Planning and Survey data are well computerised for the purpose of granting RofO and the authenticity of CofO is now verifiable via legal searches.

Other tasks that are computerised for e-LA are: street names and house numbers, revocation and reinstatement of RofO, and fiscal cadastre for billing

and issuance of payment demand notice and property valuation. It was difficult to determine exactly the levels of computerisation during the fieldwork. However, in December 2008, the level of completion of e-payment was estimated at 20%, property valuation at 10% with street naming and house numbering fully computerised.

4.6 Effects of AGIS on forms of corruption in LA in the FCT

From the evidence collected through interviews and surveys, we describe the various forms of corruption in the provision of land and property related services in the FCT in Table 2.

Following the logic that development can be seen as a process of expanding the real freedoms that people enjoy **[28]**, we present an assessment of contribution of AGIS to societal well-being in terms of whether the freedoms that people have from each form of corruption identified in Table 2 are enhanced. We take a people-centric viewpoint by considering *mainly* the effects of computerisation from the perspective of the users or demand-side stakeholders. Observe that this does not mean that the opinions and views of the supply-side stakeholders were not considered or completely excluded. Our findings from interviews, surveys and secondary data sources are presented in Figure 1.

Table 2: ***Prominent forms of corruption in LA services in the FCT***

Form of corruption	Description
Fraud	A deliberate deception or cheating in the calculation of land duties, tenement rates, withholding tax and all other taxes or fees related to land and property and pocketing of land revenue. Fraud also includes obtaining property by false pretence widely known as '419', meaning advance fee fraud.
Forgery	Creation of a false land document or alteration of a genuine one, with the intent to cheat or defraud. Since the goal of forgers is deception and cheating, forgery can be considered as a form of fraud. Eradication of forgery of land documents is a major concern of AGIS.
Multiple allocations	Deliberate allocation of one plot of land to more than one person or due to improper record keeping.
Bribery	A promise or offer in cash or kind to gain an illicit advantage in the operation of LA activities, such as processing of application for granting of statutory right of occupancy, recertification and regularisation. The person who offers bribe (briber) is usually on the demand-side and the person who obtains the bribe (receiver) is on the supply-side. At times there are persons who negotiate the bribery (mediator), intervene between the supply- and demand-sides, and make it less visible.
Nepotism and Favouritism	Abuse of discretion for the benefit of friends, relatives and political allies (for example in the granting of statutory right of occupancy).
White collar malpractices	Conspiracy with public officers, which leads to premeditated neglect of proper procedures for personal benefits. For example in cases when official permits are issued to build on utility lines or corridors (sewer, water, and telecommunication lines).

Fraud

A respondent to our survey observed that the effect of AGIS on fraud is insignificant and the "*fraudsters and perpetrators of these crimes also improve in the devilish act everyday*". Our findings show that fraudulent practices are inseparable from forgery. The perpetrators of fraud fake official government receipts to divert land revenue to their pocket. The first measure put in place by AGIS to reduce fraud was to pay directly to banks and use bank tellers for land transactions. Now, any payment to AGIS is through bank draft, which is difficult to forge because of unique identifiers on the bank drafts. It is also difficult to use the same bank draft more than one time. The accounting system of AGIS is automated, the bank draft is scanned into the system and a receipt is generated from the process. The online services offered by AGIS include opportunity for e-payment, which obviously reduce fraud. However, the e-payment is limited to one medium (eTranzact), thereby diminishing the freedom to use other modes of e-payment such as

Visa and Master Cards. Perceptibly, this does not reduce transactions costs for non- eTranzact users.

These efforts have increased the annual income to AGIS from an average of about ₦250million (USD 1.7m) per annum before AGIS to an average of about ₦5.2billion (USD 34.6m) per annum from September 2004 to November 2008. We observe that the rejection of cash transactions and workflow that checks for payment during the processing of services is largely responsible for reductions in pocketing of land revenue, consequently reducing financial haemorrhaging in the costs of enforcement of property rights by the FCTA. The reduction in the circulation of fake receipts reduced transaction costs and expands the freedom of demand-side stakeholders when venturing into land transactions.

Forgery

Both the supply- and demand side stakeholders stressed that the foremost criteria to measure the progress made by AGIS is freedom from forgery. According to a former Director of AGIS,

> *"From where we started, we started in a very bad footing because historically the documents that we took over from the defunct MFCT, which are documents that have been operated manually, the registers, the records, and all the rest of them were done manually, some have been torn, some have been tampered with […] because of this porousness of the system then, you find out that even fraudsters took over the operations to an extent of even having a parallel office that runs side by side with the department of land administration and resettlement"*.

A staff of the project's contractor remarked that "*The priority is not pushing files ahead of others, but to stop manipulations and forgery, etc*." All the respondents to our surveys either strongly agree or agree that forgery is an issue of concern. The impact of AGIS on eradicating forgery therefore turns out to be a main issue of practical interest to evaluate the capability of geo-ICT in reducing corruption and other transaction costs.

An interviewee on the demand-side of AGIS noted that if one gets the documents now "… *there is full assurance that it is a genuine land*". Another demand-side interviewee noted that "*forgery is reduced now, because it is now easy to confirm the documents from AGIS*". A civil servant also on the demand-side opined that "*But the issue of forgery, I cannot say much about it because either computerised or not, documents can be forged*". Then, we observe that the facilitation of authentication of land documents is important for demand-side stakeholders to lead a life free of corruption. This is realised through legal searches. From the searches, demand-side stakeholders can

discern between legitimate and illegitimate documents. We find out from an interviewee that "*the computerisation has helped in the storage and retrieval of land and property related information, but it is not so easy with forgery and other crimes/malpractices […] the criminals develop their own counter solutions. They use IT to produce the same set of documents"* produced by AGIS. The opinion of another interviewee is that forgery still happens, "*but everything leaves a trace, everything can be detected. As long as human beings are working with the system, we cannot rule out this. We know the cases; we are working on better supervision. It (forgery) will never go than below/to zero, but better*". This opinion corroborates data from secondary sources, for example **[8]** who reported that the Police in Abuja arrested five people for allegedly producing and selling fake land allocation papers. The report further stated that the accused forgers usually carry out the crime in collaboration with insiders. The evidence shows that they were running an illegal office in parallel to FCTA/AGIS, because official stamps of various land issuing authorities, payment receipts, blank land allocation papers of FCTA and some area councils were among the exhibits recovered by the police.

From our surveys (see methodology) the sum of the value for forgery before AGIS is 184 and 94 after AGIS. Thus, the opinion of the respondents is that there were more forgeries before AGIS than now; this is graphically presented in Figure 1. If the value is zero after AGIS, then there is an '*ideal state*' of total freedom from forgery. Evidence from three sources of interviews, surveys and documents revealed that the AGIS demand-side stakeholders have gained some freedoms to lead a life without being frustrated by fake land documents. However, slapdash and unsuspecting people are still constrained by forgery.

Multiple allocations

A respondent to our survey noted that "*the issue of multiple allocations is rare now*" and another observed that AGIS "*has reduced to the barest minimum malpractices associated with land allocations, e.g. double allocation*". Perhaps, these show reduction in the incidence of multiple allocations after AGIS, but according to a respondent, "*AGIS should improve on the issue of double allocation*". A comparison of opinions of the demand-side stakeholders in Figure 1, gives the same impression that multiple allocations have reduced, but still a noteworthy constrain. This lends credence to the observation that "… *AGIS as it is today, you still have numerous plot duplication, multiple allocations*…". The opinion that "*but I know before then double allocation was very rampant, before the computerisation. But now, to the best of my knowledge, I think that has been reduced to the barest minimum*" recapitulates the judgment of our interviewees.

The demand-side stakeholders now have more freedom from multiple allocations, because the system is designed to prevent reallocation of land that has been already allocated. The guard against multiple allocations is purely database driven. The Allocation Editor, File and Plot validation, Plot Lookup and other spatial analysis functions of AGIS-Land Information System can automatically detect and warn against multiple allocations.

Bribery

Data collection on bribery was difficult during the fieldwork, because of its hidden nature. Only one of the respondents to our survey agreed that he/she paid to quicken or facilitate the processing of statutory right of occupancy. However, some survey respondents agreed that they gave 'gifts' in appreciation of the LA services they received. A survey respondent remarked that "*today, we can observe less corrupt practices by the AGIS civil servants. But this does not mean that there is no longer bribery* …" Figure 1 shows that the respondents judge the incidence of bribery as lower now, than before AGIS. One of our demand-side interviewees, who is a civil servant noted that respondents will not like to own up to giving bribe because "*… in Nigeria if you give bribe you are an offender, if you take bribe you are an offender as well. Both of you are guilty of giving and taking, it's not one way, it's bi-directional*". The position of another interviewee is that "*in the old registry of FCT, when they ask me to give bribe, I said no. It's a capital NO. In AGIS now, I just drop my application. Most of the time, you don't have direct dealings with the guys. You just submit your application and go*". We sum up our findings on bribery with the comment of an interviewee that "*you can call it bribe or gratification or anything you like, the computerisation has reduced these problems, but mind you there are still other issues*". Cutting corners or what is locally referred to as '*chua chua'* visibly exists as a form of bribery. Chua chua involves doing things in a disorderly manner. We recognise chua chua as bribery from the statement that "*most of the things I use to get, if people are getting it one week or two weeks, my own can take three months, because I am not ready to do chua chua. I am not ready to bribe anybody* …". An interviewee noted this and said that "*I know there is chua chua, chua chua is still there*". The online services expand freedom from some kinds of 'petty' bribery, such as the payment of trifling sum to get application forms and reduce the visibility of the activities of touts around the AGIS premises.

In our study of AGIS, we find that non-payment of bribe is largely due to two reasons. One, some interviewees will not pay bribe because they consider it immoral and illegal. The second reason is lack of resources to pay bribe. An interviewee puts it clearly to us that "*But, but I don't know anybody there and don't have money to bribe*" and further reiterated that "*I don't have money for chua, chua. But, if I have I will give them, but I don't have. It's just a matter of using what you have to get what you want*". For this

interviewee, bribery is a way to acquire property rights, but constrained by the resources to offer bribe. However, we reason that if the system is fair and transparent (as wished-for in the AGIS mission) the interviewee may not consider a bribe, except if he/she is committed to bribery as a means to lead the kind of lives he/she values and have reason to value.

Nepotism and Favouritism

This is observed as an issue that is cultural and not something to worry about. For example, an interviewee remarked that "*the civil servants have to favour their friends and help them to facilitate their applications*". Another interviewee responded that "*Jamaan ka, su ne arzikin ka*", meaning "*your people/crowd is your wealth*". We observe that nepotism is still prominent or more prominent after AGIS as reflected in Figure 1. It is grounded on the concept of 'man-know-man' as observed by some interviewees, "*If you know the minister, permanent secretary or senator, top civil servants and politicians, you will get land quickly*". "*They should give land to people that does not have connections. They should tell us where there are vacant lands and people that have land in Abuja*". "*They still have clicks, let them be open. I am not sure they are faithful; still behave like typical ministry people*"**.** "*I had to seek the assistance of a colleague, a professional colleague who works there, and it was the fellow, the colleague that assisted me to retrieve the acknowledgment*"**.** About 43% of respondents to our survey confirmed that the have received some kind of assistance from friends and professional colleagues working at AGIS/FCTA. Some of these practices are considered by some respondents as normal, and those that are unwilling to support or even favour friends, relatives and allies are considered as a foe and having no place or status in the society. However, a respondent to our survey remarked that rent-seeking by government officials still continued with the computerisation and this nearly derailed the good project. An interviewee directly put it that "*favouritism, for example for a Senator's wife will always be there*".

White collar malpractices

The demolitions of some buildings with 'approved' building plans demonstrated white collar malpractices as a form of corruption in the provision of LA services in the FCT. The citizens "*were lured into purchasing the illegal land and houses by a syndicate of land racketeers who connived with some staff of the FCDA to trade the properties to unsuspecting buyers*" **[18]**. This secondary evidence does not contradict the position of some interviewees that "*abuses and malpractices, still going on, people use the boys that are running those things to change the records"* and *"there were malpractices, abuses, etc in the old system, and they are still there".* Figure 1 shows that the substantive freedom from white collar malpractices is marginal. This is reflected in our surveys' responses, with comments such as

"*malpractices have reduced, though not eliminated. Some new ones have also come up*". "*Computerisation cannot remove malpractices*". However, other respondents believe that "*it has checked malpractices and misconducts considerably. But, there are still some loopholes*", "*reduced rate of malpractices and misconducts in general*" and "*it makes people to know whether the allocation is genuine or fake, thereby reducing the rate of malpractices and misconduct*".

Overall, five of the six prominent forms of corruption in the provision of LA services in the FCT reduced with AGIS (computerisation) intervention. Our factual account of AGIS is that low human interference and higher levels of computerisation of LA services reduce corruption and transaction costs and can therefore promote good governance. Figure 1 presents the judgment of the respondents to our surveys on levels of corruption before and after AGIS. Table 3 shows the overall nature of the contribution of geo-ICT enabled services or e-land administration services to societal well-being.

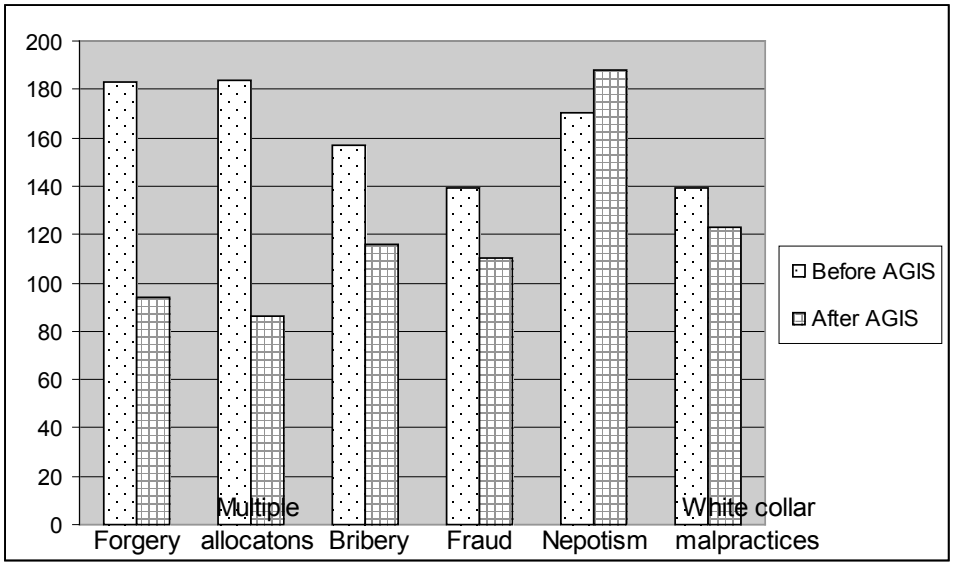

Fig. 1: An assessment of levels of corruption in the provision of LA services before and after AGIS

Evidently, citizens have more freedom from fraud and white collar malpractices. The impact of AGIS on nepotism and favouritism is uniquely different. A respondent to our survey, who has formal training in LA, opined that: *"AGIS is a welcome development; the major problem is nepotism and favouritism by the decision-makers or among politicians. The vesting of management of land solely on the political class is a problem. If all the procedures at AGIS are fully automated with minimum human interference,*

corruption can be eradicated in land administration". An interviewee reacted that *"favouritism is a cultural thing. Whenever some has opportunity to take advantage of the system, they will. People think that it is their right to do what they are doing because; they have waited enough for it".* The situation is readily understood. Since, the power to grant right to occupy and use land in Nigeria is constitutionally placed under the jurisdiction of the ruling class, unfaithful leaders can easily abuse the authority of their office to favour relatives, friends and political allies. Secondary evidence shows that 3645 plots of land were allocated within two weeks of 17-29 May, 2007, when the Federal Executive Council (FEC) had been dissolved **[5]**. The dissolution of the FEC implies that there was no legitimate Minister of FCT to grant the allocation of land. The plots, which were allocated to relatives and political allies, were later revoked by the Senate **[13]**.

