THE ADOPTION OF OPEN SOURCE SOFTWARE IN UGANDA: A PRAGMATIST APPROACH TO THE FORMATION OF A NATIONAL INFORMATION POLICY FOR A NEW TECHNOLOGY

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Dissertation Prepared for the Degree of

DOCTOR OF PHILOSOPHY

UNIVERSITY OF NORTH TEXAS

May 2014

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This exploratory research examined an information policy formation process for the adoption of open source software (OSS) in Uganda. Grounded in a pragmatist tradition, this theoretical and empirical study pursued a qualitative research approach with a triangulation of theoretical concepts, data collection, and analysis techniques in an iterative and interactive process. The design provided a powerful context to develop and conduct field activities in Kampala with a purposeful sample of 22 participants, 20 in interviews and 5 in a focus group discussion. The research design enhanced consistency in the evidence from the data, increased robustness in the results, and confidence in the findings.

The results highlighted a vibrant ICT sector in Uganda, underlined the multiple stakeholders and their competing interests in the policy, revealed a lack of consensus between the government and OSS promoters on the meaning of OSS, and illuminated the benefits in the OSS model over proprietary software. The stakeholders' conflicting perceptions appear to be too far apart to allow meaningful progress and are derailing the policy. Unless their conflicting perceptions are resolved, the OSS policy will continue stagnating. The study fills critical information gaps in Uganda’s policy formation processes, provides timely and relevant information to holistically understand a complex policy formation stage to enable stakeholders to resolve their impasse and enact a law to embrace OSS. It breaks ground in information policy research in framing policy formation processes for new ICTs, such as OSS, as ideologically-oriented. The findings offer ideas to scholars and African countries to draw applicable lessons.
ACKNOWLEDGEMENTS

I wish to acknowledge and thank Dr. William Moen for serving as chair to my dissertation committee. Your constant challenges to me, dedication to this process, patience, and encouragement inspired me to give my best to the process. I also wish to thank Dr. Linda Schamber, the co-chair to my committee whose scholarly insights from the first day of my Ph.D. program continue to inspire me. My gratitude goes to Dr. Brian Richardson whose perceptive advice during this dissertation process and for supporting my education since 2004 as a member of my thesis committee. I am indebted to Dr. Lin Lin for serving on my committee and setting me on a scholarly publication track. My deepest gratitude goes to Dr. James Duban for editing my scholarship essays and to Dr. Carin Horn for editing my dissertation and to Robert Horn for his generosity.

My appreciations go to Dr. Wheeler and the department of library and information sciences for an assistantship position since 2009 and to the College of Information, Toulouse School of Graduate Studies, Diane Coulson Memorial Fund, Multiculturalism Scholastic Award, and American Council of the Blind, Incight, ACBt, and the International Education Committee for the scholarships during my program. My appreciation go to the ODA at UNT, especially Ms Rebecca Cagle and Mr. Ron Venable for all your support. I wish to thank Dr. Florence Mason, Dr. George Musambira, the late Nel LaBar, Pastor Bruce and Margie, Pastor Scarlet, Rev. Kalimi, Mr. Watson, Mr. Wabwire, Mr. Kakeeto, Christine, Margaret, Brian, Mary, Louis, Dave, Charles, Tyson, Richard, Simon, Kyle, prayer partners, and all my pastors. I wish to acknowledge my wife Dorothy, sons Kenneth, Michael, and Samuel Jr. for the love, understanding, and support. I dedicate this dissertation to my “Little Angel, doctor” Samuel Baker Tendo Muwanguzi Jr.
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CHAPTER 1

INTRODUCTION

Background of the Study

The formation of an open source software (OSS) policy is underway in Uganda to change the existing information and communication technology (ICT) policies and laws to facilitate the formal recognition, adoption, and use of OSS alongside proprietary software. The evolving OSS policy formation process followed a proposal by ICT stakeholders in Uganda under their umbrella association, ICT Cluster, to the government of Uganda to provide legal standing to OSS through an Act of Parliament to enable the formal adoption of OSS. The primary objective of the proposal by the ICT stakeholders required the creation of a clear-cut legal framework to formally facilitate and regulate the adoption, diffusion, and use of OSS.

The ICT stakeholders suggested that the adoption of an OSS policy might only recognize OSS but not give it the legal support it needs to favorably compete with proprietary software. Currently, no clear-cut legal support exists in Uganda to formally facilitate and regulate the adoption, diffusion, and use of OSS. Proponents of a new OSS policy, in a form of a law or an act of Parliament, suggested that embracing OSS would create a platform for developing new software concepts or innovations which are currently shutout by existing national ICT policies and laws that privilege proprietary software (Tentena, 2008a). Proponents of the change in the existing ICT policies stated that formal recognition of OSS would facilitate a nationwide education program about OSS because it is new but potentially transformative software for Uganda (Collins, 2010; Tentena, 2008a, 2008b).

The ICT stakeholders also stated that if OSS receives formal recognition through an act of Parliament, its adoption would engender better quality software, higher reliability, more
flexibility, lower cost, and an end to predatory vendor lock-in (Tentena, 2008a, 2008b). While no restrictions exist on the use of OSS, its competitiveness with proprietary software in the market is undermined by a lack of a supportive policy in the form of a national law recognizing it as alternative software to compete with and perhaps break the monopoly enjoyed by proprietary or commercial software. Formal recognition of OSS would facilitate its diffusion, adoption, and widespread use by government institutions and other organizations where its acquisition, which comes without vendor warranty, currently lacks the full support of the law (Collins, 2010; Tentena, 2008a, 2008b; Weddi, 2009).

Additionally, research on OSS use suggests that an inclusive OSS policy would help to potentially reduce widespread software piracy in the country (Bruggink, 2003; Collins, 2010; Coar, 2006). In Uganda, because there is no specific law to protect intellectual property, piracy of proprietary software is a common practice (Bruggink, 2003; Collins, 2010; Karume & Mbugua, 2012). While no guarantee exists that if OSS receives formal recognition, people would not also misuse OSS and abuse its licensing regime, the free availability of the software code for modification and customization to suit users’ needs would offer substantial incentive to abide by OSS licenses and minimize software piracy (Collins, 2010).

Proponents of the OSS policy for Uganda suggested that the formal recognition and adoption of OSS would provide users with an alternative and affordable software to enable the predominantly agricultural country to possibly bridge the digital divide and transform itself into an information society (Collaboration on International ICT Policy for East and Southern Africa {CIPESA}, 2005; Collins, 2010; East Africa Centre for Open Source Software {EACOSS}-Uganda, 2008; Karume & Mbugua, 2012; Reijswoud & Topi, 2003; Weddi, 2009). The formal recognition, use, and availability of OSS would also enable Ugandans to exploit and optimize the
seamless opportunities offered by the ICT-driven global economy and contribute to national
development (Baguma, 2005; Bruggink, 2003; CIPESA, 2005; Collins, 2010; EACOSS-Uganda,
2008; Weddi, 2009).

Castells (1998), Chang (1995), Organization for Economic Co-operation and
Development (OECD, 2009), United Nations (2001), and World Bank (2001) found that ICTs,
including OSS, provided a catalyst to the globalization movement and the evolution of
information societies around the world. The availability of OSS enabled developing countries to
acquire the most cost-effective ICTs to bridge the digital divide and facilitated their populations
to benefit from the vast potential offered by the digital-based global economy (OECD, 2001,
Elliott and Kraemer (2008), Open Source Initiative (OSI, 2013), and Simon (2008) stated that the
use of OSS in developed countries has been a major factor in the transformation of their
industrial communities, overall advancement, and integration into the information society.