4.7 Effects of AGIS on the satisfaction with the e-LA services

In this section we will comment on the level of satisfaction with LA services supported by AGIS and effectiveness of the services specifically for promoting good governance and improving societal well-being through corruption reduction.

Granting of statutory right of occupancy

The support of geo-ICT for the administration of land for the use and common benefit of all citizens is at risk because the critical aspect of approval of allocation of land is discretionary. Only 9% of the respondents to our survey are satisfied with the provision of the service of granting of statutory RofO, 36% are indifferent and 55% are unhappy with the service. Although, the service of granting of RofO is largely computerised, it is not effective enough to serve majority of the citizens equitably, for example majority of Federal Housing Authority, Federal Government Houses and Area Councils' potential land occupiers have not received their certificates (in 2009). Evidences from primary and secondary sources reveal that the granting of RofO is particularly plagued with favouritism and nepotism, hence highly corrupted, leading to high transaction costs and not able to support the equity goal of good governance. Despite the reasonably high level of computerisation of the granting of statutory right of occupancy, we find AGIS intervention as neither ineffective nor effective, and apparently with high transaction costs.

Area councils' title regularisation

The regularisation of titles in the area councils is not well-developed or has not received adequate attention. For example, the completion of regularisation and issuance of CofO for the people in the six area councils of

the FCT was estimated at 20% in December 2008. Although, our evidence does not show high levels of corruption in the service of regularisation, only about 11% of the respondents to our survey are satisfied with the provision of title regularisation. This substantiates the remark by a user that *"up till now, some of the documents submitted to AGIS, we have not been able to see the CofO, up till now"* (17 April 2009). While the transaction costs observed are low, the implementation of geo-ICT is ineffective thereby contributing low to societal well-being.

Recertification

The support of recertification by AGIS was scheduled for nine months: 01 August 2004 to 30 April 2005. Our last fieldwork in April 2010 revealed that the exercise had been completed, if otherwise the outstanding is negligible. Recertification is largely a geo-ICT driven process to capture spatial data, attributes and title documents in the FCC to issue a new and more 'secured' CofO to evidence the granting of statutory right of occupancy. The users, who are property owners in the FCC, are less peeved with corruption and for them transaction costs are low. 51% of the respondents to our surveys are satisfied with recertification, 27% are indifferent and 22% are unhappy. The recertification mechanism is effective with low transaction costs bearing out high contribution to societal well-being.

Legal searches

AGIS reduces the forgery of land documents to demand-side stakeholders. This is mainly due to the design of AGIS and online services, which provides opportunities to validate the legitimacy of documents through legal searches. About 92% of the demand-side stakeholders who responded to our survey are satisfied with the provision of the service of legal searches. Legal searches are less plagued with corruption; they reduce transaction costs and provide a high contribution to societal well-being.

Consents to alienate

The consents to alienate are normally granted by the FCT Minister and Governors, in the case of states in Nigeria. The workflows for consents are not fully computerised; applicants are compelled to wait for an approval, which involved ennui bureaucratic procedures, leading to high transaction costs, but seldom afflicted by corruption. Although, low corruption is associated with the provision of consents to alienate, the implementation is still ineffective to generate growth for the citizens and contribute to societal well-being.

It is worthy of note that while we observe low corruption in consents to alienate –as before with the support title regularisation– , its contribution to societal well-being is low because they have received low attention in terms

of application of geo-ICT. The desires of the majority of the potential title owners and occupiers of land were rarely met; few respondents (15%) were satisfied with the service of consents to alienate.

The administrators of AGIS and FCTA recognise that reduction of corruption in the provision of LA services cannot be achieved solely through the use of geo-ICT. They sought the assistance of the Independent Corrupt Practices and Other Related Offences Commission (ICPC) and Economic and Financial Crimes Commission (EFCC) in investigating cases of corruption in land matters. For example, the ICPC filed a case, which involves a staff (or former) of the FCTA at FCT High Court in Maitama, Abuja. It is recently reported that "*… seven years after, the Abuja Geographic Information System (AGIS) was still at its infancy, thereby making it susceptible to manipulation of Land Information System as well as other irregularities*" **[10**, **p 80]**. One of the respondents to our survey pointed out that "*what we can see today is that AGIS has only shifted corrupt practices to higher level. Corruption is no longer open as in the past but, it is till there, but less visible".* According to a respondent, "*computerisation may not prevent some of these issues of corruption if there is no political will to stop it".*

4.8 Conclusions

This paper assesses the effects of the use of geo-ICT by AGIS on corruption reduction in the provision of land administration services in the public sector of Nigeria and presents an outlook of how the services supported with geo-ICT can contribute to good governance and societal well-being. Our empirical findings, summarised in Table 3, reveal that the e-land administration services of recertification and legal searches (characterised by less human involvement) reduce corruption and have a high contribution to promoting good governance and improving societal well-being. We observe low levels of corruption in the provision of the services of title regularisation and consents to alienate. However, the contributions of the two services to promoting good governance and improving societal well-being are minimal.

The facilitation of the granting of statutory right of occupancy with geo-ICT is yet to contribute to societal well-being. The e-land administration service for the granting of the statutory right of occupancy received most criticisms throughout our study of AGIS and does not promote good governance and improve societal well-being. For example, recall that only 9% of the respondents to our survey are satisfied with the provision of the service of granting of statutory RofO. Herein, we deduce that geo-ICT or electronic services do not drive, but enable corruption reduction in the provision of LA services, which then contributes to promoting good governance and improving societal well-being. The degree of enabling by geo-ICT is however, dependent on the people (service providers and users). This is clearly

recognised by one of our interviewees, who remarked that "*as long as human beings are working with the system, we cannot rule out this* [corruption]".

The capabilities offered by AGIS to rapidly display land information do support decision-making and enhance the property market through legal searches and reduction of circulation of fake land documents. Yet, they also intensify nepotism and favouritism. Decision-makers readily have access to land information to support decision-making in granting right of occupancy to allies. Overall, we find out that forgery, multiple allocations, bribery, fraud and white collar malpractices decline. On the other hand, nepotism and favouritism is a unique form of corruption on the increase.

Further studies are necessary to advance knowledge on why the use of geo-ICT in support of land administration or why the provision of e-land administration in the FCT is still susceptible to manipulations and irregularities. We particularly suggest the impact of policies, legislations, norms and rules of conduct on the societal benefits of AGIS. The findings of our study can encourage researchers to take a closer look at why and how the society is benefitting from geo-ICT implementation in the public sector or e-government policy initiatives. This study can also inform practitioners about the pervasiveness of factors not deeply rooted in standard technical solutions of geo-ICT implementation for e-government.

Table 3: A précis of the impacts of geo-ICT support in the provision of land administration services in the FCT of Nigeria

LA services in FCT before AGIS	LA services vulnerable to corruption	LA services supported with geo-ICT	Forms of corruption that have decreased	Forms of corruption that have increased	Enhancing effects on societal well-being	Constraining effects on societal well-being
Granting of statutory right of occupancy. Processing of consent to alienate. Verification of land record. Revocation and reinstatement of Rights of Occupancy. Consent to alienate.	Granting of statutory right of occupancy. Processing of consents to alienate. Verification of land record. Consent to alienate.	Granting of statutory right of occupancy. Recertification and regularisation of land titles. Verification of land record (legal searches). Consent to alienate.	Forgery. Multiple allocations. Bribery. Fraud. White collar malpractices.	Nepotism and favouritism.	Trouble-free legal searches to confirm the status of property before purchase. Security of landed property, confidence in land transactions and promotion of property and estate business. Decrease in fear of double or irregular allocations and reduction in the effects of forged documents, such as trauma and loss of money. Ease of processing of recertification. Knowing the status of a plot at a dial. Less apprehension about bills and increased land revenue. Ease of confirmation of land documents to secure housing loan from Primary Mortgage Institutions without the gratuitous payments.	Limited online services: not all information (e.g. plot owners, vacant plots, value of properties, etc) are provided. Limitations in e-payment: only one option. Periodic failure of website (abujagis.com). Delay of documents: certificates of occupancy and consents. No transparency in the granting of statutory right of occupancy/ Favouritism in granting of statutory right of occupancy. All services are located at the headquarters, including the only electronic customer service centre.

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Chapter 5: The impact of Electronic Land Administration on urban housing development: The case study of the Federal Capital Territory of Nigeria

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The impact of Electronic Land Administration on urban housing development: The case study of the Federal Capital Territory of Nigeria

ABSTRACT
This paper evaluates the impact of electronic land administration as an e-government policy initiative in Nigeria. It analyses conceptually the differences between the expected and actual value of Abuja Geographic Information Systems (AGIS)—an e-land administration project—on urbanisation in Abuja, the Federal Capital Territory (FCT) of Nigeria. The AGIS case study reveals that differences between the expected and actual value of strengthening the state's financial capacity are low. The differences are medium for enhancing access to and security of credit, and improvement of land use planning and environmental management and high for the promotion of popular participation. The elicited differences are traceable to hindrances inscribed in Land Use and National Housing Acts, to inequitable access to land, inconsistent resettlement policy, poor community participation and financial misconduct. The findings suggest the need to pay attention to provisions through which e-government can support the reduction of country specific problems, improve the quality of institutions and to promote urbanisation, thereby increasing social welfare as well as participation by the people in promoting suitable and adequate shelter for all citizens.

Keywords: Abuja; Nigeria; E-Land Administration; Housing; Expected Value; Actual Value

5.1 Introduction

Urbanisation has emerged as a core political issue in Africa and many African countries have started to recognise the potential contribution of urban centres in the development of their national economy (Puglisi, 2010). The debate on how urban governance influences social cohesion and economic development in Africa is gaining momentum among academics (Gandy, 2006). Yet, how do Information and Communication Technology (ICT) and governance processes mutually shape each other in urban development? Generally, e-government is perceived to improve the capacity of the state to respond to citizens' needs and demands (Gauld et al., 2009), to serve as a mechanism for government's administrative reform and to realise state policies and developmental goals (Ciborra & Navarra, 2005).

In Nigeria, politicians and bureaucrats observed that to achieve developmental goals reliable and up-to-date cadastral records are imperative, and this can be achieved through good urban governance and well managed

Geographic and Land Information System after the computerisation of land registries (Alkali, 2005; Suleiman, 2009); or in other words electronic land administration (e-LA). However, the role of e-LA as an e-government policy initiative for urbanisation in Africa has not yet been fully investigated in the academic literature. There have been few, if any, empirical studies on the role of e-LA on urbanisation in Nigeria, and elsewhere in Africa.

The objectives of this paper are to explore the expected benefits of e-LA according to the academic literature and then examine how Abuja Geographic Information Systems (AGIS) contributes to urbanisation in Abuja, the Federal Capital Territory (FCT) of Nigeria.

The rest of the paper is organised as follows. Section two presents a review of literature. A framework for the evaluation of the impact of e-LA in urban housing development is proposed in section three. Section four discusses the methodology and gives a description of the case study. Section five analyses the case and presents the research findings. Section six presents the lessons learned from the case study with some recommendations. Section seven concludes the paper and offers suggestions for further research.

5.2 Literature review

This section reviews the literature on the role of e-LA in urban development, which encompasses the planning and investment in facilities and structures to support urbanisation (Stren, 1993). It also explores the benefits expected from e-LA in urban housing development and in particular: access to and security of credit, the improvement of land use planning and environmental management, the promotion of popular participation and the strengthening of the state's financial and taxation capacity.

5.2.1 E-land administration and urban development

Good urban development can support a nation's growth and welfare agenda (Kessides, 2007). Land Administration has for long time contributed to the understanding and management of urban centres through the development of cadastral systems for the provision of services and information on land ownership, value and use (Dale & McLaughlin, 1999).

The rate of urbanisation in Africa is one of the fastest in the world (Puglisi, 2010). Such a trend is a great challenge to land professionals who apply e-LA to tackle the social, economic and environmental consequences of rapid urbanisation (Enemark et al., 2010). Researchers claim that e-LA can contribute to urbanisation via potentially facilitating the development of the infrastructure for the implementation of land policies and land management

strategies to support sustainable development (Williamson et al., 2010a) and future living and livelihoods (Enemark et al., 2010).

E-LA also has the potential to support greater efficiency and to improve government coordination and collaboration, better management of urban infrastructure, to enhance public participation in the affairs of government and the democratic process and bring people and government closer (see, Gauld et al., 2009). Yet, how can urban governments and citizens in Africa benefit from e-LA as an e-government policy intervention, with most land lacking formal documentation of ownership and rights of use (Toulmin, 2009)?

According to de Soto (2000), such undocumented assets are hard to move in the market. De Soto argues that land with ownership rights not adequately recorded cannot be readily turned into capital and used as collateral for a loan. For de Soto, the main cause of poverty is lack of formal property rights that can easily convert work and savings of the poor into capital. De Soto exemplified his idea with the case of Egypt, where the poor have accumulated wealth worth 55 times as much as all direct foreign investment ever recorded in the country.

In Nigeria, "… *far too little emphasis is placed on the economic incapacitation of the population due to their having no recognizable property rights. Nigerian citizens thereby miss out on many economically empowering possibilities that such rights confer, including access to the collateral that is required to acquire credit from financial institutions*" (Mabogunje, 2009: p. 793). Even though adequately documented or recognisable property rights are necessary for social and economic growth, they are not sufficient to ensure it and restrictions in property rights can limit the capacity of urban dwellers to afford formal housing and encourage informality and squatting (World Bank, 2009).

5.2.2 Expected Value (EV) of e-LA on urbanisation

It is difficult to establish that formal evaluation methods work well when evaluating e-government projects (Irani et al., 2005) and there is no internationally accepted or standardised method for the evaluation of Land Administration Systems (Steudler et al., 2004). Set against these academic findings, this paper identifies the benefits of e-LA in the academic literature, referred to as the 'Expected Value' (EV) of e-LA in urbanisation and groups them into four categories: 1) Enhancement of access to credit and security for credit, 2) Strengthening of the state's financial and taxation capacity, 3) Improvement of land use planning and environmental management and 4) Popular participation.

Capacity is defined as the "*ability of individuals and organisations or organisational units to perform functions effectively, efficiently and sustainably*" (UNDP, 1998: p. x). The capacities for the realisation of the expected value are factors that affect the ability of a project to be developed, implemented and the results to be sustained (UNDP, 1998). The literature, for example (Enemark & Williamson, 2004; Guy & Henneberry, 2000) shows that the capacities for the realisation of the expected value of e-LA in urbanisation can be broadly classified as: Institutions, Organisation and human resources, Infrastructures and Finance.

Enhancement of access to credit and security for credit

The growing African urban population requires housing (Puglisi, 2010). Accessibility to and security of credit have direct influence on the availability of capital for citizens to build or buy houses. Yet, credit transactions are naturally risky. Lenders require collateral such as fixed assets as guarantee for loan repayment. For land or property to serve as collateral, the lender must be assured that the borrower is indeed the owner (Feder & Nishio, 1998). To lessen the credit risk, especially for long-term mortgages, lenders also check applicant's income as well as the income-to-loan ratio (Loutskina & Strahan, 2009). Two issues are usually investigated before a credit is granted: title of the borrower and the value of the land or property (Osamolu et al., 2008). The situation becomes difficult when lending institutions have imperfect information on the borrower, for example incorrect and out-of-date facts or data about land occupiers and property owners. E-LA therefore can be assessed in terms of its effects on the reduction of risky credit transactions and to verify the collateral to grant credits for housing, investigation of title and security for credits granted.

Strengthening of state's financial and taxation capacity

Finance plays a central role at all stages of urbanisation (World Bank, 2009). An analysis of the effects of e-LA in supporting land and property taxation indicates an increase in effective revenue mobilisation (Mabogunje, 1990); therefore highlighting the direct contribution of e-LA to the financial and taxation capacity of urban governments (strengthening the state's legitimacy) as well as potentially reducing the vulnerability to political violence in African states (DiJohn, 2010). Land Administration (LA), through taxes on land plays a significant role in raising revenue for public finances (FAO, 2007), which can also contribute to urbanisation.

Improvement of land use planning and environmental management

Improved planning and land-use procedures can increase the supply and reduce the cost of land for housing and plummet urban squatting (Toulmin, 2009). The use of high resolution satellite imagery and electronic surveying to monitor urban land use changes and GIS to manipulate spatial data and

attributes to monitor physical development and plan service provision in urban centres (Masser, 2001) can improve urban planning and land-use procedures. GIS, with an integrated socio-economic database such as population, health, education, markets, transportation, and land-use, provides functionalities that can also support planning of utilities and environmental management (Liu & Zhu, 2004). Cadastral maps, which regularly support land registration in many countries, are now derived from digital geo-databases.

Popular participation

Popular Participation (PP) provides the driving force for collective commitment to citizen-centric urban housing development processes. It has emerged as a major force in policy-making and political philosophy (Gbadegesin & Ayileka, 2000) and motivates citizens to undertake sacrifices and expend their social energies for urban development. PP is also a fundamental right of a citizen: to fully and effectively participate in decision-making, which affect his or her life (Adedeji et al., 1997; cited in Amba, 2010). PP encompasses promotion and building of partnerships among public- and private-sector agencies, and Community Based Organisations to avoid duplication of activities and conserve resources (time, money and equipment) needed for urban housing development (Williamson et al., 2010b). PP can make land administration transparent, enhance citizens' confidence in LA and also promote private sector investment in urban housing development. Thus, the extent of citizens' participation in e-LA requires monitoring and evaluation.

5.3 Evaluation framework

Drawing on the insights from the literature review, one can examine the role of e-LA in urban housing development in terms of the extent to which an Expected Value (EV) or theoretical expectation *meets or surpasses* the Actual Value (AV) or actual outcome of e-LA in urbanisation. The size of the gap (Aldrich et al., 2002) between the EV and the AV (i.e. low, medium or high), will ultimately determine how the anticipated effects and benefits (Irani et al., 2005) of e-LA as an e-government policy initiative for urbanisation are being met or surpassed.

The framework proposed in Fig. 1 (hereinafter referred to as 'EV-AV evaluation framework') can be applied in evaluation of the role of e-LA in urban housing development in four steps. The first step involves the development of a list of expected benefits from the literature. The second step is an empirical study of the real effects of e-LA in urban housing development, and a consideration of the theoretical expectations of a project vis-à-vis the real effects to determine the differences between the EV and AV.

During this step, researchers "… *cannot avoid what the positivists disparately refer to as 'value judgements'. 'Development' is inevitably a normative concept, almost a synonym for improvement. To pretend otherwise is just to hide one's value of judgements*" (Seers, 1972: p. 22). The third step focuses on explanations of the differences in terms of the capacities for realisation of the EV. The fourth or final step consists of recommended actions to lessen the differences.

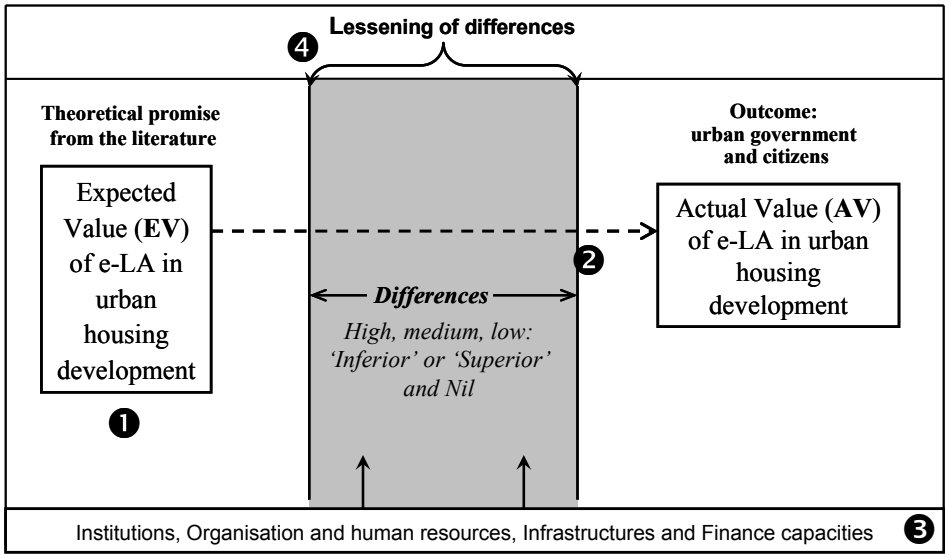

Fig. 1: Proposed evaluation framework for the role of e-LA in urban housing development

Fig. 1 illustrates the EV of e-LA on the left (alias the theoretical promise from the literature) and the AV on the right (alias the outcomes on urbanisation: government and the citizens). The dashed line with single-headed arrow indicates the differences existing between the EV and AV. The AV can fall behind ('inferior to') the EV or surpass ('superior to') the EV. In any of the two cases, the differences between EV and AV can be analysed and assessed as Low, Medium or High. The assessment can mark out and specify if a difference is inferior or superior as illustrated in the middle or shaded area of Fig. 1.

When the EV is exactly realised as AV, then there is a perfect situation of nil difference, low difference indicates that the EV is maximally transformed into AV and vice versa. When the AV exceeds the maximum or upper limit of the EV, the AV can be considered superior to the EV. The solid lines with single arrows pointing towards the differences are supposed to show that the AV can fall behind the EV or surpass the EV due to variations in the capacities.

5.4 Case study

5.4.1 Methodology

This research follows a case study methodology. Thus, it illuminates the implementation of AGIS and its effects on urban housing development in Abuja, within the natural real-world setting of AGIS. Data was collected in three phases: (1) preliminary exploration before field work in December 2007 and March 2008, (2) comprehensive data collection between February and May 2009 and (3) additional data collection in February-April 2010 and supplementary surveys in May-June 2011.

Primary data were collected from organisations and individuals through 48 semi structured interviews, direct observation and surveys. Some of the interviews were digitally recorded with the consent of the interviewees and notes were taken in all cases. Direct observation involved on the spot study of geo-ICT users and people at work in AGIS headquarters. The observations took place at the reception desks, waiting hall and back offices. Three types of secondary sources of evidence were used: documents, archival records and physical artefacts. The total of six sources of evidence allowed the verification of data from one source with another (Yin, 2003).

Respondents to the interviews and surveys were selected from the AGIS organisation proper (*supply-side*) and from the users of AGIS services (*demand-side*). The interview respondents were further drawn from other organisations involved in the provision of land and property related services and electronic government (supply-side). While the interviews cut across both demand- and supply-sides, the surveys focused entirely on the demand-side: the users of those land administration services that are electronically supported by AGIS. The organisations selected on the supply-side for e-LA in Abuja are the Federal Capital Territory Administration (FCTA), AGIS and National e-Government Strategies (NeGSt). On the demand-side are Federal Mortgage Bank of Nigeria (FMBN) and four Primary Mortgage Institutions (PMIs). Also on the demand-side are professionals, civil servants, local indigenes and individual citizens who use the services of AGIS. The selected users have received at least one kind of service from AGIS. For privacy reasons, it was not possible to get a list and contact information of users (individual citizens) of AGIS services. However, it was clear that organisations such as the FMBN and the PMIs are regular users of AGIS services as are private professional companies of Land Surveyors, Town Planners and Lawyers are also regular users of AGIS services. The professionals were contacted mainly through professional bodies like the Nigerian Institution of Surveyors and Nigerian Geo-information Society, Abuja

branch. These approaches ensured that the respondents are true representatives of the users of AGIS services.

The interviews and surveys with the organisational respondents were conducted in their offices, for example at the FMBN and ASO Savings and Loans PLC. All the interviews and surveys were conducted *in-person (face-to-face)*. Attempts to use electronic survey were not productive, out of the ten trial questionnaires sent out by email, only one was returned. It is essential to recall that the survey respondents were selected from people who physically go to AGIS headquarters to request services. This is because the authors do not have access to an advance list from which to sample. Thus, *the in-person survey* adopted in this research constitutes a variation of so-called '*intercept surveys'* (Rea & Peter, 2005).

Surveys were conducted in two sets. The first set of surveys was carried out between February and April 2010 and the second set of surveys in May-June 2011. The surveys were conducted using questionnaires administered to the organisations and to individuals. Out of the 100 questionnaires administered during the first set of surveys, only 51 were returned and 77 were received back from the 132 questionnaires administered during the second set of surveys.

During the preliminary exploration, we discovered that no user requirements surveys and analysis were carried out prior to designing and implementing AGIS. Thus, we included into the first set of surveys *ex post* questions, which go backward in time to identify causal factors for using AGIS services. An example of such question is "Tell me three benefits that you derive from making use of AGIS products and services". We also asked questions on the significance of the computerisation and participation of Abuja residents in the activities of AGIS. The second set of surveys was a supplementary survey to incorporate more objective measures to evaluate each of the four criteria presented as the theoretically expected benefits. During the second set of surveys, a ranking by Fisher (2006) was adapted to allow the respondents to rank the effects of AGIS on housing development in Abuja on a scale from 0 (not applicable), 1 (strongly disagree), 2 (disagree), 3 (agree) and 4 (strongly agree). The idea here is that the higher the value of each of the four criteria, the better the impact of AGIS on the criteria. This ranking is referred to as *weighted value*[17] in the case study analysis. This implies that when a respondent selects 1, the impact is designated as very poor, for example, for a question like "the conduct of legal searches has indeed

[17] For example, if 50 out of the 77 survey respondents selected 4 (strongly agree) for a particular question. The weighted value for the response to the question will be (50*4) 200 and 20 selected 1 (strongly disagree), the weighted value will be (20*1) 20. The impact in the former is considered better than the latter.

enhanced my access to mortgage or opportunity to borrow money to build or buy a house". When 2 is selected the impact is poor, for 3 the impact is good and a selection of 4 is designated as very good impact. This concept is summarised in Table 1. It is important to note that these are perceptions of the effects of the computerisation by demand-side stakeholders. The perceptions were further verified from other data sources such as interviewing and documents.

Table 1: Ranking of demand-side respondents' opinions and assigned impact

Ranking /Weight	Opinion	Impact
1	Strongly disagree	Very poor
2	Disagree	Poor
3	Agree	Good
4	Strongly agree	Very good

The data analysis started with transcription of digital voice files and field notes. The transcribed texts were assembled into six categories of related issues and followed by reading and analysis of documents and archival records. The open ended questions of the surveys were summarised to show categories of similar issues on housing development and the closed questions were analysed as percentages/ratio and displayed graphically in Microsoft Excel®. Based on the qualitative analysis of the interviews, secondary evidence and quantitative analysis of the survey results, the differences between the expected value and actual value of e-LA in housing development in Abuja were labelled as Low, Medium or High.

5.4.2 Abuja Geographic Information Systems (AGIS)

To guide an orderly development of the Federal Capital City (FCC) and the FCT, the Abuja Master Plan was approved by the Federal Government of Nigeria in 1979 (Jibril, 2006). Housing is recognised as a critical success factor in the implementation of the Master Plan by the designers of the Master Plan (International Planning Associates) at least in two ways.

- Housing represents the most basic of human needs and has a profound impact on the health, welfare, and productivity of individuals.
- Residents will judge the City not only on how the organisation of the City fits their everyday needs, but also on how the demand for housing is provided (COHRE-SERAC, 2008).

Prior to AGIS, it was difficult to meet the land and housing needs of the citizens, especially with influx of civil servants into the new capital city (Ikejiofor, 1997) in the early 1990s. This forced civil servants to share apartments and led to the growth of squatter settlements. In 2002, it became clear that the implementation of the Master Plan has been distorted

and the Federal Capital Territory Administration (FCTA), embarked on what is referred to as: '*Restoration of the Abuja Master Plan*'.

AGIS was established in 2003 to modernise the entire operations of the Land Administration (LA) and other land related departments of the FCTA. From direct observation of processes and technology at AGIS, the Agency can be viewed from two perspectives. The first perspective is that of an agency for performing internal government processes through the use of GIS and associated technologies such as global positioning systems and intranet to support FCTA Departments and the six Area Councils of the FCT. The second perspective is employing the processes of the internal systems to externalise government by enabling citizens, public and private sector agencies to have access to LA services through the internet and connecting with citizens through mobile phones, radio, television and print media.

The e-LA services of AGIS include preparation and issuance of Certificate of Occupancy (CofO), preparation and issuance of statutory Right of Occupancy (RofO), production and printing of Titled Deed Plan (TDP), street naming and house numbering, provision of textual and graphic data such as land records, aerial photographs, satellite images, engineering drawings, images of buildings, property search and verification of land records, application for land allocation and land and property related revenue collection[18]. Generally, these services are expected to support the implementation of the Abuja Master Plan, enforce development control standards, limit squatter settlements, facilitate infrastructure development plan for the FCT satellite towns and rural areas, improve sanitation level and greening, and improve funding and administration of the FCT.

Evidences from direct observation and physical artefacts reveal that AGIS-GIS is customised especially for cadastral applications, using proprietary software and programs built in-house to store, manage, integrate, analyse and present geographic information to support decision-making and solve environmental problems. Large scale cadastral maps were produced on a scale of 1:2,000 and 'as built engineering drawings' on a scale of 1:500 to support physical planning and development, such as road construction and mass housing development. Furthermore, a Land Information System (AGIS-LIS) was developed and linked to the AGIS-GIS. The AGIS-LIS produces all necessary documents including Title Deed Plan (TDP) and Certificate of Occupancy (CofO). A Document Management System (DMS) was also built and linked to AGIS-LIS and AGIS-GIS.

[18] http://www.abujagis.com/services.html, accessed on 15 November 2010

5.5 Case study findings and analysis

This section presents an analysis of the differences between the EV and AV of the effects of AGIS on housing development in the FCT as an indicator of urbanisation, and recommendations for lessening the differences.