Inspired by the exponential growth, ubiquitous use, and transformative impact of ICTs,
including OSS, which unlocked the boundless opportunities in the knowledge-based global
economy for communities in developed countries, the ICT stakeholders proposed a change in the
existing ICT laws to enable Ugandans to embrace OSS to optimize opportunities in the
burgeoning global ICT environment (Baguma, 2005; Bruggink, 2003; CIPESA, 2005; Collins,
2010; EACOSS-Uganda, 2008; Weddi, 2009). Guided by the vision that the largely agro-based
Ugandan society could transform itself into an information society, the objective of the OSS
proponents in proposing a formal recognition of OSS through an act of Parliament would give
legal standing to OSS and enable its diffusion and use (Collins, 2010; EACOSS-Uganda, 2008;
Weddi, 2009).
Open source software and information society concepts. OSS refers to computer programs developed through some collaborative effort and whose source code is made available to the general public for use, modification, and adoption at no cost (Gonzalez-Barahona, 2004; FSF, 2013; OSI, 2013; Tiemann, 2006). Despite differences in their names, free software (FS) also refers to computer programs whose source code can be freely acquired by users, who have the freedom to alter, run, and redistribute it without any licensing encumbrances (Colford, 2008; Free Software Foundation {FSF}, 2007, 2013; Stallman, 1996). Regardless of ideological differences among their developers and advocates, both OSS and FS, variously referred to as FOSS or simply OSS, have played a transformative role in the evolution of information societies in the Western hemisphere and in the developing countries of Asia, South America, and parts of Sub-Saharan Africa (Camara & Fonseca, 2007; Karume & Mbugua, 2012; Simon, 2008; Sowe, 2011; Weerawarana & Weeratunga, 2004).

An information society refers to a social state where the convergence of computing and telecommunications technologies facilitate the creation, diffusion, use, integration, storage, and manipulation of information to play a dominant and transformative role in the political, economic, and cultural lives of communities (Castells, 1998; Chang, 1995; OECD, 2009; Webster, 2002, 2006; World Summit on Information Society {WSIS}, 2013). An information society is characterized by the convergence and use of computers and telecommunications technologies to accomplish information-related tasks to satisfy major economic, political, cultural, and social needs of communities (Castells, 1998; Chang, 1995; OECD, 2009; Webster, 2006; WSIS, 2013).

Most developing countries, their development partners, some scholars, and OSS adherents view OSS as a potential bridge across the digital divide and a highway for developing
countries to the information society (Camara & Fonseca, 2007; CIPESA, 2005; OECD, 2009; Karume & Mbugua, 2012; Sowe, 2011; WSIS, 2013). The widely held perception is that if strategically utilized, OSS offers a potential to diffuse knowledge and become a gateway to the exploitation of opportunities available in the information society (Camara & Fonseca, 2007; CIPESA, 2005; OECD, 2009; Karume & Mbugua, 2012; Sowe, 2011; WSIS, 2013). In Africa, the most economically underdeveloped continent, the prospect of acquiring free, high quality, adaptable, and stable OSS applications encouraged key players in both the public and private sectors to consider the adoption and use of OSS as a cost-cutting measure and pathway to social transformation (CIPESA, 2005; Coar, 2006; Free Software and Open Source Foundation for Africa {FOSSFA}, 2013; Karume & Mbugua, 2012; Sowe, 2011).

However, while OSS has been widely used in developed countries for over half a century (Elliott & Kramer, 2008; OECD, 2009; Simon, 2008), it is still a new technology in developing countries especially in Africa (FOSSFA, 2013; Karume & Mbugua, 2012; Sowe, 2011). For Uganda in particular, while OSS has gained a reasonable degree of adoption and use, it is still new software, inadequately explained, and not well understood (CIPESA, 2005; Collins, 2010; EACOSS-Uganda, 2008; FOSSFA, 2013; Sowe, 2011; Weddi, 2009).

Purpose of the Study

The purpose of this study was, therefore, to conduct a theoretical and empirical examination of an information policy formation process for the adoption and use of OSS in Uganda. This study also investigated and described the perceptions and multiple interests of stakeholders involved in the OSS policy formation process. The overarching goal of this exploratory study was to create a thorough understanding of OSS and the dynamics and complexities associated with information policy formation processes in the country. Secondly,
the study provided the relevant information about OSS for Uganda’s policy makers to render informed decisions on appropriate national information policies related to the utility of OSS compared with proprietary software. It also provided vital information to the OSS policy promoters to strategically manage the OSS policy process.

To purposely investigate and describe the multiple interests and perceptions of stakeholders involved in this policy process for the formal recognition, adoption, diffusion, and use of OSS, this study primarily addressed the following overarching question:

What are the underlying interests of ICT stakeholders in Uganda to propose a new policy for the formal recognition and adoption of OSS as an alternative choice alongside proprietary software?

While addressing the overarching question, the study identified, described, and categorized the various ICT stakeholders promoting the OSS policy initiative, delineated their complementary and competing interests, and provided information on whether the proposed OSS policy is consistent with existing ICT policies and laws to enhance the attainment of Uganda’s national development goals. The study also described the features of the policy development structures and processes, how they can be improved to ensure an egalitarian policy environment, and highlighted the financial advantages and disadvantages of OSS and proprietary software. The study recommended the need to develop a consensus towards a formal recognition and adoption of a national OSS policy through an act of Parliament to enable Ugandans to benefit from opportunities available in the global economy.

However, addressing this overarching question thoroughly demanded an understanding of the processes in Uganda by which information policies are formulated. For such an understanding to develop and emerge, empirical and conceptual examination of the process was
undertaken to provide relevant insights into the formation of a national information policy for the formal recognition and adoption of OSS. Since this was the first theoretically and empirically based study on this topic, the results will not only enhance theory building but also potentially inform the Ugandan Parliament and influence government policy initiatives related to OSS and proprietary software. The components of the study included:

- The description of the information policy process with specific emphasis on the formation stage in policy development;
- The description and discussion of OSS adoption, diffusion, and use in relevant and diverse contexts to facilitate some comparisons and contrasts;
- The identification, description, categorization, and analysis of the various Ugandan ICT stakeholders, their affiliations, and their various interests in challenging the exclusive use of proprietary software as well as their advocacy for a law to recognize OSS as an alternative to proprietary software;
- The description of Uganda’s policy development structures and processes to identify opportunities and challenges for an information policy to facilitate and create an inclusive policy for the formal recognition, adoption, and use of OSS alongside proprietary software;
- The provision of recommendations to help inform and improve policy formation structures and processes to ensure the development of integrated policies consistent with national development goals to transform Uganda’s economy and propel the population into the information society.

This exploratory study provides relevant information about OSS for Uganda’s policy makers to render informed decisions on the formation of a national information policy for the formal
recognition and use of OSS. Also, the information aims to encourage Ugandans to acquire relevant knowledge about OSS and embark on developing skills to customize and use OSS to participate in the global economy. Similarly, information from this study may help set Uganda on a path to bridging the digital divide and transforming into an information society.

This study also provided ideas that could be used to aid other developing countries in Africa and elsewhere seeking to develop information policies for the adoption of new ICTs. Furthermore, this study contributes practical and theoretical knowledge towards policy formation processes for the adoption of OSS and other technologies in diverse contexts as well as research in the information policy (IP) discipline. While this study is not primarily a comparison between the cost of OSS and proprietary software, it has, in the process of examining an information policy formation process for the formal recognition and adoption of OSS, highlighted the financial advantages and disadvantages associated with OSS and proprietary software.

A Case Study of Uganda

Since 2003, OSS proponents have lobbied the government to formally recognize and adopt the use of OSS and to provide an even and fair playing field to enable OSS to compete and operate alongside proprietary software (Baguma, 2005; CIPESA, 2005; EACOSS-Uganda, 2008; Reijswoud & Topi, 2003). In 2008, software stakeholders proposed to the government to change the current ICT policy through an act of Parliament to recognize and provide legal standing to OSS to enable it to fairly compete for public contracts with proprietary software (Tentena, 2008a). Independent OSS adherents, both from within and outside Uganda, have consistently made similar suggestions to the government to change the ICT policy and enact an OSS-embracing law as a cost-cutting measure, a technology and knowledge acquisition strategy, and as a tool to bridge the digital divide and transform the country into an information society.
(CIPESA, 2005; Collins, 2010; EACOSS-Uganda, 2008; Reijswoud & Topi, 2003; Weddi, 2009). Currently, the use of OSS in Uganda, apparently on the upsurge, is informal, random, and not supported by any specific law; it lacks the full force of the law to fairly compete with proprietary software in the increasingly lucrative ICT market (Collins, 2010; Weddi, 2009).

Focusing specifically on the emerging OSS policy as a case study, this exploratory and descriptive research comprehensively explored underlying interests of stakeholders and thoroughly described and created a better understanding of the evolving information policy for the formal recognition of OSS. This initiative provided a case study through which this research effort:

- Examined the underlying interests of software stakeholders who recommended to the government to change the existing ICT policies to embrace OSS (Tentena, 2008a);
- Described characteristics associated with OSS and provided relevant information about the adoption of OSS in a country such as Uganda;
- Provided pertinent information to facilitate the development of an integrated ICT policy to enhance the adoption of OSS to increase capabilities for Ugandans to exploit opportunities in the global economy.