5.5.1 Actual Value and differences with Expected Value

Enhancement of access to credit and security for credit

One of the objectives of the National Housing Fund (NHF) Act of Nigeria is to facilitate the mobilisation of funds for the provision of houses to Nigerians. The Federal Mortgage Bank of Nigeria (FMBN) was established to provide long-term credit facilities to mortgage institutions, which grants the credit to Nigerians desiring to acquire houses of their own. An employee of FMBN pointed out that "*there is no loan that we are going to give out without the end users proving that he or she owns a title to the land that he/she is going to build on […] We source the fund that we give to the PMIs* [Primary Mortgage Institutions]. The fundamental requirement for processing NHF loan by the PMIs visited during the fieldwork is the title document, the Certificate of Occupancy (CofO) or deed of assignment.

To benefit from the NHF loan, the NHF Act obliges Nigerians working in private or public sector to contribute 2.5% of his/her basic salary to the Fund. The PMIs require evidence of registration with the NHF, equity contribution (deposit of part of the required loan with the PMI), income statement and three years tax clearance. These technically exclude the majority of Nigerians that are self-employed, the less-privileged and non-working class from benefiting from the NHF loan to own a dwelling.

In Nigeria, financial institutions often investigate title before granting credits to: ascertain borrowers' ownership to the land or property being mortgaged to a financial institution as security, ensure that the same property has not been previously mortgaged, and ascertain there are no other encumbrances on the property (Osamolu et al., 2008). This was a very slow exercise before AGIS; some citizens were frustrated and lost opportunities to secure credits simply because their files could not be traced. AGIS now supports the investigation of titles in the FCT electronically through legal searches. It is possible to submit requests for legal searches physically at the AGIS office or online. According to an interviewee, who is a 'private estate manager', "*I go to AGIS mainly on behalf of my clients, they want to use their title documents for housing loan and others want to sell or buy properties, I have to confirm the necessary document from AGIS. In fact this is the most important reason why I come to AGIS*". Another interviewee said that "*the major relationship with AGIS is through our legal department for verification*

of land titles […] *the verification is faster now and better. Well, I believe that this has helped us in doing our job*".

48% of the respondents to the survey strongly agree and 43% agree that AGIS improved the performance of the legal search of title of a potential borrower and users are better served now than before. 52% of the survey's respondents strongly agree and 40% agree that the processing of the requests by mortgage institutions for the verification of titles to land is faster and better now. On the contrary, the majority of the respondents do not agree that the improvement in the conduct of legal searches or verification of titles to land has really enhanced the access to mortgage. Only 38% agree and none strongly agree legal searches have indeed enhanced the access to mortgage. Also, only 31 % of the respondents believe that the computerisation of land administration services by AGIS has generally helped in building up opportunity to lend money to buy or build a house in Abuja.

AGIS significantly enhanced the investigation of title to secure credits for housing development in the FCT. Prior to AGIS, the investigation of title usually took several months or indefinitely in cases of missing files, while now this can be achieved within 24 hours. This *enhances security of credit* because of the certainty of occupier of the land or ownership property being mortgaged and ensures that the same property has not been previously mortgaged. However, this positive development has not been accompanied by an enhancement of access to credit for housing. Fig. 2 shows the weighted values of actual impacts revealed during the supplementary surveys. While, the analysis presented graphically in Fig. 2 shows that enhancement of investigation of title is very good, improvement of access to credit through investigation of titles is less impressive. This finding from the surveys obliged us to present the findings under two headings in Fig. 2.

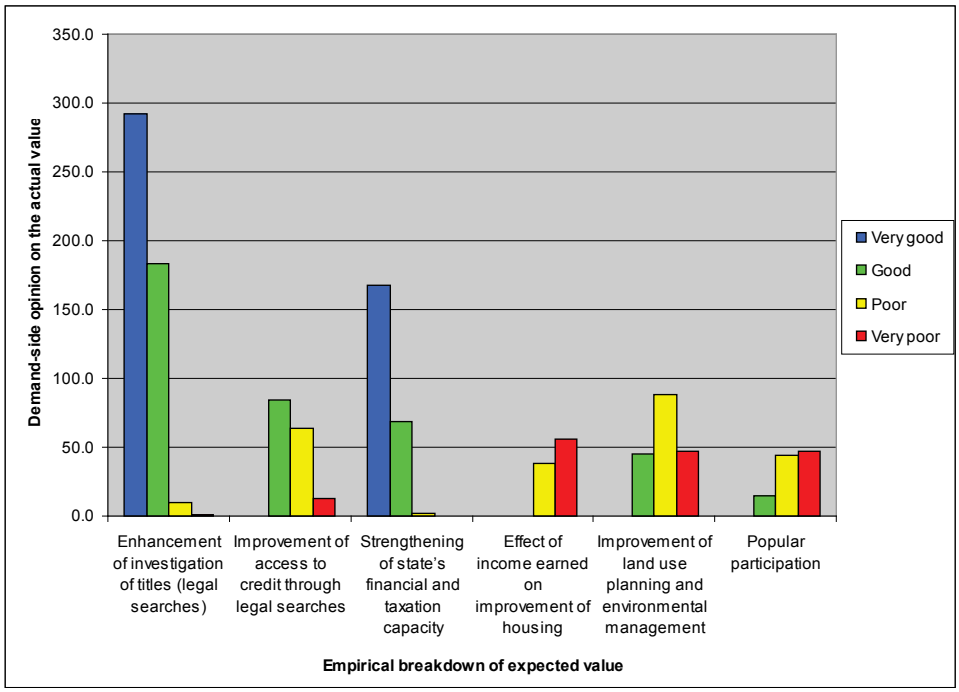

Fig.2: An assessment of the effect of AGIS on urban housing development in Abuja

Nevertheless, if all the respondents strongly agree that investigation of title through legal searches has enhanced their access to credit for housing; the benefit is to people who have already acquired land titles. An interviewee's comment in this direction is that "*… I cannot vouch for how easy one can get it* [land] *now…*". Another interviewee observed that, "*…AGIS has made little contribution to getting CofO, although the process can be faster, in fact, I think it is faster now. The problem is to get the land. I have been trying to get a plot for more than two years now, but no way*". Other interviewees opined that: "*I am not sure that computerisation can do so much at the moment. The computer does not take decision on who will get land, rather it is the people*"**.** "*I submitted my application, waited, wait and wait. They said no land*". The problem is getting land or titles to land to secure mortgages in the FCT.

The evidence from interviews, surveys and documents shows that the requirement to proceed to investigation of title, which is acquisition of statutory right of occupancy evidenced by CofO, is weak. Therefore, adequate documentation of land rights electronically by AGIS only enhances the ability

of land title holders[19] to secure mortgages and does not necessarily turn into enhancement of access to credit. Then, there are differences, which can be described as 'medium', between the expected and actual value of e-LA for enhancement of access to credit and security for credit in the FCT.

Strengthening of state's financial and taxation capacity

According to a former General Manager of AGIS, the Agency had generated N15 billion (about 100 million US$) in 2007. The computerisation of the accounting system of AGIS makes it easier to create and update ground rent bills, calculate land premiums and generate demand notices for payment. Citizens have the opportunity to make payments through bank draft or online. Evidence from interviews and documents reveal that the revenue increased by up to 21 times between September 2004 and November 2008, when compared with the period before AGIS. However, an interviewee noted that "*yes, they are making the money, but another thing is whether all the money is going to government purse*". This corroborates the opinions of some respondents to our surveys that: fraud and corruption "*depends on the integrity of the operators"* and AGIS "*has checked malpractices and misconducts considerably. But, there are still some loopholes.*"

AGIS has substantially enhanced electronic billing and payment, resulting in increased government revenue. Even so, the Abuja government (FCTA) does not have access to this revenue to support housing development because the money goes into the federal treasury, in compliance with financial regulation while financial flows back to Abuja government are determined independently from land revenues. 69% of the survey respondents opined that the computerisation of land administration services by AGIS has opened new and better opportunity for the FCTA to earn more money. On the contrary, only one-fifth of the 69% thought that the money has contributed positively to improving the housing condition in the FCT, Abuja. Fig. 2 shows that the strengthening of the state's financial base is perceived to be almost entirely very good and good while the effect of the income earned by the FCTA on the improvement of housing is entirely very poor and poor. The case study reveals that the differences between the expected and actual value of strengthening of the state's financial and taxation capacity are 'low'. At the same time the increase in land and property related revenue in Abuja is not reflected in the housing condition.

[19] These are already more-privileged citizens and land occupiers

Improvement of land use planning and environmental management

AGIS analyses proposed and actual landuse. Landuse violations or misuses, such as buildings on water mains, encroachment on road corridors, and loss of Maitama Sport Complex to residential use were identified. Fig. 3 exemplifies the practical value of e-LA in Abuja. In December 2008, the workflows for street naming and house numbering were fully computerised, and plots of land or houses with more than one number (see Fig 3) were corrected.

Fig. 3: Identification of a plot with two house numbers and street names: image credits to Abuja Geographic Information Systems (AGIS), Source: Secondary data, Presentation by AGIS

To correct the land use violations, the FCTA demolished houses and physical developments, which contravenes the Master Plan. Citizens and civil society have different opinions about the demolitions, and the FCTA claimed it was necessary for overriding 'public interest'. The Social and Economic Rights Action Center (SERAC) described the demolitions as a policy of forced, mass evictions and about "… *800,000 people lost their homes, schools, worship places and businesses during the exercise with spiralling effects on health, education, employment, and family cohesion*". Secondary evidence[20] reveals that the commitment to the Master Plan is laudable and "… *has brought discipline and organization to bear in a capital city of a great nation, a nation trudging on in an arrested development*".

An interviewee remarked that "…*government land is being sold to an individual, sewage systems are being sold to people to erect structures on them*" [before AGIS]. A similar opinion is that "*… a good development; they are doing it without fair or favour, with notices of demolition. They demolished political party secretariat and even federal government building at Mabushi roundabout. Come to Abuja before* [prior to AGIS]*, it was very bad, but the place is better now*" [after AGIS]. However, another interviewee claimed that "*the decision to demolish may not be wrong, but it has no human face and not in the interest of less-privileged citizens*". Less than half (41%) of the survey respondents feel that computerisation tools of AGIS have helped in the use of land in an environmental friendly manner in Abuja. The weighted value of how AGIS has improved land use planning and environmental management in Abuja is mixed (good, poor and very poor) as shown in Fig. 2, with 'poor' dominant. The restoration of the Abuja Master Plan did not improve housing delivery systems, rather it reduced the prospect of poor households to housing, increased squatting because alternatives or compensations were not provided for the evicted citizens and increased illegal land developments as evictees relocated to other places within the FCT. For these reasons, the differences between the expected and actual value of improving land use planning and environmental management can be considered as being 'medium.'

Popular participation

The participation of citizens as envisioned in the Land Use Act was neglected. No Land Use and Allocation Committee, which is statutorily expected to advise the Minister of FCT on matters relating to land use and allocations, was established. Few people have access to the Master Plan and its recommendations, thereby leaving citizens in the dark regarding their rights and responsibilities with respect to physical development in Abuja. The

[20] Source: http://www.nigeriavillagesquare.com/articles/sunny-chris-okenwa/behold-the-demolition-mallam-of-abuja.html, accessed on 22 April 2010

Master Plan is misconceived as a complete or rigid blueprint for development, whereas planning is supposed to be a participatory, dynamic and an iterative process (COHRE-SERAC, 2008). A question is whose Master Plan is it: Abuja's government or its citizens'? One of the respondents to our surveys suggested that "*the government should carry us along in the implementation of the Abuja Master Plan; it is not good to force everything they want to do on us*".

Fig. 2 shows that the respondents feel that the extent of citizens' participation in improving housing in Abuja is largely very poor and poor. Only 11% of the survey respondents have attended any stakeholders' meeting with AGIS. The respondents who attended the meeting all stated that they participated only in an '*AGIS open day event*' in 2008.

AGIS supports Federal Ministries such as Water Resources and Solid Minerals, and State Governments. The support is ad-hoc and not based on a long-term mutual partnership. We do not find any evidence of partnership between AGIS and the National eGovernment Strategies (NeGSt) or the National Information Technology Development Agency (NITDA), which is the focal organisation for coordinating ICT projects in the public sector of Nigeria. According to an interviewee, "*the challenge really is policy. If there is no policy, there is no way to coordinate. There must be a central coordinating unit. NITDA is supposed to be coordinating. Nobody is following any standard. That is why AGIS is doing their own thing in their own way*". Set against these evidences, the differences between the expected and actual value of AGIS in promoting popular participation for housing is regarded as 'high'.

As a final point, for the four criteria applied to evaluate AGIS for Abuja housing development, generally 92% of the survey respondents do not think that AGIS has performed better than they anticipated.

5.6 Discussion, lessons learned and recommendations

The Land Use Act (LUA) governs all land in Nigeria. The LUA prohibits the alienation of the statutory RofO without the consent of the Minister of the FCT (Governor for States). The security of land transactions is neither adequately protected under the LUA nor readily available for exchange in the property market (Atagher, 2007). Property rights that do not guarantee free transfer of the rights in the property market are not only counter-productive to housing and urbanisation but also to economic development.

The low civil service salary in Nigeria reduces the cost of corruption to civil servants and bureaucrats. One of our interviewees clearly put it to us that "*if*

at the end of the day, we can tackle the issue of corruption, this issue of computerising our land administration is the best, […] *it is not the computer that is the problem now, it is the individual*". The computerised accounting system is also flawed in terms of financial misconducts as "*certain officials have succeeded in exploiting certain loopholes in the billing system to defraud government*"[21]. Corruption can be adjudged as responsible to the low differences observed for strengthening of the state's financial base and implicitly for weakness of the requirement (statutory right of occupancy) for investigating title.

Accordingly, the Nigerian Compass newspaper on 25 January 2010 reported that the LUA has created more problems in land administration making land inaccessible to the people. There is also no legal backing for electronic investigation of ownership titles in Nigeria. A bill to provide for their legal recognition is yet to be passed by the National Assembly. These institutional constraints are responsible for the medium differences between the expected and actual value of enhancement of access to and security for credit for residential housing.

Secondary evidence reveals that between 1976 and 2003, there have been almost four major policy changes affecting resettlement within the FCT. The policy changes revolve around resettlement of original inhabitants (indigenes) of the area now defined as the FCT. An indigene from the Garki Chiefdom remarked that "*… the disadvantage of removing people from their land is much. We believe in culture, there are people which have buried their parents on this land. They think leaving here is like vacating their posterity*". The inconsistent resettlement policy leads to a surge of informal and squatter settlements, which were later demolished. A citizen[22] remarked that "*rather than pull down existing structures, government should have integrated same into its approved master plan by reviewing the plan in line with present day reality*". This can be regarded as being a contributing factor to the medium differences between the expected and actual value mainly for the Improvement of land use planning and environmental management.

Electricity to power communication infrastructure is generally inadequate in Nigeria. The Guardian newspaper on 7 June, 2010 reported that power outages are accountable for loss of about US$984.38 million annually. The power supply situation limits communication through internet and electronic

[21] Source: http://www.abujainquireronline.com/fetcher.php?fid=3134, and http://www.afriquejet.com/news/africa-news/nigeria:-jonathan-suspends-land-allocations,-sales-in-abuja-2010041647810.html accessed on November 2010
[22] Nigerian Newsday, Nasarawa State Weekly Newspaper: http://www.nasarawastate.org/newsday/news/nasarawa/10528110829.html, accessed 04 April 2010

media. Worse more, the supply-side controls the implementation process. The majority of Abuja citizens (specifically, AGIS demand-side stakeholders) have limited access to information, for example the Master Plan and its recommendations and the citizens are not noticeably integrated into planning and implementation. These observed and documented drawbacks explain the high differences between expected and actual value for popular participation.

There have been trainings on the job for AGIS and FCTA staff members. They also participated in local and international conferences. However, there is no evidence of coherent actions for local personnel to carry on with the project. The position of an interviewee is that "*it is a deliberate thing, government must stand firm. Train our people on how to do it*". A respondent to our survey commented that "*Nigerians are not well trained in the technology and most of the operatives and staff at the front desk are casual workers*". The poor salary structure of the civil service discourages competent IT and GIS personnel from working in the public sector in Nigeria.

The funding of AGIS comes from the budget of the Federal Government. The funds may be delayed but it comes and is used to acquire and maintain hardware, software, computer peripherals and communication apparatus including intranet, internet and wireless communication devices like mobile phone to serve Abuja residents. Therefore, the nature of the funding of AGIS accounts less for the differences.

Table 2: Summary of findings

Expected Value	**Actual Value for housing and *Differences***	**Reasons for Differences**
Enhancement of access to and security of credit	Investigation of title to secure credits for housing development and security of credit are enhanced. Improvement of access to credit to own houses is weak. *Differences: Medium.*	Constraints to access mortgages, e.g. requirements for consent to alienate and equity contribution. Difficulties in getting land.
Strengthening of state's financial and taxation capacity	Increase in government land and property related revenue has no direct benefit on improvement of housing condition. *Differences: Low.*	No direct access to land revenue for housing development. Financial misconducts.
Improvement of land use planning and environmental management	GIS and remote sensing supports identification of land use violations and planning of utilities. Enforcement of the Abuja Master Plan makes some citizens homeless. *Differences: Medium.*	Inconsistent resettlement policy. Poor access to the Master Plan. Absence of the Land Use and Allocation Committee to advise the Abuja government.
Popular participation	Participation is mainly limited to the supply-side. No clear evidence of partnership of AGIS with other public agencies. *Differences: High.*	Poor infrastructure and inadequate coordination of ICT projects in general.

The findings of this research suggest the need to revisit the issue of how adequately documented property rights can support urban housing development, the increase of social welfare as well as citizens participation. Whereas it is the government that holds the right of occupancy, once it is secured by the citizens, it is adequately documented electronically in Abuja by AGIS; some difficulties still persist in securing the right. Other issues such as the acquisition of the statutory right of occupancy and gainful employment are also de rigueur to the realisation of the expected value. While the case study of AGIS shows that adequate documentation of property rights is advantageous, the actual values are basically shaped by the capacities, for example Land Use and NHF Acts, and infrastructures. The requirements for granting mortgages and Land Use Act consent proviso points to the need for adequate financial strength to secure mortgages. Therefore, institutional reforms are pivotal to urbanisation in the FCT through e-LA as an e-government policy intervention.

The establishment of AGIS by the FCTA is pursuant to Chapter II, Section 18 (2) of the 1999 Constitution of Nigeria: "*Government shall promote science and technology*". It is important for the FCTA to pay attention to the provisions of other Sections of the same Chapter, such as; welfare of the people shall be the primary purpose of government, participation by the people in their government, and suitable and adequate shelter for all citizens. E-LA can contribute to the realisations of the impressive constitutional provisions if implemented within the wider context of e-government policy initiative to achieve better urban governance in Abuja. The case study findings in Table 2 can help researchers and practitioners to recommend public policies and actions for improving urbanisation and housing development in Africa and give attention to the reduction of country's specific problems (e.g. better infrastructure and the reduction of corruption).

5.7 Conclusion

In this paper, we propose and apply an evaluation framework to analyse a case from a major African city, where insufficient attention has been given to the evaluation of the impacts of e-Land Administration in urban housing development.

From the EV-AV evaluation framework, we observe whether or not AGIS is really providing government and citizens in the FCT with the expected outcomes. The EV-AV evaluation framework is expandable and can accommodate future changes in the land administration and housing development policy, research and practice.

The study shows that there are medium differences between the expected value and actual value of Abuja Geographic Information Systems (AGIS) in

housing development in the Federal Capital Territory (FCT) of Nigeria for enhancement of access to and security of credit, and improvement of land use planning and environmental management. The differences are low for strengthening of state's financial and taxation capacity and high for popular participation.

Observe that this paper is limited to the role of e-LA in housing development and the four categories of expected value of e-LA in urban housing development suggested in section 2.2 are not exhaustive and can be extended to incorporate new factors.

AGIS indeed brings the required assurance and confidence into the Abuja land market, for example by confirming occupier and ownership, guaranteeing that the same land or property has not been previously mortgaged and certifying that there are no other encumbrances on a land or property. AGIS also improves land use planning and environmental management in the FCT. However, the case shows that e-Land Administration does not guarantee beneficial outcomes for housing development in the FCT without due attention to formal institutions and policies (for example, the Land Use Act), informal institutions (ethos of the Nigerian society), geo-ICT expertise, communication and power supply infrastructures and funding.

Other issues, such as tax regimes and mortgage interest rates, which are not directly related to e-LA, could be considered in future research. Further research could also explore how urban development in general affects Nigeria's socio-economic development and overarching human well-being in the FCT.

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Chapter 6: General Conclusion

6.1 General overview

This thesis evaluates the societal impacts of the implementation of e-LA in the context of e-government in Africa through the case study of AGIS, an urban GIS established to improve governance in the FCT of Nigeria.

The research commences with a review and classification of GIS impact literature in a taxonomy, which categorises GIS impacts in terms of *efficiency, effectiveness* and *societal well-being*. The impact of GIS as reported in the literature is assessed through a consistent judgment of whether an article claims a positive, mixed or negative impact. The IS, public administration and e-government literatures, for example, Danziger and Andersen (2002) and Heeks (2002) provide a yardstick to decide whether a reported impact is positive, mixed or negative.

After the review and classification of GIS impact literature, the research moves into the first empirical part by adapting the concepts of global and local networks to study and describe the network of supply-side and demand-side stakeholders involved in the project, their linkages and interactions that shaped the implementation of AGIS over time. The AGIS implementation trajectory is traced with the concepts of degree of attachment of supply-side stakeholders and the degree of mobilisation of demand-side stakeholders. The historical trajectory offers lessons that can be applied to improve the success rate of GIS implementation in other parts of Africa.

The disclosure from the review and classification of GIS impact literature – Chapter 2– that the Internet and other mobile and wireless devices are shaping the access and use of GIS re-echoes in implementation trajectory of AGIS in Chapter 3. The implementation of AGIS incorporates the use of ICT, ranging from the Internet and Intranet to mobile phones, in addition to standard geographic technologies. The thesis considers AGIS as a geo-ICT implementation to provide geospatial data and services, and to support LA. Therefore, AGIS is a full-fledged e-government intervention and not a limited GIS project. This fundamental insight influenced the second and third empirical parts in Chapters 4 and 5.

The second empirical part investigates the impact of AGIS on corruption in the provision of LA services in the FCT and explores how LA services electronically supported by AGIS contribute to good governance and societal well-being. The third and final empirical part examines how AGIS delivers the promise of e-LA for housing development in the FCT.

6.2 Research findings

The four research objectives were realised through the four main research questions. Each main research question has four sub questions. The research findings respond to the main research questions by providing answers to each of the sub questions to realise the objectives. These are reported in Table 1 and discussed in sub-sections 6.2.1 to 6.2.4.

6.2.1 Findings on Objective 1

The evaluation approaches in the information systems (IS), geographic information systems (GIS) and electronic government (e-government) literatures give attention to measurement of tangible efficiency benefits, assessment of advantages of a specific application, matching of benefits with organisational goals, determination of the potentials of a proposed application with respect to financial benefits, information quality and benefits to citizens. Existing approaches will be more relevant for evaluating the impact of GIS in governmental and non-governmental organisations as a development intervention if they analyse the capabilities and functions for interaction and cooperation for exchange of data and services, and highlight mechanisms and behavioural factors that can facilitate or impede GIS activities across multiple governmental and non-governmental organisations (Nedović-Budić & Pinto, 2000). More relevant approaches should accentuate the impact of GIS on individual and collective goals of citizens. A classification which designates GIS contributions to efficiency, effectiveness and societal well-being is proposed to evaluate GIS impact issues from the literature and implementation of GIS in the public sector.

As Figure 2 in Chapter 2 discloses, the impact of GIS on efficiency and effectiveness received the highest research attention, with 50% of the articles analysed focussing on efficiency and 39% on effectiveness. Only 5% address societal well-being. Majority (76%) of the researches took place in the advanced economies, about 21% are from the emerging and developing economies and the research sites of the remaining 3% is not obvious.

The research findings underscore two important concerns: 1) need for more empirically grounded research on the effects of GIS on society-wide critical issues; and 2) need to reduce the disparity in geographic focus by conducting more research in emerging and developing economies.

6.2.2 Findings on Objective 2

In the beginning, AGIS was able to build a supply-side network backed with domestic political and economic resources. This lasted only for a while, as the political support faded and economic support waxed and waned. Eventually, AGIS was not able to build and maintain a stable supply-side network.

With the establishment of AGIS in 2003, a demand-side network emerged because of the basic need for land and associated services by individual citizens and corporate bodies. The demand-side increased the income of some supply-side stakeholders (the Federal Government of Nigeria via the Federal Capital Territory Administration) through rise in revenue accrued from land premiums. However, the benefit of the increase in income (economic return) accrued to neither the stakeholders in the supply-side nor those in the demand-side. The project does not have control over the use of the economic return because AGIS is funded through budgetary allocations from the federal government. The national financial regulations (standard) mandates government's Ministries, Departments and Agencies in Nigeria to pay all revenues directly to the federal government account and financial allocations are secured via approved budget by the National Assembly and endorsed by the President.

The design, location and construction of an accessible and convenient building for production and orderly business transactions are social returns to both supply- and demand-sides networks. The provision of online services delivered socio-economic returns of speeding up of services such as legal search, online tracking of applications and reduction of travel costs.

The capacity of AGIS to impose itself as an obligatory passage point (OPP) between supply- and demand-sides networks was problematic, for at least two reasons. Firstly, in terms of financial matters AGIS is not an OPP between the two networks, because of existing standards, which mandate the payment of all revenues generated by government agencies into the central government treasury. Secondly, there is 'seepage' between the two networks. Some supply-side stakeholders were able to make or even 'veto' decisions that affected the overall structure of the supply- and demand-sides networks, for example in the appointment of administrators of AGIS.

AGIS' historical trajectory suggests that the national funding might have contributed more to the supremacy of the influential stakeholders on supply-side than nurturing the project for success and furthering the realisation of its aim.

In the light of the above, the success chances of GIS and other computerisation projects in Nigeria and other parts of Africa can be improved by giving ample attention from the beginning to specific social factors that form the setting for implementation. The case study of AGIS elicits five success supporting social (SSS) factors: 1) legal power to function as independent public sector service provider; 2) safeguarding of political backing; 3) entrenching stakeholders-centred policy, meaning effectual strategy to enhance and stabilise the attachment of supply-side and

mobilisation of demand-side stakeholders; 4) self-sustaining financial policy through funding by the demand-side network; and 5) development of home-grown personnel right from inception.

6.2.3 Findings on Objective 3

AGIS applies geo-ICT in the FCT to: process and grant statutory Right of Occupancy (RofO); conduct regularisation of titles in the six area councils, recertify all plots of land allocated within the Federal Capital City (FCC) before the establishment of AGIS and issue new Certificate of Occupancy (CofO) from a geo-database, and process consent to alienate the statutory RofO. The Urban and Regional Planning and Survey data are also computerised for the purpose of LA in the FCT. Other tasks that are computerised for LA are: street names and house numbers, revocation and reinstatement of RofO, and fiscal cadastre for billing and issuance of payment demand notice and property valuation.

The computerisation of the services aims to reduce fraud, forgery, multiple allocations, bribery, nepotism and favouritism, and white collar malpractices in the provision of LA services in the FCT. Interestingly, the research finding as illustrated with Figure 1 in Chapter 4 reveal that fraud, forgery, multiple allocations, bribery and white collar malpractices reduced after the computerisation. The highest levels of reduction in corruption are observed for forgery and multiple allocations with the least for white collar malpractices. Obstinately, nepotism and favouritism increased after the computerisation.

The contribution of AGIS to promotion of good governance and improvement of societal well-being through corruption reduction can be assessed at four levels: computerisation, observed corruption, demand-side satisfaction and transaction costs. The contribution can be ineffective, effective or very effective. As discussed in Chapter 4 under the 'effects of AGIS on the satisfaction with the e-LA services', AGIS intervention in the granting of statutory RofO is neither ineffective nor effective and unable to support good governance and societal well-being in the FCT. The electronic implementation of area councils' title regularisation is ineffective thereby contributes low to good governance and societal well-being. The recertification mechanism and legal searches are effective, bringing high contribution to good governance and societal well-being. The implementation of consents to alienate is ineffective to support good governance and societal well-being.

6.2.4 Findings on Objective 4

The literature reveals that e-LA can support urban housing development via:
1) enhancement of access to credit and security for credit;

2) strengthening of state's financial and taxation capacity;
3) improvement of land use planning and environmental management; and
4) popular participation.

The differences between the Expected Value (EV) and Actual Value (AV) of e-LA can help evaluate the role of e-LA in urban housing development. This is conceptually referred to as EV-AV evaluation framework and presented graphically in Figure 1 in Chapter 5. For AGIS, the observed outcomes (AV) fall below the (expected results) EV; the greater the difference between the EV and the AV, the less positive or successful is the outcome. The difference between the EV and the AV of e-LA for enhancement of access to credit and security for credit is medium, the difference for strengthening of the state's financial and taxation capacity is low, medium for improvement of land use planning and environmental management and high for popular participation.

The observed differences are due to: constraints in accessing mortgages, e.g. requirements for consent to alienate and equity contribution; difficulties in getting land, lack of direct access to land revenue for housing development; financial misconducts; inconsistent resettlement policy; poor access to the Master Plan; absence of the Land Use and Allocation Committee to advise the Abuja government; poor infrastructure and general inadequate coordination of ICT in Nigeria.

It is essential to improve on popular participation in the implementation of the Abuja Master Plan. Resolute policy reforms targeted at enhancing the realisation of the EV are necessary, for example amendment of Land Use and National Housing Fund Acts, and improvement on provision of supporting infrastructures for delivering electronic services, especially electricity. Therefore, institutional reforms are central to lessening the differences between the expected results and realised outcomes.