Statement of the Problem

The lack of vital information about the multiple ICT stakeholders in Uganda and their underlying interests in proposing to the government to change the existing ICT laws to facilitate the formal recognition of OSS as an alternative to proprietary software has created uncertainty in the policy formation process and in the ICT sector in the country. Second, the absence of relevant information to create a clear understanding of OSS has raised skepticism about the software, placed motives of the OSS policy promoters into the spotlight, and derailed the ability
of policy makers to develop a coherent national policy for the formal adoption of OSS. This uncertainty and skepticism is compounded by lack of relevant information about the dynamics and complexities associated with the formation process of an information policy for the adoption of software such as OSS.

This absence of empirical and relevant information about OSS and associated complexities and uncertainties inherent and surrounding the formation process for an information policy for the formal recognition and adoption of OSS has already derailed the process and could negatively impact efforts by policy makers to fulfill their legislative mandate. Consequently, failure to develop an OSS policy could leave a gap that would hinder the Ugandan population from maximizing opportunities offered by the ICT-based global economy. Equally, the assumption by ICT stakeholders that the adoption and use of OSS would be a panacea to the digital divide and a sure pathway for Uganda to transform into an information society raised a critical problem that warranted closer scrutiny.

In addition, while the most proclaimed advantage of OSS is that it is free to download and use, associated costs and requirements, such as knowledge and skills needed to customize and use the software in a specific locale, and its requisite maintenance and support, is often overlooked or underestimated by adopters in various contexts (Colford, 2008). Subsequently, Uganda risks developing an information policy for the formal adoption of OSS if policy makers lack the relevant information to formulate a policy that strategically addresses associated skills, knowledge, and costs needed to customize, use, and maintain the software, as are often ignored in other contexts. These outstanding and lingering problems necessitated an empirical and theoretical examination of the OSS policy initiative.
First, this research identified, described, and categorized the multiple ICT stakeholders and highlighted their underlying interests in the OSS policy initiative to understand them and to ensure rationality in the policy formation process. Second, the absence of adequate information for policy makers to understand OSS and reasonably assess the pertinent knowledge, skills, and associated costs involved in the adoption and use of OSS was addressed. Third, the study described the current state of Uganda’s ICT environment as impacted by social, economic, and political factors under which the formal adoption of OSS is taking place. This was essential to ascertain and assure whether the population will benefit from the proposed policy goals. Finally, little or no evidence of elements of technological utopianism were identified. This was aimed, in essence, to ensure that high sounding rhetoric associated with OSS promoters does not mislead the policy formation process. Technological utopianism, in this context, refers to high-sounding or unrealistic rhetoric and visions of OSS advocates about its universal functionality and versatility in all contexts (Iacono & Kling, 1996).

This dearth of vital information for policy formation, therefore, necessitated an investigation of the OSS policy proposed by the ICT stakeholders to base policy decisions on empirically grounded research. Berger (1993) suggested that the availability of adequate and appropriate information is a prerequisite in the formation of coherent and comprehensive information policy initiatives. To generate such requisite information for the OSS policy development, the previously stated overarching question and a set of specific questions (see below) were addressed. The resultant pertinent information about OSS is intended to empower policy makers to strategically develop informed and justifiable decisions in executing their legislative mandates. It is the responsibility of the Parliament of the Republic of Uganda, the country’s legislature, to debate, enact, and change laws, statutes, or acts that are consistent with
national values and goals (Parliament of the Republic of Uganda, 2011). To that end, a set of specific research questions outlined in the next section guided the collection of data from which an understanding of the evolving OSS policy emerged.

Research questions. Consistent with the above overarching question, the following specific research questions guided this study:

RQ 1. Who are the various stakeholders behind the proposed national information policy for the formal recognition, adoption, diffusion, and use of OSS in Uganda and what information about OSS do they possess?

RQ 2. What are the complementary and competing interests among the various stakeholders supporting an information policy that would formally recognize the adoption and use of OSS as an alternative to the use of proprietary software in Uganda?

RQ 3. How consistent is the proposed OSS policy with the existing legislation on the use of ICTs in fostering an integrated and inclusive information policy in the attainment of Uganda’s national development goals?

RQ 4. What are the characteristics of the policy development structures and processes in Uganda and how have the legislature and government used them to respond to the OSS policy initiative?

RQ 5. What recommendations should be made to improve the policy formation structures and processes to enhance the legitimacy of national development policies?

The examination of the above questions contributed toward a better understanding of the ICT stakeholders in Uganda, their underlying interests, and capabilities to advance the OSS policy initiative. Focusing on these questions also created an understanding about stakeholder perceptions and knowledge about OSS, and the process through which Uganda’s national
information policies are conceptualized and formulated. Special attention was given to how internal and external interests, values, and forces intersected to frame, control, influence, guide, augment, champion, and direct the policy process.

Rationale of the Study

For Uganda, and possibly other developing countries, there is little understanding based upon systematic empirical and theoretical research, of the formation of national information policies for the adoption, diffusion, and use of OSS. While research on OSS continues to grow, there has been little attempt to develop an empirical or theoretically based holistic understanding of a national information policy formation process for the adoption of OSS. A corpus of studies on OSS highlights the historical development, characteristics, benefits, and differences between OSS and proprietary software, as well as breakthroughs in OSS development processes (Camara & Fonseca, 2007; Coar, 2006; Colford, 2008; Raymond, 1998, 1999; Stallman, 1996; Tiemann, 2006). Other studies on OSS present anecdotal accounts of its ubiquitous use and its formidable challenge to the monopoly of proprietary software (Blansit, 2009; Camara & Fonseca, 2007; Colford, 2008).

For some research on the adoption, diffusion, and use of OSS, efforts have largely focused upon case studies on the evaluation of OSS projects and the illumination of their economic benefits and inherent technical and culturally based challenges (Camara & Fonseca, 2007; Weerarwana & Weeratunga, 2004). Other research on OSS highlights the complexities, dynamics, and disillusionment associated with OSS in various contexts (Elliott & Kraemer, 2008; Simon, 2008). The main thrust of this research, however, illuminates major OSS shortcomings resulting from inherent technical challenges and underlines the concept of technological utopianism that has come to epitomize the rhetoric from the Free Software
Foundation (FSF) and the Open Source Software Initiative (OSSI) movements (Elliott & Kraemer, 2008; Simon, 2008).

Available studies on national information policy formation processes for the adoption of OSS are less than adequate to support a thorough understanding of an information formation process in Uganda. This study addresses this gap and through a case study of the policy formation process, contributes to an understanding of that process in Uganda and potentially to policy formation processes in other developing countries as they address the adoption, diffusion, and use of OSS. This study examined the complex stakeholder interests, activities, forces, and processes that highlight the formation of a national information policy to contribute towards a holistic understanding of the underlying interests that influence and shape a new policy. It may be the case that even if OSS is free at one level, it comes with multifaceted costs that some of the poorest countries with an inadequate ICT infrastructure, shortage of technical manpower, and limited software expertise, such as Uganda, may not be able to afford.

Drawing on Camara and Fonseca (2007), the study also aimed to ascertain whether the proposed OSS policy initiative in Uganda viewed OSS adoption as both a strategy to acquire technology and a process of developing indigenous knowledge for future software development to benefit the country or not. In practical terms, the raison d'être why this study was compelling included recent developments in the telecommunications infrastructure in the East African region. While the only Internet connection to Uganda was previously via a prohibitively expensive and limited satellite link, the cost of which was reflected in Internet charges paid to service providers by corporations and a few affluent users, the situation drastically changed since July 2009 (Kulabako, 2009; Mugabe, 2009; Schlimdwein, 2010; Tentena, 2010; Wafula, 2010a).
The previously e-landlocked Uganda is now connected to high speed broadband Internet via three fiber optic submarine cables straddling the East African coast in the Indian Ocean, linking parts of Africa to the rest of the world (Kulabako, 2009; Mugabe, 2009; Tentena, 2010; Schlindwein, 2010; Wafula, 2010a). These technological developments have since enabled the availability of a reliable broadband Internet service, considerably reduced user fees, facilitated faster, easier access, and increased communication and collaboration between Ugandan software stakeholders, including OSS developers, and other OSS communities around the world. This became a new and interesting development that merited closer examination and illumination. The changes in this telecommunication infrastructure in the country also gave momentum to the OSS policy initiative and further made the need to study the policy formation process more compelling.