Table 1: Research objectives, questions and summary of main findings

No	Chapter Title	Objective	Main research question	Sub research questions	Summary of research findings
1	A 10 years Review and Classification of the Geographic Information Systems Impact Literature (1998-2008). **Published in Nordic Journal of Surveying and Real Estate Research.**	To propose a series of considerations to develop a '*lens*' for analysing Geographic Information Systems (GIS) impact issues as reported in academic literature published between 1998 and 2008.	To which extent are existing approaches in the IS, public administration and e-government literatures suitable for the evaluation of the implementation of GIS in the public sector?	(a) Which evaluation approaches are available in the IS, GIS and e-government evaluation literatures and how can they be systematically characterised and classified? (b) How relevant are these frameworks for evaluating the impact of GIS in governmental and non-governmental organisations as a development intervention? (c) Which approach can be adopted to classify GIS impact issues from the literature? (d) What is the contemporary aspect of attention in GIS impact research, which aspects need more research attention and what are the research implications of the findings?	• Contemporary IS, GIS and e-government evaluation approaches mainly measure tangible benefits. • The approaches can be more relevant by considering the fact that IS, GIS and e-government are implemented and used across multiple public and private sector agencies and incorporate social factor and value of the systems. • GIS impact issues can be examined from the literature by analysing if they have made positive, negative or mixed impacts in terms of contribution to efficiency, effectiveness and societal well-being. • GIS impact research efforts have been directed mainly to efficiency and effectiveness aspects, with few studies dealing with societal well-being, especially in emerging and developing economies. • There is need for more theoretically and empirically grounded and multidisciplinary research on the contributions of GIS to societal well-being in the emerging and developing economies.
2	Lessons from the implementation of the first urban GIS in Nigeria: a longitudinal study of Abuja Geographic Information Systems. **Under review by Computer Environment and Urban Systems.**	To analytically trace the historical trajectory or evolution of Abuja Geographic Information Systems for the benefit of its stakeholders and other GIS initiatives evolving within Nigeria, and Africa in general.	How did AGIS become what it is now?	(a) How has AGIS over time been able to build and maintain a supply-side network that will for a time provide resources in the expectation of an ultimate return? (b) How has AGIS over time been able to build a demand-side network that will ultimately offer economic and social returns to actors lodged in the supply-side and demand-side networks? (c) How has AGIS over time been able to impose itself as the obligatory point of passage (OPP) between the two networks? (d) Which insights can be gained from the history of AGIS that can improve the success rate of similar projects in other locations, particularly in Nigeria and other parts of Africa?	• AGIS was not able to build and maintain a stable supply-side network. • The demand-side network was weakly mobilised for the AGIS project. However the project offers monetary gains as economic return to the supply-side network, and facilities and services that are beneficial to both supply-side and demand-side networks. • AGIS was not able to establish itself as an obligatory passage points between the supply-side and demand-side networks. • AGIS' historical trajectory is influenced by past and emerging socio-political and economic relations, and LA standards in the FCT. • The success rate of geo-ICT projects in Africa can be improved by been cognisant of the evidence that standards, personnel development policy, financing, political and legal support and attaining OPP are the critical success factors in the case study of AGIS.
3	A case study of geo-ICT for e-government in Nigeria: Does computerisation reduce corruption in the provision of LA services? **Published in Survey Review.**	To ascertain the impact of AGIS on corruption in the provision of LA services in the Federal Capital Territory of Nigeria and explore how e-LA services contribute to good governance and societal well-being.	Does automation reduce corruption in the provision of LA services?	(a) How does AGIS support LA services in the FCT of Nigeria? (b) Which forms of corruption in the provision of land and property related services in the FCT of Nigeria do AGIS intends to reduce? (c) How has AGIS reduced the various forms of corruption in the provision of LA services in the FCT of Nigeria? (d) How to evaluate the contribution of AGIS to society well-being from the perspective of the services supported with geo-ICT?	• The granting of statutory right of occupancy, recertification and regularisation of land titles, verification of land record (legal searches) and consent to alienate are the core services supported by AGIS with an integrated use of GIS and ICT. • AGIS tries to reduce forgery, multiple allocations, bribery, fraud, white collar malpractices, and nepotism and favouritism. While the first five reduced at different rates, the last (nepotism and favouritism) increased. • The impact of AGIS on levels of computerisation, observed corruption, demand-side satisfaction and transaction costs can be assessed to illustrate the nature of support of AGIS to good governance and societal well-being in the FCT.
4	The impact of e-LA on urban housing development: The case study of the Federal Capital Territory of Nigeria. **Published in Habitat International.**	To examine how AGIS delivers on the theoretical promise of e-LA in Federal Capital Territory (FCT), Abuja, Nigeria.	How is AGIS supporting housing development in the FCT, Abuja, Nigeria?	(a) What are the theoretical promises of e-LA for urban housing development? (b) How do we logically evaluate the role of e-LA in urban housing development? (c) To which extent are the expected results realised through AGIS and why are there differences between the expected results and realised outcomes, if any difference exists? (d) Which strategies can be adopted to lessen the differences between the expected results and realised outcomes?	• In principle, e-LA can support urban housing development through enhancement of access to credit and security for credit, strengthening of state's financial and taxation capacity, improvement of land use planning and environmental management and popular participation. • The differences between the Expected Value (EV) and Actual Value (AV) of e-LA can reveal the role of e-LA in urban housing development. This is conceptually dubbed EV-AV evaluation framework in Chapter 5. • The AV falls below the EV in the case study of AGIS. The greater the difference between the EV and the AV, the less successful is the outcome. • The difference between the EV and the AV of e-LA for enhancement of access to credit and security for credit is medium, the difference for strengthening of the state's financial and taxation capacity is low, medium for improvement of land use planning and environmental management and high for popular participation. • The observed differences are due to: difficulties in accessing mortgages, Land Use Act induced constrictions and absence of the Land Use and Allocation Committee, problems in getting land, lack of direct access to land revenue for housing development, inconsistent resettlement policy, and poor access to Abuja Master Plan and general inadequate coordination of ICT in Nigeria. • The realisation of the expected value can be improved through resolute policy reforms targeted at citizens' participation, amendment of Land Use and National Housing Fund Acts, and improvement on provision of supporting infrastructures for delivering electronic services, especially electricity. • Institutional reforms are central to lessening the differences between the expected results and realised outcomes of e-LA in housing development in the FCT.

6.3 Reflections on the findings and discussion

6.3.1 An outlook of the findings

An overview of the core findings on AGIS as e-government policy intervention to deal with societal problems and improvement of governance in the FCT of Nigeria can be presented by re-examining the research findings and summing up the findings on each aspect as positive, mixed or negative. This approach, which presents an outlook of the findings in Table 2, is based on Danziger and Andersen (2002) study of the impacts of IT on public administration reviewed in Chapter 2. Following Table 3 of Chapter 2, outcomes (or findings) that have enhanced good governance and societal well-being are indicated as positive. Both positive and negative outcomes on the same aspect are summed up as mixed. Negative outcomes are opposite effect of positive outcomes and have not improved or even worsen, despite electronic intervention by AGIS.

The research findings show that the demand-side stakeholders were poorly mobilised to participate in the implementation of programmes enabled by AGIS, for example in the restoration of Abuja Master Plan. The demand-side stakeholders were weakly and passively involved in AGIS implementation and the supply-side attachment to the project was unsteady. Thus, the outcome is recapitulated as negative in Table 2.

Table 2: A summary of the core findings on AGIS

	Review of nature of the findings		
Aspect of good-governance and societal well-being	**Positive**	**Mixed**	**Negative**
Popular participation and stakeholders' integration.			✓
Reduction of corruption in the provision of LA services.		✓	
Improvement of urban housing.		✓	
Enhancement of state income through land revenue.	✓		
Improvement of housing development via land revenue.			✓
Demand-side satisfaction with e-LA services.		✓	
Service provision: effectiveness of e-LA services.		✓	

The impact of AGIS on the reduction of the various forms of corruption is uneven. Although, there is decline in five forms of corruption out of the six studied, the rate of decline is not uniform, for example, while forgery decreased by about 50%, white collar malpractices only declined by about 12% as presented graphically in Figure 1 in Chapter 4. Thus, the outcome is denoted as mixed in Table 2.

From Figure 2 and Table 2 in Chapter 5, it is obvious that the impact on improvement of housing in Abuja is mixed. The differences between the expected values and realised outcomes for the four criteria studied are:

1) 'Medium' for Enhancement of access to and security of credit;
2) 'Low' for Strengthening of state's financial and taxation capacity;
3) 'Medium' for Improvement of land use planning and environmental management and
4) 'High' for Popular participation.

AGIS increased revenue accrued to the federal government from land premiums by up to 21 times between September 2004 and November 2008 by generating about US$147.2 million. This impressive testimony for the Nigeria public service is a positive outcome. Figure 2 in Chapter 5 shows that the strengthening of the state's financial base is perceived to be almost entirely very good and good. However, the effect of the income earned by the FCTA on the improvement of housing is very poor and poor, as shown in the same Figure 2 in Chapter 5. The effect of the land revenue on improvement of housing development is therefore represented as a negative outcome.

Few demand-side stakeholders are satisfied with the e-LA services of granting of statutory Right of Occupancy (9%), area councils' title regularisation (11%) and consents to alienate (15%). The demand-side stakeholders are largely satisfied with e-LA services of recertification (52%) and legal searches (92%). The demand-side's level of satisfaction with AGIS' e-LA services is therefore generally marked a mixed outcome.

The impact of e-LA services delivered by AGIS on societal well-being is mixed. Despite the reasonably high level of computerisation of the granting of statutory right of occupancy, the service is neither ineffective nor effective. The implementation of geo-ICT in support of regularisation of titles and consents to alienate are ineffective. However, the recertification mechanism and legal searches are effective.

The overall impression of the impacts of AGIS by demand-side stakeholders (92% of survey respondents) is that AGIS has not performed beyond their expectation (Akingbade et al., 2012). Majority (67%) feels that considering the services they have received, AGIS is a worthwhile investment by the Federal Government of Nigeria. Summing-up the research findings, AGIS is yet to have overall positive impacts on the demand-side stakeholders. This thesis submits at this juncture that the impacts are mixed.

6.3.2 Revisiting AGIS impacts: standards and policy implications

This thesis observes and recognises a plethora of visible or imperceptible concerns that purposely or fortuitously control AGIS implementation and affect the returns of the project to the demand-side stakeholders and Abuja citizen, in general. AGIS came into existence from standards, socio-political, economic and technical relations that are already in place and matures in the context of others that emerge during its implementation and application to administer land in the FCT.

The foremost is the Land Use Act (LUA). A Director in the Federal Mortgage Bank of Nigeria (FMBN) remarked that the LUA recognises only "holders" of statutory Right of Occupancy (RofO) and definitely excludes mortgagees; this poses real danger to land transactions. He argued that "the ultimate purpose of using a RofO as security is defeated because the transaction is not adequately protected under the LUA. The security is not readily available for exchange in the property market because of the consent encumbrances. This is what actually calls for review in the Land Use Act if the secondary mortgage market is to develop in Nigeria" (Atagher, 2007).

As a result of the deficiencies, the late President Umaru Musa Yar'Adua forwarded a bill to be cited as Land Use Act (Amendment) Act 2009 or the Constitution (First Amendment) Act, 2009 to National Assembly for urgent consideration and enactment. The amendment aims to restrict the requirement for Governors' consent in land transactions to assignments only. This will render unnecessary the consent for mortgages, sub-leases and other land transfers. The government and the citizens anticipate that the Bill when enacted into an Act will make land transactions less cumbersome and facilitate economic growth through capital accumulation.

The LUA is perhaps technically logical, for example the holder of trust in land should be the person to grant consent to alienate the land. However, property rights that do not guarantee free transfer of the rights in property market may be unhelpful to capital accumulation and growth of property market. A Senior Advocate of Nigeria (SAN) clearly stated in the Daily Trust Newspaper of Nigeria on Tuesday, 21 April 2009 that the "*Land use Act needs amendment*" (page 20). While this thesis concurs with the remark of the SAN, the thesis also observes that there is a maze of bureaucratic and legalistic complexities in the process of amendment. It may involve a lengthy process of review of the Constitution of the Federal Republic of Nigeria, encompassing deliberations and endorsement by majority of the 36 States of the Republic and the House of Representatives and Senate of the National Assembly of Nigeria.

From Chapter 5, it is possible to recognise that some of the indigenes (the *Gades*, *Gbagis* and *Gwandaras*) of the place now called FCT, Abuja may be unwilling to leave their 'natural abode', even with the provision of arguably 'better' alternatives. Despite that, there are inconsistencies in the resettlement policies in the FCT (Jibril, 2006).
The deficiencies in LUA and the inconsistencies in the policies have influence on the research findings. This is illustrated with the following three examples. Firstly, as stated in Chapter 3, AGIS is subjected to the LUA for the purpose of carrying out its duties, thus the LUA has effect on its historical trajectory. Secondly, an outright vesting of land in one person –via the LUA– may groom high level of discretion and foster a self-seeking and patronage agenda, as seen in the increase in nepotism and favouritism in Chapter 4. Thirdly, the power to grant and revoke statutory RofO that the FCT Minister holds by virtues of the LUA and inconsistencies in the resettlement policies contributed to the growth of squatter settlements in the FCT and the subsequent demolitions of houses, which some Nigerians referred to as a policy of forced eviction.

The research findings are also shaped by what can generally be referred to as non-formal social standards. In most part of Africa, family and kin based relationship flourishes. Allegiances to place of birth, ethnic-, religion- and region-based dichotomies are firmly established. The political leaders, their followers and majority of the citizens carry out their daily activities and state responsibilities in accord with the deep-rooted culture of mutual aid and patron-client reciprocity (Smith, 2003). This is an issue of major concern as political agenda and policy interventions like e-government will be drawn along ethnic lines, rather than aiming at good governance and societal well-being. The policy challenge is to conform to probity, shun ethnic dichotomy, and preserve social cohesion and repositioning to leadership by personal example, which is the hallmark of true leadership and good governance (Smith, 2003; Awe, 1999; Achebe, 1984).

As a final point on standards and policy implications, it is worthy of note that a Presidential Technical Committee on Land Reform (PTCLR) was inaugurated also by the late President Yar'Adua to delve mainly into technical aspects of LA in Nigeria and recommend effective, simplified, sustainable and successful approach to LA. The PTCLR has the potential to re-align both technical and institutional strategies of LA in Nigeria to reduce public cynicism about LA systems due to corruption and generally a lack of good governance, improve urban housing development, and encourage participation and effectiveness in land-related public sector management.

6.4 Empirical implications of the findings

It is still difficult to establish straight forward relationships on the impacts of electronic provision of LA services on citizens. Table 3 is summarised from the research findings to illustrate the difficulty. Observe from Table 3 that high level of computerisation is not equal to low level of corruption and incapable to support good governance and societal well-being via the e-LA service of granting of statutory Right of Occupancy (RofO). On the other hand, the highly computerised e-LA service of legal searches is accompanied by low corruption and effectively supports good governance and societal well-being. More of the complexities can be deduced from Table 3, and then it is possible to argue that high levels of computerisation or high-end e-LA solution is not a paranormal remedy to corruption in the provision of LA services. In the same vein, e-LA solution may not automatically push effectiveness into land-related public sector management to improve governance and societal well-being. This induction illustrated in Table 3 with the case study evidence can be applied to study the societal impacts of e-LA through corruption reduction.

Table 3: Some effects of AGIS e-LA services

e-LA services	Level of computerisation	Level of observed corruption	Level of transaction costs	Level of demand-side satisfaction	Support for good governance and societal well-being
Granting of statutory RofO	High.	High.	High.	9% are satisfied.	Unable: neither ineffective nor effective.
Area councils' title regularisation	Low.	Low.	Low.	11% are satisfied.	Low: ineffective.
Recertification	High.	Low.	Low.	51% are satisfied.	High: effective.
Legal searches	High.	Low.	Low.	92% are satisfied.	High: effective.
Consents to alienate	Low.	Low.	High.	15% are satisfied.	Low: ineffective.