Significance of the Study

While CIPESA (2005) and Reijswoud and Topi (2003) advocated the adoption and use of OSS for Africa as an alternative to proprietary software, their recommendations fell short of specific and contextual considerations. Reijswoud and Topi suggested that adoption of OSS would be cost effective for African countries and would enhance their goals to participate in the global knowledge economy. The CIPESA report, a toolkit for policy makers and practitioners, provided modules for the adoption of OSS by African countries but lacked empirical evidence from the countries it covered. Also, while Baguma (2005), Bruggink (2003), and EACOSS-Uganda (2008) made strong cases for Uganda to formalize the use of OSS to accelerate e-governance activities and for general social transformation, their analyses glossed over cultural factors and recommended the need for the formation of a policy on OSS without empirical support.
Overall, while the above studies provided useful anecdotal information on the OSS movement and benefits that would accrue from the utilization of OSS, they lacked any theoretical basis to support their recommendations. Second, none of the reports sufficiently highlighted and addressed the complexities of political, social, cultural, and economic idiosyncrasies of countries, values nor aspirations around which policy formation and legislation coalesce. To address such shortcomings, this study on an evolving information policy for the formal recognition and adoption of OSS:

- Highlighted the relevant information on the multidimensional challenges and requirements that would stand in the way of adopting OSS in the country;
- Provided information that could be used to aid other developing countries in Africa and elsewhere seeking to develop information policies for the adoption of new technologies;
- Provided information to policy makers that could be useful in the adoption of other new technologies that increasingly emerge on markets in developing countries;
- Advanced the frontiers of knowledge for the field of information policy (IP) in the broader discipline of information sciences where theoretical and empirical research in information policy formation processes for the adoption of OSS and other ICTs are needed.

This exploratory study has practical and theoretical implications on policy formation for the adoption of OSS and other technologies in diverse contexts and on research in the IP discipline.

Definition of Terms

- Digital divide: Is a multifaceted phrase or concept that refers to disparities pertaining to the accessibility and usability of ICTs, which were accentuated by the widespread use of computers and the Internet as sources of information (OECD, 2001; United Nations,
2001; Vehovar et al., 2006). Generally, the digital divide reflects differences between individuals, households, companies, or regions related to the access and usage of ICTs. The digital divide may appear as a result of historical, political, socioeconomic, cultural, or geographical factors (OECD, 2001; United Nations, 2001; Vehovar et al., 2006). Other conditions that may cause the digital divide include educational, behavioral, generational, physical disability, gender, religion, race, and/or language (OECD, 2001; United Nations, 2001; Vehovar et al., 2006). The term is also broadly used to describe differences in the access and use of other traditional ICTs, such as cellular phones, television, and radios (OECD, 2001; United Nations, 2001).

- **Information and communication technologies (ICTs):** Are technologies that broadly refer to technologies that facilitate the creation, distribution, exchange, and storage of information unrestricted by physical barriers. They include traditional technologies, such as radio, television, print, video or film, telephone, and cellular phones (United Nations Information and Communication Technologies Task Force, 2000). According to the United Nations Information and Communication Technologies Task Force (2000), New information and communication technologies (NICTs) include the Internet, virtual reality, content management systems (CMS), and software applications. Given the dynamic and complex nature of NICTs, Braman (2004, 2006), Lievrouw and Livingstone (2002), and Zembylas and Vrasidas (2005) referred to them as meta technologies.

- **Information society:** Is a society where ICTs are used by governments, organizations, and citizens to produce, use, and exchange information as the central activity of social, cultural, economic, and political life (Burch, 2006; Castells, 1998; Chang, 1995; Lievrouw & Livingstone, 2002; OECD, 2009; Webster, 2002, 2006). Economies in
information societies revolve around the use of ICTs with more than half of the workforce producing more than half of the Gross National Product (OECD, 2009). In information societies, knowledge is used as the central resource and the principle force of production to process data as a raw material into information products and services (OECD, 2009).

- **Globalization:** Is a multidimensional ICT-driven phenomenon that entails a ‘compression’ of space and time and a shrinking of the world (Harvey, 1989; Mittelman, 1996). With globalization, interdependence of national economies in trade, finance, and macroeconomic policy increases (Gilpin, 1987) and an information-based economy with the capacity to work as a unit in real time exists on a planetary scale (Castells, 1996).

- **Innovation champions:** These are high profile individuals, also referred to as opinion leaders, who gain attention and resources for an issue and can play an important role in boosting the priority of an issue and help to place it on the agenda of an organization or a nation for action (Backer, & Rogers, 1998; Rogers, 1995). Innovation champions or opinion leaders are instrumental in positively influencing public opinions to support and accept a new idea (Backer, & Rogers, 1998; Rogers, 1995).

- **Innovation pioneers:** These are public-spirited individuals or organizations that take the lead in launching an initiative, a campaign, or program and are soon followed by hundreds or thousands of other people or organizations (Rogers, 1995; Rogers & Kincaid, 1981).

- **Stakeholder:** Is an individual or group (entity) who can affect, or is affected by the success or failure of an endeavor (Freeman, 1984; Wicks & Parmar, 2004; Grimble, Chan, Aglionby, & Quan, 1995). These are individuals, groups, or entities that are likely
to positively or negatively affect or be affected by a proposed endeavor or action by business entities, organizations, and/or governments (Freeman, Wicks, & Parmar, 2004; Grimble et al., 1995; Mitchell, Agle, & Wood, 1997).

- **Stakeholder analysis (SA):** Is the process of identifying, describing, categorizing, and understanding stakeholders based on how they would impact on an endeavor and the impact an endeavor would have on them (Freeman, 1984; Freeman et al., 2004; Grimble et al., 1995; Mitchell et al., 1997).

- **Policy:** Is a principle or rule to guide decisions and achieve rational outcome(s). Policies may be political, managerial, financial, or administrative mechanisms designed to guide actions toward attaining specific goals or achieve desired outcomes through programs or projects. They include the 'what' and the 'why', the 'how', the 'where', and the 'when' (Hernon, McClure, & Relyea, 1996; Hernon & Relyea, 1968). Policies are issued by presidents or the judiciary, formulated by parliaments or adopted by boards of directors or governors in an organization (Hernon & Relyea, 1968).

- **Policy formation:** Is the first of the 3-stage policy cycle: formation, implementation, and evaluation. The formation stage of a policy is also variously referred to as policy formulation, development, or creation (Berger, 1993).

- **Laws:** Are legal instruments that can compel or prohibit behaviors. A law may require the payment of taxes on income. Laws can also emerge from a policy (Hernon et al., 1996; Hernon et al., 1968).

- **Frames:** Are mental structures on which individual perception and understanding are molded or formed (Goffman, 1974; Rowlands, 1998).
Scope of the Study

This study was conducted in Kampala, Uganda. Drawing from Berger (1993), information policies, just like any other public policy processes in political science theory, can be viewed from three stages: “Policy formation or policy making; implementation or policy production; and policy evaluation or feedback” (p. 8). Berger (1993) observed that “policy formation or policy making covers the policy process from the inception of an idea to its passage as a law by a legislative body” (p. 8). While ideas for public policies can and do come from anyone, both inside and outside the government, the implementation of a policy is carried out by a government agency to achieve the set goals (Berger, 1993; Hernon, McClure, & Relyea, 1996).

Further, Burger (1993) and Hernon, McClure, and Relyea (1996) observed that every stage of the information policy process is characterized by complexities from multiple and competing interests of stakeholders involved in the policy initiative. Since the information policy process for the formal recognition and adoption of OSS is in its formative stages, the scope of this research was limited to the examination of the formation stage as described by Burger (1993). Thus, the inception of the idea and proposal by ICT stakeholders in Uganda to the government to formalize and adopt the use of OSS as an alternative choice alongside proprietary software marked the beginning of this exploratory study. The formation stage of this OSS initiative is still ongoing. It will end when an OSS policy in a form of an act of Parliament, statute, or a law is enacted and assented to by the President.

The OSS policy formation stage includes the government and legislative responses, thus far, to the OSS policy proposal by the ICT stakeholders, as a component of the formation process. Other factors affecting the process, such as stakeholder relationships involved in the process were also the focus of this study.
To put forth the proposal by software stakeholders to the government to change the existing ICT policies and laws and pave the way for the adoption of OSS in its proper context, a definition of an information policy and a description of some of its components are provided below. Hernon et al. (1968) stated:

Although the literature often refers to information policy in the singular, there is no single all-encompassing policy. Rather, information policies should be viewed as issue-specific because they tend to address specific issues and, at times, to be fragmented, overlapping, and contradictory. (p. 1).

Information policy scholars variously describe information policies as sets of principles, laws, guidelines, rules, regulations, and procedures for the production, collection, distribution or dissemination, retrieval, use, retirement, and preservation of information (Berger, 1993; Hernon et al., 1987; Hernon et al., 1996; Hernon et al., 1968; Weingarten, 1989). In addition, governments also develop information policies to adopt, regulate, and promote research in ICTs to benefit their citizens (Braman, 2004, 2006; Berger, 1993; Daniel, 2000; Hernon et al., 1987; Hernon et al., 1996; Hernon et al., 1968; Shapiro & Varian, 1997; Weingarten, 1989). With rapid advancements in ICTs, Braman (2006), Daniel (2000), and Shapiro et al. (1997) stated that governments sometimes, proactively or reactively, develop information policies to cope with the dynamics and complexities of ICTs.

While Uganda considers policies as broad government principles that offer guidance to the supervision or regulation and development of a given sector, policies in themselves, are not legally binding. They are political guidelines developed by the executive branch but lack legal enforcement powers (Parliament of the Republic of Uganda, 2011). However, policies offer a foundation on which laws (statutes or acts) are enacted by the Parliament. In the Ugandan
context, only acts of Parliament (statutes or laws) are legally binding (The Parliament of the Republic of Uganda, 2011).

However, this study adopted and pursued the broader conceptualization of information policies: Sets of principles, laws, guidelines, rules, regulations, and procedures for the production, collection, distribution or dissemination, retrieval, use, retirement, and preservation of information (Berger, 1993; Hernon et al., 1987; Hernon et al., 1996; Hernon et al., 1968; Weingarten, 1989). Therefore, while the evolving OSS policy initiative, within the Ugandan context, is a process to enact a law to formally recognize the adoption of OSS in the country, it is, under the broader conceptualization above, an information policy formation process.

The information policy (IP) discipline. While the foregoing definitions highlight the bureaucratic and legislative processes and components of information policies, this study, on the other hand, is anchored in the IP discipline that investigates underlying factors that influence the history, conceptualization, and scope of the discipline. The IP discipline, an interdisciplinary field of research, also offers tools for examining how knowledge is generated, evaluated, and classified (Braman, 2004, 2006; Berger, 1993; Daniel, 2000; Frohmann, 1995; Hernon et al., 1987; Hernon et al., 1996; Hernon et al., 1968; Shapiro et al., 1997; Weingarten, 1989).

The IP discipline, a problem-oriented area of research, analyzes underlying principles in policy making processes to illuminate the symbiotic relationship between the influence of political, economic, and cultural values in shaping information policies and how they affect the manner in which such policies impact individual and societal choices (Moore, 1996; Overman & Cahill, 1990; Rowlands, 1998; Rowlands, Eisenschitz & Bawden, 2002). Information Policy questions, therefore, should not be treated as technical and bureaucratic responses of government agencies but viewed as contextualized elements within the cultural environment they impact and
from which they derive (Braman, 2004, 2006; Frohmann, 1995; McCain, 1990; Moore, 1996; Overman et al., 1990; Shapiro et al., 1997; Rowlands, 1998; Rowlands et al., 2002).

This exploratory study, grounded in the IP discipline, investigated and provided a clear understanding of the complexities associated with the formation stage of the national information policy to formalize and adopt the use of OSS in Uganda. Empirical and descriptive data from this study contributed towards an understanding of developments in information society research. To the extent that information flows and technologies comprise the core of an information society; information policies are developed to guide and regulate the information life cycle; and the IP discipline is preoccupied with studying such processes and their implications for humanity, (Duff, 2001, 2004), this research contributed to the IP discipline.

Theoretical Frameworks

This study adopted a pragmatist approach (Quine, 1980; Rist, 1995; Rorty, 1979; Tashakkori & Teddlie, 2002) to inform and account for the potential complexities that may underlie the formation of a national information policy process for the adoption of OSS. A pragmatist approach suggests a necessity for using multiple theories to gain a holistic understanding of practical problems and complex social phenomena (Quine, 1980; Rorty, 1979; Tashakkori et al., 2002).

The strength of the pragmatist approach (Tashakkori et al., 2002) lies in its recognition of the value derived from applying multiple perspectives to generate strategic solutions to address social problems in addition to gaining meaningful insights to advance frontiers of knowledge. Quine (1980) and Rorty (1979) stated that despite some contradictions, classical and neopragmatist literature consistently linked scholarly research and practical social problems. Classical and neopragmatist scholars strongly emphasized the centrality of cultural and political
values in offering solutions to recurring human problems and in generating legitimate knowledge about complex social processes and phenomena (Quine, 1980; Rorty, 1979; Tashakkori et al., 2002).

Since the pragmatist approach offers a strong premise upon which a rapprochement between problem-oriented scholarly and professional research can be built, it was found both most appropriate for this study and consistent with the interdisciplinarity and problem-based nature of the IP discipline in which this study is grounded. Consistent with the pragmatist approach, this study therefore, applied relevant concepts drawn from five theories across disciplinary boundaries. Selected concepts from the theories were used to inform, describe, and enhance a holistic understanding of the multiple interests and complexities characterizing the process through which the national information policy for the formal recognition and adoption of OSS is developing.

The constellation of related concepts from the theories also helped to provide information that addressed the research questions that guided this case study. The five theories, with pertinent concepts to this study include: Stakeholder theory (ST); frame theory; the new institutionalism theory; the social construction of technology (SCOT) theory, and the diffusion of innovations (DOI) theory.

The stakeholder theory (ST), which was developed in organizational management and business ethics, provides a systematic mechanism for identifying, categorizing, describing, and analyzing multiple stakeholders’ interests in a given endeavor (Donaldson & Preston, 1995; Freeman, 1984; Mitchell et al., 1997; Robert & Freeman, 2003). Subjecting stakeholders to such a systematic examination contributes to the understanding of their behaviors and interests in order to better design strategies and techniques to communicate with them, as well as manage
and appropriately respond to their multiple interests (Donaldson et al., 1995; Freeman, 1984; Mitchell et al., 1997; Robert et al., 2003).

The two concepts from ST for this study helped to identify, describe, analyze, and categorize the various stakeholders involved in the OSS policy process to better understand them and present information that enhanced the formation of a realistic and inclusive OSS policy consistent with existing ICT policies. The two adopted concepts were: (1). Stakeholder attributes (Burgoyne, 1994; Freeman, 1984; Grimble et al., 1997) and (2). Stakeholder affiliations (Freeman et al., 1987). This concept was useful in delineating affiliations (associations) to which ICT stakeholders belonged and/or those they are likely to subscribe.

These concepts from ST helped to create some understanding of the identities of the ICT stakeholders, provided insights into their underlying interests in the OSS policy initiative, their perceptions, influence, importance, power, resources, and their negotiation strategies, and offered a better view of how they are influencing the policy formation process.

The frame theory, originally conceptualized by Goffman (1974), suggests that individuals use frames, which are mental structures to select, interpret, emphasize, organize, and present their perceptions based on their social experiences. Frames, therefore, guide and reflect the social reality about what exists, what happens, and what matters to individuals (Goffman, 1974). Tracing the evolution of frame theory, König (2004) suggested that the theory has been adopted and used in multiple disciplines, most especially, management and organizational studies (Kahneman & Tversky, 1979), social movement studies (Snow, Rochford, Worden, & Benford, 1986), and in media and communication studies (D'Angelo, 2002; Entman, 1993). König stated that frame theory has now morphed into a flexible construct through which social experiences are investigated and understood.
Extending frame theory into the IP discipline, Rowlands (1998) and Rowlands et al. (2002) suggested that analyzing and understanding frames should be the first and most crucial undertaking to gain a thorough understanding of policy processes, especially the early stages of problem identification and agenda formation. Rowlands (1998) stated that since frames are sets of values and concepts that people use in making sense of the world around them, IP scholars should critically analyze them because they offer a powerful tool for understanding how different people may view and interpret the same social phenomenon differently. Rowland et al. (2002) suggested that information policies, “…outcomes of political and legislative processes can never be value-free and there can be no objective ‘truths’ in information policy” (p. 31).