The impact of e-LA on housing development in Abuja suggests the need to revisit the issue of adequately documented property rights. The case of Abuja is complex and challenges some of the ideas laid by Hernando de Soto (see Bromley, 2008; de Soto, 2000; Sjaastad and Cousins, 2008) in two ways. One, the less-privileged in Abuja are living in the houses which contravene the Abuja Master Plan because they have no income or are under-employed and are not capable of saving to make the equity contribution to secure mortgages. Secondly, it is the government that holds the right of occupancy, once the right is secured by the citizens, they are adequately documented electronically by AGIS; the difficulty is in getting the right. The empirical evidence on AGIS does not give particular significance to adequate documentation, but centres on acquisition of property right and gainful

employment. The requirements for granting mortgages and LUA consent condition combine together to emphasise adequate financial strength by potential house owners more than adequately documented property rights to secure mortgages.

This thesis observes from the case study of AGIS that political setting realistically influences successful provision of e-LA services from three perspectives. Firstly, one of the factors that hindered earlier computerisation efforts before AGIS was lack of political will (MFCT, 2004). Secondly, Ifinedo (2006) observed that e-government implementation progress in Nigeria only when the President supports the implementation. Thirdly, a change in national government has direct consequences on the historical trajectory of AGIS as described in Chapter 3. The empirical lesson for researchers and practitioners is to evolve strategies that can de-politicise or lessen political influence on provision of e-LA services in Africa.

6.5 Theoretical implications of the findings

Bromley (2008; p 20) revealed that "urban slum dwellers who get titles but who are without work cannot possibly leverage credit from the banking sector. Formalisation erodes and displaces existing social networks and arrangements that do offer security. Formalisation offers little assurance that beneficial outcomes are inevitable". This shows that adequately documented property rights are insufficient to guarantee improvements in urban governance and societal well-being.

From the empirical insights, LA and GIScience researchers are still theoretically challenged to show how the technical knowledge about geo-ICT can be meaningfully integrated with scientific knowledge in LA to deliver citizen-centric services to improve societal well-being in Africa. While addressing the challenge, researchers have to think of how the transfer of knowledge between academics and practitioners in Africa can be made simple and workable. Some of the questions are: How to explore the potentials of e-LA, or geo-ICT in land administration for societal benefits? How to design, implement and nurture e-LA in Africa in an apolitical setting? The research inference is to have more theoretical concepts and frameworks on how to bring about good governance in LA and improve societal well-being in Africa through electronic services.

In that case, further multi-disciplinary and international research work centred on e-LA that will focus on empirical investigation of impacts of e-LA would concern itself with broad category of impact issues related to drawbacks of societal well-being and country specific problems, as mentioned at the end of the discussion in Chapter 5. Additional examples of the problems are unemployment, inequality in land distribution and difficulties in

having access to land, trifling private sector involvement in real estate/housing development, insecurity of tenure, food insecurity and famine, social instability and forced eviction.

The concluding research implication is to highlight the spatial context and localised meaning of good governance in LA, and the ways through which e-LA bring about good governance in a locality. This thesis therefore suggests the need for more studies that are explicitly critical, but simplified in their theoretical orientation and follows the interpretive school of thought of action research or case study to have direct facts on good governance issue under investigation in a specific area in Africa.

6.6 General recommendations

This thesis proposes immediate and specific recommendations as the research findings come into view and presented from Chapter 2 to this closing Chapter. The general recommendations below are intended to improve the overall benefit of AGIS electronically supported LA services as e-government policy intervention to deal with societal problems and improvement of governance in the FCT of Nigeria. The recommendations are also put forward to generally foster successful implementation of e-LA, reduce corruption in LA through electronic intervention and improve urban housing development in Africa.

1) Good governance is participatory. Any government or administration that misses the participatory attribute of good governance referred to in this thesis as popular participation is likely to miss the *connection* between policies and programmes and its intended beneficiaries. The first area that the Federal Capital Administration can improve upon is active integration of the citizens, corporate bodies and civil organisations into the provision of e-LA to improve governance in the FCT. Generally, the success rate of e-LA implementation in Africa can be improved by giving more attention to stakeholders' integration and participation right from the planning and design stage of the interventions.
2) There is a general need to institute and reinforce definite standards on transparency, accountability and effectiveness into land-related public sector management in Africa. This can be achieved in the FCT of Nigeria through target-driven partnership by the Federal Capital Territory Administration and AGIS with the Independent Corrupt Practices and Other Related Offences Commission (ICPC) and Economic and Financial Crimes Commission (EFCC) or any such organisation established by the Federal Government of Nigeria. It is necessary to expedite action on the amendment of the Land Use Act and revise the National Housing Act to enhance productivity in the land and housing sectors of Nigeria.
3) In Nigeria, the Presidential Technical Committee on Land Reform can consider the integration of courses on transparency, accountability, rule

of law, equity, participation and effective land management practices into educational curriculum on LA. This is also an issue for consideration by regional and national institutes in Ghana, Namibia, Nigeria, Rwanda and other African countries offering academic programmes in LA.

4) Funding by those who have interests, stakes and are benefitting from e-LA services seems to be a sustainable approach to funding of e-LA, at least from the modest inference that this research can draw from the case study of AGIS. However, the initial funding or take-off grant might be problematic and this can be sought from local financial institutions or through Public Private Partnership (PPP). The National eGovernment Strategies (NeGSt) of Nigeria is already exploiting PPP for its sustenance.
5) African countries will also benefit from concerted policy and investment on research by national governments, regional and continental organisations such as Economic Community of West African States, NEPAD and African Development Bank. From the case study of AGIS, such research can focus on organisational concepts, which emphasises de-politicisation, autonomy and sustainability of e-LA agencies and the ways e-LA as e-government policy intervention can contribute positively to societal well-being and good governance in Africa.
6) Lastly, in the course of design and implementation of e-LA, African countries are encouraged to pay attention to the five SSS factors drawn from the case study of AGIS in sub-section 6.2.2.

6.7 Overall conclusion

This thesis has elicited a new set of empirical evidence from Africa on the implementation of e-LA in the FCT of Nigeria. This fills a gap in knowledge identified by Akingbade et al. (2009) and may start to help to address the challenge of achieving success and avoiding failure in the implementation of similar projects in Africa (Heeks, 2002). The research established empirically that success in the electronic provision of LA services to citizens may depend on the ability of African countries to rapidly initiate and purse political agendas that encourage public sector accountability and transparency, and social policies designed to promote the basic physical and material well-being of Africans.

The thesis offers an innovative approach to analyse GIS impact issues and provides further systematic evidence on the societal impact of the implementation of geo-ICT in the public sector. The research findings will help researchers and practitioners to recognise the significance of studying the history of similar projects, as a step to improve successful implementation of geo-ICT projects in Africa.

The analysis of AGIS brings further knowledge and empirical evidence that the design and implementation of e-LA should give adequate attention not

only to technological concerns, but also to conscious or premeditated political and administrative actions specific to the local setting of e-LA project implementation. Furthermore, the thesis illuminates ways through which electronic services can support the realisation of the principles of good governance in LA. Very few researchers have addressed the realisation of the principles of good governance in LA with conceptually guided empirical studies.
Although, there have been other assessments of LA systems, even so, an additional one in the specific context of this thesis can be of academic interest. The development and application of the EV-AV evaluation framework in Chapter 5 is a progress on existing evaluation frameworks in LA and GIScience. Similarly, the thesis shows that ideas and theories from the social sciences and public administration could be applied to tackle evaluation problems in LA and GIScience.

Overall, this thesis emphasises the often overlooked demand-side perspective and can encourage researchers to take a closer look at why and how the society is benefitting from the implementation geo-ICT and e-LA in the public sector. While some LA studies have paid narrow attention to this challenge in the context of e-government, few GIScience researches have addressed the research concern in the context of e-government as provided in this thesis. This thesis opens up a discussion on systematic study of the benefits of e-LA in Africa and hopes that it has made a little contribution to the scientific discourse on how to use electronic services to foster good governance and societal well-being in Africa.

Lastly, it is important to state that more studies on the impact of AGIS, especially on the demand-side network are still necessary. The studies can be aligned to the aim and goals planned for AGIS, the impact of the project on external demand-side stakeholders and improvement of national LA standards and institutional frameworks. It is also worthy of note that future studies on AGIS can be positioned to investigate the direct effects of the national (domestic) funding of AGIS. There is also the need for periodic evaluation of AGIS and development of 'non-mechanistic' frameworks to evaluate the societal impacts of AGIS.

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Summary

This thesis examines the dynamics of geographic information systems (*GIS*) implementation in the public sector and evaluates the impacts of geographic information and communication technology (*geo-ICT*) and electronic land administration (*e-LA*) on good governance and societal well-being. The empirical field is an e-government policy initiative in Africa—Nigeria's Abuja Geographic Information Systems (AGIS). AGIS aims to strengthen good governance by developing a digital system of cadastral records for e-LA and by providing additional geospatial data and services in the Federal Capital Territory (FCT) of Nigeria, Africa's most populous nation and the second largest economy. AGIS is a leading, long-term and consistent implementation of geo-ICT for urban governance in Africa.

In the first part of the research I reviewed and classified GIS impact literature from 1998-2008 in a taxonomy, which distinguishes impacts *of GIS implementation* in terms of *contributions to efficiency, effectiveness and societal well-being*. The analysis revealed a persistent paucity of empirical studies on contribution of GIS to societal well-being, with very few studies from emerging and developing economies. This steered the research towards a better understanding of the impact of implementation of AGIS on good governance and societal well-being in the FCT of Nigeria.

Next, I applied the global and local networks framework and the supply- and demand-sides stakeholders' concept to trace the historical trajectory of AGIS and interactions involved in the implementation of the project. The findings disclose that the attachment of supply-side stakeholders to the AGIS project over time was not steady and the mobilisation of the demand-side stakeholders for the implementation of the project was weak. AGIS was also unable to impose itself as an obligatory point of passage (OPP) between the supply- and demand-side stakeholders. The combination of global and local networks framework and supply- and demand-side stakeholders' concept is illuminating for understanding the context of the evolving AGIS initiative and has implications regarding the processes of design, implementation and application of geo-ICT for good governance and social well-being, both for academics and practitioners. Specifically, computerisation administrators in Africa should appreciate that initiatives like AGIS can be significant beyond a narrow emphasis on technology. Indeed, they can be influenced by and also influence social, institutional and political changes and interests of stakeholders in the national and the local networks, which in turn affect the successful design and implementation of the initiative. The historical trajectory of AGIS shows that practitioners can improve the success rate of implementation of e-LA in Africa by being cognisant that standards,

personnel development policy, financing, political and legal support are critical success factors when implementing GIS in the public sector.

The research further reveals that the granting of the statutory right of occupancy, area councils' title regularisation, recertification of land title, verification of land record (legal search) and consent to alienate property are the core services supported by AGIS with an integrated use of GIS and ICT or geo-ICT. AGIS intervention in the granting of statutory right of occupancy is partly ineffective and partly effective and thus unable to consistently support good governance and societal well-being in the FCT. The electronic implementation of area councils' title regularisation is ineffective thereby contributes low to good governance and societal well-being. The recertification mechanism and legal searches effectively contribute to good governance and societal well-being, while the implementation of consents to alienate is ineffective.

Corruption is one of the most problematic factors in land administration in Africa and a major obstacle to good governance and societal well-being. AGIS aims to minimise corrupt practices such as forgery, multiple allocations, bribery, fraud, white collar malpractices, and nepotism and favouritism in the provision of land administration services in the FCT of Nigeria. However, while the first five corrupt practices were reduced at different rates, the last (nepotism and favouritism) increased.

The levels of computerisation of land administration services supported by AGIS, observed corruption, demand-side satisfaction and transaction costs provide a perspective to explore how AGIS contributes to good governance and societal well-being in the FCT. The thesis argues that high levels of computerisation or high-end e-LA solutions are not a panacea for corruption in the provision of LA services. In the same vein, e-LA does not automatically increase effectiveness in land-related public sector management.

The last part of the research evaluates the differences between the expected value and actual value of e-LA in urban housing development in the FCT of Nigeria. The difference between the expected value of e-LA and the actual value of AGIS is: '*medium*' for enhancement of access to credit and security for credit, '*low*' for strengthening of the state's financial and taxation capacity, '*medium*' for improvement of land use planning and environmental management and '*high*' for popular participation. Generally, the actual value falls below the expected value. The greater the difference between the expected value and the actual value, the less successful is the outcome.

The observed differences are due to difficulties in accessing mortgages, Land Use Act induced constrictions and absence of a Land Use and Allocation

Committee to advise the Minister of FCT on matters related to management of land, problems in acquiring land, lack of direct access to land revenue for housing development, inconsistent resettlement policy, poor access to Abuja Master Plan and general inadequate coordination of implementation of ICT in Nigeria. The thesis highlights that the realisation of the expected value can be improved through resolute policy reforms targeted at citizens' participation, amendment of Land Use and National Housing Fund Acts, and improvement of supporting infrastructures for delivering electronic services, especially electricity.

Finally, the thesis offers general recommendations and makes suggestions for further academic research. The general recommendations can improve the overall benefit of AGIS electronically supported LA services as e-government policy intervention to deal with societal problems and improvement of governance in the FCT of Nigeria, and enhance the realisation of societal benefits of the implementation of e-LA in Nigeria and other African countries.

Résumé

Cette thèse examine la dynamique des systèmes d'information géographique (SIG) dans leur mise en application dans le secteur public et évalue les impacts de l'information géographique et de la technologie de communication (géo-TIC) et l'administration des terres électronique (e-LA) sur la bonne gouvernance et le bien-être de la société. Le champ empirique est une initiative politique de l'e-gouvernement en Afrique- le Système d'information géographique d'Abuja. Nigeria (AGIS). AGIS vise à renforcer la bonne gouvernance en développant un système numérique de documents cadastraux pour l'e-LA et en fournissant d'autres données géospatiales et des services dans le Territoire de la capitale fédérale (FCT) du Nigeria, pays le plus peuplé d'Afrique et la deuxième plus grande économie d'Afrique. AGIS est un chef de file dans la mise en application, cohérente et à long terme de la géo-TIC pour la gouvernance urbaine en Afrique.

Dans la première partie de la recherche, la littérature sur l'impact du SIG a été examinée et classée de 1998-2008 dans une taxonomie qui distingue les impacts de l'application des SIG en termes de contribution à l'efficacité, l'effectivité et au bien-être sociétal. L'analyse a révélé une pénurie persistante d'études empiriques sur la contribution des SIG au bien-être de la société, avec très peu d'études provenant des économies émergentes et de celles en développement. Cela a conduit la recherche vers une meilleure compréhension de l'impact de la mise en application de AGIS sur la bonne gouvernance et le bien-être sociétal dans la Capitale Fédérale du Nigéria.