The frame theory was, therefore, applied to this study to identify, describe, and comprehend the crucial sets of values and concepts used as frames of reference by ICT stakeholders in the evolving OSS policy initiative. By understanding the values they attach to the OSS policy initiative, a clear sense of how their world views are influencing and shaping their policy agendas and interests emerged. Viewing the emerging OSS policy initiative from the frames of reference espoused by the various individuals involved in the process, their political, economic, and professional ideologies were described, compared, contrasted, and illuminated. The theory facilitated an understanding of how the multiple ICT stakeholders held contrasting perceptions about OSS, how they variously envisage the direction of the policy formation process, their views on how they would benefit from the policy outcomes, and yielded insightful conclusions regarding their divergent values and interests.

The new institutionalism theory, grounded in the pragmatist tradition, is a meta theory that draws from legal, political, and economic theories that views information policies from three theoretical approaches: the interest-group approach, the ideological approach, and the
technology-centered approach. Through these approaches, the new institutionalism theory views
information policies as complex and thoroughly moderated processes influenced by multiple
economic, social, cultural, political, governmental, nongovernmental, and global institutions
(Galperin, 2004).

Viewed from an ideological approach, information policy questions and issues are
described and perceived as translations of ideas into policies that serve to consolidate and
perpetuate the political ideology of dominant social groups and institutions. This study adopted
the ideological approach from the new institutionalism theory to describe and explain the
evolving OSS policy initiative. The approach facilitated an understanding of the underlying
ideological interests of the multiple groups and institutions involved in the promotion of the OSS
policy initiative in collaboration with policy makers.

The social construction of technology (SCOT) theory suggests that the adoption,
diffusion, and use of a new technology does not occur *ex nihilo* or emerge automatically. Rather,
it results from interplay between “…the social, the economic, the technical, the scientific, and the
political forces in a given social context” (Bijker, 1995, p. 13). Bijker, Hughes, and Pinch (1987)
and Pinch and Bijker (1984, 1986) also stated that the strength of the SCOT theory lies in its
capacity to diminish a priori assumptions about meanings and utilities of a technological artifact
but derive them as socially constructed outcomes and assessments that emerge from a dynamic
social process involving various actors.

This study applied two SCOT concepts: Interpretive flexibility and technological frames.
The application of the two concepts was justified because the OSS policy initiative is in its
formative stages; it has neither stabilized nor closed. Neither a consensus has emerged nor a
conclusion of the formative policy formation process has been attained (Bijker, 1995).
(1). Interpretive flexibility suggests that as each interest or relevant group makes sense of the technological artifact, a likelihood that differences in meanings assigned to the artifact by each group will emerge and change from time to time, an interpretive flexibility of the artifact (Bijker, 1995). The value of interpretive flexibility lies in its recognition that decisive outcomes on the meanings, adoption, diffusion, and use of a technological artifact are not based on deterministic narratives (Bijker, 1995). Instead, they are products or outcomes of protracted and fluid intergroup negotiations based on their perceptions about a given artifact (Bijker, 1995; Pinch et al., 1986).

(2). Technological frame includes all elements that influence the interactions within relevant social groups and facilitates “…the attribution of meanings to technical artifacts that constitute a technology” (Bijker, 1995, p. 123). A technological frame facilitates the fusion of disparate elements associated with the definition of the artifact by a relevant social group and makes connections between individual members and the social groups to which they belong (Bijker, 1995). It is an illumination of cognitive, social, and material elements, such as goals, problems, practices, design methods, and the artifacts themselves (Bijker, 1995). This study used the concept of technological frame to describe the dynamic relationship between individuals, relevant social groups, institutions, their negotiated meanings attributed to OSS, and the emerging policy initiative.

These two concepts from SCOT were particularly pertinent to this study because they took into account the dynamic and complex nature of processes and their negotiated and unpredictable outcomes. Such outcomes were vital in providing a clear understanding of how multiple social factors are influencing the formation of the OSS policy initiative to recognize, formalize, adopt, and use OSS in Uganda. Viewing the OSS policy formation process from a
technological frame standpoint was consistent with Bijker (1995), who stated that the broader
goal of SCOT is to “…break down arbitrary distinctions between the social and the technical,
and to study the ‘seamless web’ of science, technology, and society in totality” (p. 6).

The diffusion of innovations (DOI) theory suggests that the diffusion of an innovation or
a new concept occurs when the adoption of an idea, practice, or object spreads by
communication through a social system (Rogers, 1995; Rogers & Kincaid, 1981). The DOI
theory effectively examines and explains the communication flow of new ideas into a
community and how targeted communities respond positively or negatively to the ideas
disseminated to them through both formal and informal communication networks. Two concepts
from DOI theory: 1) innovation pioneers and 2) innovation champions or opinion leaders, were
applied to this study. The concepts were used to inform and describe the process through which
actors in the information policy development process assumed various roles and responsibilities.

pioneers define and shape the meaning of the innovation or new idea and initiate a
communication process by using existing formal and informal communication networks to
disseminate information and to talk to other people about the new idea. Innovation pioneers
articulate the relevance, simplicity, flexibility, and usefulness of a new idea. Gradually, some
people are persuaded to become early adopters and then more people adapt the innovation when
they start observing its benefits to early adapters.

This study utilized the innovation pioneer concept from DOI to ascertain whether OSS
policy promoters, who are also early adopters and users of OSS, are taking effective steps to
popularize the use of OSS.
(2). Innovation champions or opinion leaders. The second concept from DOI suggests that for an innovation to be successfully spread and adopted, it must initially attract the attention of a key member of a society, a champion, who supports and elevates the cause and profile of the new idea (Backer & Rogers, 1998; Rogers, 1995). A champion elevates the innovation to prominence on the public agenda and helps to secure resources for its promotion in society (Backer et al., 1998; Rogers, 1995). The champion of the innovation is a prominent member of society, a high profile opinion leader who can easily influence public opinion by eloquently articulating the politics of the innovation (Backer et al., 1998; Rogers, 1995). The authors suggest that the champion or opinion leader uses the available formal and informal communication networks to persuade members of society to accept and adopt the innovation.

This study adopted the concept of innovation champions to investigate whether the ICT stakeholders identified and gained the support of any influential national opinion leader to place the OSS policy proposal on the national and legislative agenda. The individual should be a well-respected national figure and a strong proponent of OSS to champion the politics of the policy initiative. Using this concept helped to ascertain whether stakeholders in the OSS policy initiative succeeded in recruiting such a champion to persuade both government bureaucrats and policy makers to place the policy proposal on the legislative agenda. These two concepts offered some insight, thus far, into how the ICT stakeholders are effectively managing the diffusion of OSS to advance the formation of the policy initiative.

The stated concepts from the five theories cited were found appropriate because they complement and reinforce one another with each adding an incremental piece to the description and understanding of the nuances that characterize complexities inherent in an information policy formation process. Taken together, the predominant ethos in the constellation of related
concepts from the five theories provided a holistic perspective through which the policy development process with all its idiosyncrasies was described, explained, and understood.

The concepts from the five different theories generally reflect an emphasis on the timing or the onset of the formative stage of a policy-making agenda. While they are drawn from five theories, the concepts intersect and share characteristics that inform, describe, explain, and create understanding of the formation stage of an evolving information policy for the adoption of OSS. This intersection of concepts from five distinct theoretical frameworks used to address a social phenomenon raises the speculation that this study provided new descriptive information through which future problems of IP and information society studies can be examined and understood.

The main thrust in the overview of the five theories was grounded in their capabilities to inform, guide, and facilitate this research to address the overarching question: What are the underlying interests of ICT stakeholders in Uganda to propose a new policy for the formal recognition and adoption of OSS as an alternative choice alongside proprietary software?

Theoretically based and empirical knowledge about both OSS and proprietary software could enable policy makers to arrive at informed decisions in the adoption of an appropriate information policy. Denzin (1978) and Patton (1999) suggested that using multiple theoretical perspectives is a productive strategy of inquiry because it strengthens the examination and interpretation of most elements to understand complex processes and social phenomena. To that end, the use of theoretical triangulation for this study ensured a broader and deeper understanding of a complex information policy formation process for the adoption of OSS.

Theoretical triangulation refers to the application of complimentary elements from various theories to enhance the description, examination, and understanding of dynamic and complex processes associated with social phenomena. The assumption is that if appropriately
applied, theoretical triangulation techniques facilitate the generation of knowledge for a holistic understanding of nuances associated with multifaceted social phenomena (Denzin, 1978; Patton, 1999). In addition, the application of theoretical triangulation techniques is consistent with the qualitative or naturalistic approach and the pragmatist paradigm, which suggest the use of multiple techniques to explore, discover, and create understanding about evolving social processes (Tashakkori et al., 2002).

The research design. This study design was based on a qualitative or naturalistic research approach because it targeted discovering, describing, and creating a holistic understanding of the dynamics and complexities associated with the formative stage of an information policy for the adoption of OSS in Uganda. Patton (2002) suggested that a qualitative approach aims at discovering, describing, and creating a holistic understanding of complexities and dynamics of processes through which social phenomena evolve. The approach was most appropriate for this study because it is consistent with the pragmatist paradigm, which links the selection of an approach directly to the complexity of a phenomenon, purpose of study, and the nature of the research questions posed (Creswell, 2003; Tashakkori et al., 2002).

The data collection and analysis processes for this study evolved through an iterative and interactive process with a revelatory case study strategy accounting for the dynamics and complexities that highlighted the evolution of the OSS policy formation process. Data for this study were collected on site in Kampala, Uganda through face-to-face (semi-structured) interviews, a focus group discussion, and supplemented by documentary evidence. Each of the data sources provided specific but also overlapping types of information to address the overarching question and the specific research questions.
The data analysis process involved the use of multiple techniques, including descriptive information policy assessment techniques, stakeholder analysis (SA), frame analysis, and thematic analysis. The multiple data collection and analysis techniques, all occurring iteratively, contributed towards a holistic understanding of the emerging OSS policy in Uganda. A detailed description and justification for the selected research approach, strategy, and techniques of data collection and analysis are presented in Chapter 3.

Chapter summary. The chapter presented the emerging OSS policy in Uganda and raised the associated problem surrounding the inadequacy of information about the adoption of OSS as a new application (technology) in the country. The chapter presented the overarching question of this study, which focused attention on understanding the underlying interests by the various stakeholders in the ICT sector in Uganda who proposed the formation of a new ICT policy that would embrace OSS, break the monopoly enjoyed by proprietary software, bridge the digital divide, and transform the country into an information society. The chapter presented the rationale for the study, outlined the five research questions that guided the study, and described the scope of the research to specifically illuminate the formation stage of an information policy process.

Grounded in the pragmatist tradition and anchored in the interdisciplinary IP discipline, the chapter discussed concepts from five theoretical frameworks that informed the study and through which the dynamic and complex information policy formation process for the adoption of OSS was described, analyzed, and understood. A review of the relevant literature that established the context of the study and placed it in the interdisciplinary IP discipline follows in Chapter 2.
CHAPTER 2
REVIEW OF LITERATURE

Chapter Overview

This chapter presents a review of the streams of research on the evolution of free software (FS) and open source software (OSS), free open source software (FOSS) or the FS/OSS movement since the late 1960s. Throughout this chapter, the acronym OSS is used to generally refer to all types of FS/OSS/FOSS. However, where specific differences between these types of software are reviewed, the acronym representing a specific type of software will be used. First, the chapter presents a brief history of the development of OSS, provides a general definition and the various characteristics of OSS, and highlights the extent to which OSS has been embraced and used for ubiquitous computing tasks in various contexts around the world.

Second, the chapter surveys relevant streams of research pertaining to the nature of information policies, illuminates underlying factors that influence policy formation processes, and describes information policy goals relevant to information and communication technology (ICT) adoption to further underline the information policy (IP) discipline in which this study is grounded. Third, the review highlights elements from the literature on the digital divide and the impact of OSS on the elimination of the divide to explain whether embracing OSS technologies is a panacea to the digital divide and a pathway to the information society.

Fourth, the chapter presents a review and analysis of studies that apply relevant elements of stakeholder, frame, new institutionalism, social construction of technology, and diffusion of innovations theories in the adoption and use of ICTs to purposely inform, guide, and ground this study in the broader interdisciplinary IP literature. Fifth, the review highlights research pertaining to information policies on the adoption of OSS by governments around the world,
developing countries in particular, before analyzing the case for Uganda to illuminate the
information policy environment in which the OSS initiative is evolving. In the course of the
review, the overarching question and the set of specific research questions guiding this study are
stated.

The History of FS/OSS

The history of FS/OSS, its model of development, adoption and use, its comparison and
challenge to proprietary software, its impact on the digital divide, its catalytic role in ubiquitous
computing, and the evolution of information societies have generated substantial attention in the
scholarly and popular literature since the first versions of FS/OSS emerged in the second half of
the last century (Blansit, 2009; Elliott & Kramer, 2008; Iacono & Kling, 1996; Kling, 1996;
Krishnamurthy, 2003; Murphy, 2004; Pykalainen, 2008; Raymond, 1998, 1999; Simon, 2008;
Stallman, 1996; Tiemann, 2006). The remarkable interest in the multifaceted OSS model by
scholars from diverse fields of study resulted in a sizeable corpus (popular and scholarly)
illuminating the complex and dynamic features and processes associated with the OSS model in
various contexts (Blansit, 2009; Elliott & Kramer, 2008; Iacono & Kling, 1996; Kling, 1996;
Simon, 2008).

Compared with proprietary software, OSS predates the former but did not appear on the
United States software market until the 1960s (FSF, 2007; Gonzalez-Barahona, 2004; Raymond,
1998, 1999; Tiemann, 2006). Interestingly, too, OSS never gained prominence until after IBM
and other proprietary computer manufacturers unveiled and sold the first computers in the United
States and provided free software (Altenhöner, 2005; Gonzalez-Barahona, 2004). The free
software was distributed with source code that could be shared, modified, and customized by
respective users (Altenhöner, 2005; Blansit, 2009; FSF, 2007; Gonzalez-Barahona, 2004;
Raymond, 1998; Stallman, 1996; Tiemann, 2006). Campbell-Kelly and Garcia-Swartz (2009) suggested that:

The history of the OSS technology, its association with IBM, and its subsequent appearance on the market was more of a pragmatic business decision by IBM to move from a form of open to a non-open proprietary software and back to a mixture of open source and non-open source as a response to changing market conditions, hardware configurations, social environments, and legal limitations. (p. 232).

Consistent with its pragmatic and social movement model towards business,

“IBM became a founding member of the Open Software Foundation (OSF)” (Blancet, 2009, p. 364). Following IBM footsteps, other commercial software companies, such as Apple Computer, Oracle, and Sun Microsystems, developed and marketed OSS applications alongside their proprietary products (Blansit, 2009; Campbell-Kelly & Garcia-Swartz, 2009).

Through subsequent decades, the OSS movement continued to grow among disparate groups that constantly integrated their operations through USENET and the Internet into strong user communities (Campbell-Kelly & Garcia-Swartz, 2009). Gonzalez-Barahona (2004) stated that during the 1990s, two distinct efforts by Bill Jolitz in California and Linus Torvalds in Finland led to the development of the Net/2, the forerunner to the BSD Unix and the first versions of the Linux kernel that resulted in the GNU/Linux, respectively. Over the years, BSD Unix, GNU/Linux, and Apache, went through advanced development processes to become some of the most stable, robust, and widely used OSS products around the world (Blansit, 2009; Campbell-Kelly & Garcia-Swartz, 2009; Gonzalez-Barahona, 2004).

Hamel (2004), McGowan (2000), Raymond (1998, 1999), Stallman (1996), and Tiemann (2006) have listed other OSS products that have gained universal use including web/proxy servers, freeBSD/openBSD, and squid cache, mozilla firefox (a web browser), wordpress, movable type, open office suite, media wikis, pdf creator, and instant messenger. Other OSS
products that have since been developed include drupal, pidgin, joomla, geronimo, emacs, tomcat, samba, python, eclipse, gnome, and firebird (Blansit, 2009; Campbell-Kelly & Garcia-Swartz, 2009; Colford, 2008). Some OSS products, such as Star Office, are now used to accomplish word processing tasks while others are serving as operating systems for iphone and ipod touch devices (Campbell-Kelly & Garcia-Swartz, 2009).