Ensuite, le cadre global et local des réseaux et les concepts de l'offre et la demande des parties prenantes ont été appliqués pour repérer la trajectoire historique de AGIS et les interactions impliquées dans la mise en œuvre du projet. Les résultats révèlent que l'attachement de l'offre des intervenants au projet AGIS au fil du temps n'a pas été régulier et la mobilisation des parties prenantes au niveau de la demande pour la mise en œuvre du projet était faible. AGIS a également été incapable de s'imposer comme un point de passage obligé (PPO) entre les parties de l'offre et de la demande. La combinaison du cadre des réseaux mondial et local et le concept des parties de l'offre et de la demande est édifiante pour comprendre le contexte évolutif de l'initiative AGIS et a des implications sur les processus de conception, de mise en œuvre et d'application de la géo-TIC pour la bonne gouvernance et le bien-être social, à la fois pour les universitaires et les praticiens. De façon spéciale, les administrateurs en Afrique doivent comprendre que des initiatives d'informatisation telles que AGIS peuvent être significatives au-delà de l'accent étroit mis sur la technologie. En effet, elles peuvent être influencées par et également influencer des changements sociaux, institutionnels et politiques et les intérêts des parties prenantes dans le

contexte national et local des réseaux, qui à leur tour ont une incidence sur la conception et la mise en œuvre de l'initiative. La trajectoire historique de AGIS montre que les praticiens peuvent améliorer le taux de réussite de la mise en œuvre de l'e-LA en Afrique en considérant le fait que les standards, la politique de développement du personnel, le financement, le soutien politique et juridique sont des facteurs critiques de succès lors de la mise en œuvre du SIG dans le secteur public.

La recherche révèle en outre que l'octroi du droit légal d'occupation, les conseils régionaux de régularisation du titre, la recertification de titre foncier, la vérification de l'enregistrement des terres (recherche juridique) et le consentement à l'aliénation des propriétés sont les services de base pris en charge par AGIS avec une utilisation intégrée des SIG et des TIC ou la géo-TIC. L'intervention de AGIS dans l'octroi du droit légal d'occupation est en partie inefficace, et partiellement effective et donc incapables de soutenir cohérement la bonne gouvernance et le bien-être sociétal dans le FCT. La mise en œuvre électronique de conseils régionaux de régularisation du titre est inefficace, par conséquent contribue peu à la bonne gouvernance et au bien-être sociétal. Le mécanisme de recertification et de recherches juridiques contribue efficacement à la bonne gouvernance et au bien-être sociétal, tandis que la mise en œuvre des agréments à l'aliénation est inefficace.

La corruption est l'un des facteurs les plus problématiques dans l'administration des terres en Afrique et un obstacle majeur à la bonne gouvernance et le bien-être sociétal. AGIS vise à minimiser les pratiques de corruption, telles que les falsifications, les allocations multiples, la corruption, la fraude, les malversations des cols blancs, le népotisme et le favoritisme dans la prestation de services d'administration des terres dans le FCT du Nigéria. Cependant, tandis que les cinq premières pratiques de corruption ont été réduites à des taux différents, la dernière (le népotisme et le favoritisme) a augmenté.

Les niveaux d'informatisation des services d'administration des terres pris en compte par AGIS, ont observé la corruption, la satisfaction de la demande et les coûts de transaction et fournissent une perspective pour explorer la façon dont AGIS contribue à la bonne gouvernance et le bien-être sociétal dans le FCT. La thèse soutient que des niveaux élevés d'informatisation ou des solutions haut de gamme d'e-LA ne sont pas une panacée pour la corruption dans la provision de services de LA. Dans la même veine, e-LA ne signifie pas automatiquement accroître l'efficacité dans la gestion des terres par le secteur public.

La dernière partie de la recherche évalue les différences entre la valeur attendue et la valeur réelle de l'e-LA dans le développement du logement urbain dans le FCT du Nigeria. La différence entre la valeur attendue de l'e-LA et la valeur réelle de AGIS est :«*moyenne*» pour l'amélioration de l'accès au crédit et à la sécurité pour le crédit, «*faible*» pour le renforcement de la capacité financière et la fiscalité de l'État, «*moyenne*» pour l'amélioration l'aménagement du territoire et de gestion de l'environnement et «*élevée*» pour la participation populaire. En général, la valeur réelle est inférieure à la valeur attendue. Plus grande est la différence entre la valeur attendue et la valeur réelle, moins réussi, est le résultat.

Les différences observées sont dues à des difficultés d'accès aux prêts hypothécaires, la Loi sur l'aménagement induit des constrictions et l'absence d'un Comité d'attribution et de l'aménagement des terres pour conseiller le Ministère du FCT sur les questions liées à la gestion des terres, les problèmes dans l'acquisition de terres, le manque d'accès direct au revenu foncier pour le développement du logement, la politique de réinstallation inconsistante, le pauvre accès au Plan directeur d'aménagement de Abuja et la coordination générale inadéquate de la mise en œuvre des TIC au Nigéria. La thèse met en évidence que la réalisation de la valeur attendue peut être améliorée grâce à des réformes politiques résolues ciblées sur la participation des citoyens, l'amendement des actes du Fonds national de Logement et de l'utilisation des terres, et l'amélioration des infrastructures de soutien pour la prestation de services électroniques, notamment l'électricité.

Enfin, la thèse propose des recommandations générales et fait des suggestions pour une recherche universitaire approfondie. Les recommandations générales peuvent améliorer le bénéfice général de prestation de services LA supportée électroniquement par AGIS comme une intervention politique d'e-gouvernement pour faire face à des problèmes sociétaux et l'amélioration de la gouvernance dans le FCT du Nigeria, et d'améliorer la réalisation des avantages pour la société dans la mise en œuvre de l'e-LA au Nigeria et dans d'autres pays africains.

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Samenvatting

Dit proefschrift onderzoekt de dynamiek van de invoering van geografische informatiesystemen (GIS) in de publieke sector en evalueert de invloed van geografische informatie en communicatie technologie (geo-ICT) en elektronische land administratie (e-LA) op goed bestuur en maatschappelijk welzijn. De empirie betreft een e-overheidsinitiatief in Afrika – Nigeria's Abuja Geographic Information Systems (AGIS). AGIS beoogt goed bestuur te bevorderen door een digitaal systeem van kadastrale gegevens voor e-LA te ontwikkelen en door in aanvullende ruimtelijke gegevens en diensten te voorzien binnen Nigeria's Federal Capital Territory (FCT). Binnen Afrika kent Nigeria de grootste bevolking en vormt het op een na grootste economie. AGIS is een toonaangevend en langlopend invoeringstraject van geo-ICT voor stedelijk bestuur in Afrika.

In het eerste deel van het onderzoek heb ik over de periode van 1998 tot 2008 literatuur over de invloed van GIS bestudeerd en geclassificeerd in een taxonomie die de invloed van GIS onderscheidt naar de bijdrage aan efficiency, effectiviteit en maatschappelijk welzijn. De analyse bracht een consequent gebrek aan empirische studies naar maatschappelijk welzijn aan het licht, met heel weinig studies uit opkomende economieën en ontwikkelingslanden. Daarom focust dit onderzoek zich op een beter begrip van de invloed van de invoering van AGIS op goed bestuur en maatschappelijk welzijn in Nigeria's FCT.

Vervolgens pas ik het raamwerk van globale en lokale netwerken en het concept van belanghebbenden van de aanbod- en vraagkant toe om het historische ontwikkelingstraject van AGIS en de interacties tijdens de invoering te traceren. De bevindingen brengen aan het licht dat binding van de belanghebbenden van de aanbodkant aan het AGIS project door de tijd niet stabiel was en dat de mobilisatie van de belanghebbenden van de vraagkant voor ondersteuning van het project zwak was. Het is AGIS ook niet gelukt een verplicht passeerpunt te worden tussen de belanghebbenden van de aanbod- en vraagkant. De combinatie van het raamwerk van globale en lokale netwerken en het concept van belanghebbenden van de aanbod- en vraagkant verschaft inzicht in de context van het ontwikkelingstraject van AGIS en heeft consequenties voor het proces van ontwerp, invoering en toepassing van geo-ICT voor goed bestuur en maatschappelijk welzijn, zowel voor wetenschappelijk onderzoekers als voor praktijkmensen. In het bijzonder beheerders van automatiseringsprojecten in Afrika zouden moeten waarderen dat initiatieven zoals AGIS verder reiken dan een nauwe focus op technologie. Zulke initiatieven kunnen zelfs beïnvloed worden door, en ook invloed hebben op, sociale, institutionele en politieke veranderingen en belangen van belanghebbenden in de nationale en lokale netwerken, welke

op hun beurt van invloed zijn voor het succesvol ontwerpen en invoeren van een initiatief. Het ontwikkelingstraject van AGIS laat zien dat praktijkmensen de slagingskans van de invoering van e-LA in Afrika kunnen verbeteren door zich bewust te zijn dat standaarden, een personeelsontwikkelingsbeleid, bekostiging, politieke en juridische steun allen kritische succesfactoren van invoering van GIS in de publieke sector zijn.

Het onderzoek laat verder zien welke activiteiten de kerndiensten zijn die AGIS ondersteunt door een integraal gebruik van GIS en ICT of geo-ICT (het gaat om: het toekennen van specifieke vormen van grondbezit, het formaliseren daarvan door wijkraden, het opnieuw uitgeven van bezitspapieren, het controleren van het bezit in de registratie en het instemmen met bezitsoverdracht). De rol van AGIS bij het toekennen van grondbezit is deels ineffectief en deels effectief en dus niet in staat om een eenduidige ondersteuning te geven aan goed bestuur en maatschappelijk welzijn in de FCT. Het elektronische uitvoeren van de formalisering door wijkraden is ineffectief en draagt dus nauwelijks bij aan goed bestuur en maatschappelijk welzijn. Het opnieuw uitgeven van bezitspapieren en het controleren in de registratie dragen wel op een effectieve manier bij aan goed bestuur en maatschappelijk welzijn, terwijl het instemmen met bezitsoverdracht ineffectief is.

Corruptie is een van de meest problematische factoren in land administratie in Afrika en een belangrijk struikelblok voor goed bestuur en maatschappelijk welzijn. AGIS beoogt corrupt gedrag zoals vervalsing, meervoudige toekenning, omkoping, fraude, witteboordencriminaliteit, en nepotisme en voortrekken bij de verlening van land administratie diensten in Nigeria's FCT te minimaliseren. Echter, waar de eerste vijf vormen van corrupt gedrag in uiteenlopende mate verminderden, nam de laatste (nepotisme en voortrekken) toe.

De niveaus van automatisering van land administratie diensten ondersteund door AGIS, de waargenomen corruptie, de klanttevredenheid en transactiekosten vormen een perspectief om te onderzoeken waarom AGIS bijdraagt aan goed bestuur en maatschappelijk welzijn in FCT. Het proefschrift betoogt dat een hoog niveau van automatisering of een high-end e-LA oplossing geen panacee zijn voor de corruptie in het voorzien in LA diensten. Vergelijkbaar leidt e-LA ook niet automatisch tot een toename in de effectiviteit in land-gerelateerd management in de publieke sector.

Het laatste deel van het onderzoek evalueert de verschillen tussen de verwachte waarde en de gerealiseerde waarde van e-LA voor de ontwikkeling van de stedelijke huisvesting in Nigeria's FCT. Het verschil tussen de verwachte waarde van e-LA en de gerealiseerde waarde van AGIS is:

'gemiddeld' voor het vergroten van toegang tot krediet en zekerheid van krediet, 'laag' voor de versterking van de overheidsfinanciën en haar belastingcapaciteit, 'gemiddeld' voor de verbetering van de ruimtelijke ordening en het milieubeheer en 'hoog' voor inspraak van betrokken burgers. In het algemeen blijft de gerealiseerde waarde achter bij de verwachte waarde. Hoe groter het verschil tussen de verwachte waarde en de gerealiseerde waarde, hoe minder succesvol het resultaat.

De waargenomen verschillen zijn door een aantal case specifieke zaken te verklaren (zo is het moeilijk om een hypotheek te krijgen, legt de relevante grondgebruikswet de nodige beperkingen op en ontbreekt een commissie die de Minister voor FCT kan adviseren over zaken aangaande management van land, zijn er problemen met het verwerven van land, is het niet mogelijk land gerelateerd opbrengsten direct voor de ontwikkeling van huisvesting aan te wenden, is er een inconsistent herhuisvestingsbeleid, is het moeilijk toegang te krijgen tot het ruimtelijke plan voor Abuja en is er in het algemeen onvoldoende coördinatie bij de invoering van ICT in Nigeria). Het proefschrift benadrukt dat het behalen van de verwachte waarde kan worden bevorderd door forse beleidshervormingen gericht op inspraak van de burger, wijziging van de wetten inzake grondgebruik en huisvestingsfinanciering, en verbetering van de basisinfrastructuur voor de elektronische dienstverlening, vooral elektriciteit.

Tenslotte geeft het proefschrift een aantal algemene aanbevelingen en doet suggesties voor verder wetenschappelijk onderzoek. De algemene aanbevelingen kunnen verbetering brengen in de algehele baten van de door AGIS ondersteunde e-LA diensten als e-overheidsbeleidsinterventie om sociale problemen aan te pakken en het bestuur in Nigeria's FCT te verbeteren, en om de realisatie van maatschappelijke baten van de invoering van e-LA in Nigeria en andere Afrikaanse landen te versterken.

Biography Adewale Olusola Akingbade

Adewale graduated from the Department of Geography, Faculty of Science of the University of Ibadan, Nigeria with Second Class Honours, Upper Division in 1985 and obtained a Professional Diploma in Surveying from the Federal School of Surveying, Oyo, Nigeria in 1989. Adewale also obtained a Postgraduate Diploma in Cartography from the International Institute for Aerospace Surveys and Earth Sciences (ITC) in 1994 and specialised Masters Degree in Application of Geographic Information Systems (GIS) for Environmental Analysis from the Faculty of Civil Engineering and Geo-information of the Technische Fachhochshule (University of Applied Sciences), Berlin in 1999.

In September 2003, Adewale Akingbade went back to the International Institute for Geo-information Science and Earth Observation (ITC) and was awarded the Degree of Master of Science in Geo-information Science and Earth Observation (with Distinction) upon successful completion of his studies in March 2005.

The first working experience of Adewale started as a teacher at St. David's Primary School, Ibule, near Akure, Ondo State, Nigeria in 1979. He later taught at Oyemekun Grammar School, Akure (his *alma mater*) in 1980 and worked as a Senior Clerical Officer at Ondo State Television Corporation, Akure in 1982. After graduation in 1985, Adewale carried out his primary assignment of the mandatory National Youth Service as a teacher in a Seminary in Imo State, Nigeria.

Adewale is a Registered Surveyor of the Federal Republic of Nigeria and worked at the Federal Surveys Department (now Office of the Surveyor General of the Federation) from 1987 until he joined RECTAS as a Lecturer in 2001. Adewale served as the Secretary, RECTAS Consultancy Technical Committee (CTC), managed consultancy projects including mapping and short courses. He also served on the Technical Advisory Committee (TAC) of the Governing Council of RECTAS in 2005 and currently (August 2012) a Senior Lecturer and Head of the Cartography Department at RECTAS.

Some of the publications of Adewale Akingbade are:

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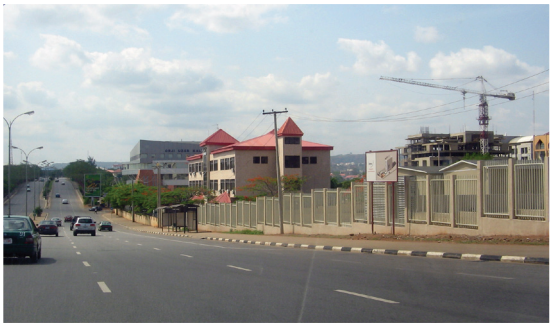

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