OSS literature suggests that some OSS applications are developed through collaboration among software engineers, programmers, and users (Altenhöner, 2005; Blansit, 2009; Elliott & Kramer, 2008; Iacono & Kling, 1996; Kling, 1996; Krishnamurthy, 2003; Murphy, 2004; Pykalainen, 2008; Raymond, 1998, 1999; Stallman, 1996; Tiemann, 2006). The majority of OSS products, however, are developed by foundations and organizations that make them freely available to the community for customization and use (Altenhöner, 2005; Simon, 2008).

Free Software (FS) versus Open Source Software (OSS). As collaborative efforts to develop FS/OSS or FOSS ensued, two distinct definitions of FOSS based on ideological orientations emerged. Stallman (1986) referred to FS as inherently free. FS is software that end users have freedom to alter, run and redistribute as they see fit. For Stallman (1986), FS is a matter of liberty, not price, and should be viewed as free as in free speech, but not as in free beer. The implication was that while no monetary price could be attached to the freedom of speech, a monetary price could be attached to free beer. According to Stallman (1996), FS, therefore, is a matter of freedom relating to four kinds of freedoms for the users of the software to:

- Run the program for any purpose
- Study how the program works and adapt it to their needs
- Redistribute copies to help their neighbors
• Improve the program and release the improvements to the public, so that the whole community benefits

While FS implied that it was free to use at no cost, in actual sense, cost was not a basic criterion for free software (Colford, 2008; Stallman, 1996; Valimaki & Oksanen, 2005). Rather, software licensed at no cost is generally referred to as freeware in the United States and in other English speaking countries or designated as software *gratis* or *libre* in Spanish-speaking countries (Colford, 2008; Gonzalez-Barahona, 2004; Valimaki & Oksanen, 2005).

Conversely, OSS refers to a licensed computer program or software developed through some collaborative effort whose source code to the original design is made available to the general public and must remain open for downloading, modification, use, distribution, and freely shared for adoption at no cost (Coar, 2006; Krishnamurthy, 2003; Raymond, 1998, 1999; Tiemann, 2006). According to Bruggink (2003), Economist (2003), and Murphy (2004), OSS should come without any lock-in inconveniences. Coar (2006), Colford (2008), Raymond (1998, 1999), and Tiemann (2006) observed, however, that OSS does not necessarily mean free access, modification, use, and distribution of the code without complying with some licensing criteria.

Over time, the philosophical differences among FS/OSS developers over licensing criteria and the rhetoric surrounding FS/OSS resulted in the evolution of two dichotomous computerization movements: the free software foundation (FSF) and the open source initiative (OSI) (Blansit, 2009; Campbell-Kelly & Garcia-Swartz, 2009; Elliot & Kramer, 2008; Iacono & Kling, 1996; Raymond, 1998, 1999; Simon, 2008; Valimaki & Oksanen, 2005). The different ideologies espoused by adherents of FSF and OSI have since shaped the definition, understanding, and licensing criteria for the software developed by followers of the two movements around the world (Blansit, 2009; Campbell-Kelly & Garcia-Swartz, 2009; Elliot &

Despite ideological differences between adherents of the FSF and OSI, in practical terms both OSS and FS provide and come with similar basic advantages and challenges in settings where they are developed, adopted, and used (Elliot & Kramer, 2008; Raymond, 1998, 1999; Simon, 2008; Valimaki & Oksanen, 2005). For this reason, the two software types are often described using such collective terms as free and open source software (F/OSS), FOSS, OSS or other similar labels (Iikono & Kling, 1996; Kling, 1996; Raymond, 1998). Elliot and Kramer (2008) and Simon (2008) have suggested that philosophical disagreements notwithstanding, Stolman and Timmons, founders of the FSF and the OSI respectively, are largely credited for spearheading an almost evangelical global campaign that popularized the adoption and use of FS/OSS that contributed to the current state of ubiquitous computing in most information societies and developing countries around the world.

Comparison of OSS with proprietary software models. While ideological differences between FS and OSS advocates exist, they follow a similar model of software development quite unlike that used by developers of proprietary or commercial software. Originally, Raymond (1998, 1999) suggested that OSS was only an approach to software design, development, distribution, and an offer to practical accessibility to software source code. Over time, however, some developers and users started to consider OSS as one of various possible design approaches and a critical strategic element of their operations (Castelluccio, 2000; Open Source Resource Center {OSRC}, 2007). Others regarded OSS both as a process of gaining software development knowledge and skills and as an instrument for self-determination and social change (Camara & Fonseca, 2007; Iivari, 2010; Sagasti, 2004; Weber, 2004).
Researchers on the OSS development model highlighted differences in software development processes between OSS and closed software and concluded that in economic terms an open platform is oftentimes socially preferable to a closed model (Hars & Ou, 2002; Iivari, 2010; Raymond, 1998, 1999; von Hippel & von Krogh, 2003; Valimaki & Oksanen, 2005). Characteristically, the OSS model involves a network of programmers and users on the Internet who operate as co-developers, frequently integrating code changes on the software versions, that may include the development version with more features and a more stable version with fewer features (Castelluccio, 2000; Hars & Ou, 2002; Iivari, 2010; von Hippel & von Krogh, 2003).

Castelluccio (2000) observed that these networked enthusiasts may then report bugs and recommend solutions through a dynamic decision-making process in which strategic decisions are made to integrate the needs of users. Also, as co-creators, users participate in collective innovations, negotiate improvements, and seek legitimacy and endorsement of their innovations from technical co-designers, to attain some form of self-realization (Iivari, 2010). Through the famous metaphor, “the Cathedral and the Bazaar,” (Raymond, 1998, p. 1), vividly captured the dichotomy between the proprietary (‘closed or controlled’) and the OSS (open) software development paradigms. The cathedral metaphor symbolized a controlled environment where commercial software development takes place based on painstaking analysis and conformity to specifications by paid software engineers who rigorously test the software, eliminate bugs or security risks, and release patches to solve any problems to ensure top quality (Raymond, 1998, 1999).

Software development based on this traditional model, generally referred to as “Brook’s law” (Brooks, 1995, p. 1) is like “building a cathedral, carefully crafted by individual wizards or small bands of mages working in splendid isolation” (Raymond, 1998, p. 3). However, Brooks
(1995) supported the traditional model because it preserved the architectural integrity of a system design and argued that the fewer the software architects the more likely the specifications would be followed to ensure consistence and faster development of sturdy and high quality software. To avoid delays in software development, “the process requires a small and stable team of programmers working in a hierarchy because adding manpower to a late software project makes it later” (Brooks, 1995, p. 1).

Volunteer software designers and knowledgeable users who follow the OSS development model (the bazaar) develop a version of the software code that is freely released to the public for modification and use (Raymond, 1998, 1999). Raymond identified three widely used approaches to the OSS development model: The community project model; the master-disciples model; and the single guru model. The development of the two most successful OSS products, the Linux kernel and the Apache Web Server emerged from such models (Raymond, 1998, 1999).

Linus Torvalds, at the University of Helsinki in Finland, used the master-disciples model to develop the initial kernel, first releasing it to the software community before assembling the final Linux version (Raymond, 1998, 1999). In California, Raymond reported that Bill Jolitz used the community project model to develop the Apache Web Server. The bazaar model, therefore, is the most appropriate for software development because it is “…a great babbling bazaar of differing agendas and approaches” (Raymond, 1998, p. 3).

Because the OSS development model follows the Linus law, “given enough eyeballs, all bugs are shallow” (Raymond, 1999, p. 2), it is assumed to produce superior software products. By implication, the model suggests a more inclusive and participatory approach with final products reflecting superior qualities, cost-effectiveness, and versatility (Brandl, 2004; Economist, 2003).
However, the assumptions underlying the Linus law have since been contested as more idealistic than realistic (Camara & Fonseca, 2007). Drawing on Fitzgerald (2004) who stated that since all proven software engineering principles are present in the OSS development model, claims of total adherence to the Linus law in software development are misleading (Camara & Fonseca, 2007). Indeed, Mockus, Fielding, and Herbsleb (2002) stated that in the development of most OSS products, top programmers (‘code gods’) contribute the bulk of the work as evidenced in the development of the Apache Web server to which 88% of improvements were contributed by the leading fifteen programmers. Besides, “not all successful OSS projects are self-explanatory because a large community of developers does not always understand the source code to discover bugs at a rapid rate and fix them quickly” (Camara & Fonseca, 2007, p. 124).

Camara and Fonseca (2007) suggested that because the OSS development model involves a degree of shared conceptualization that may limit the potential for the software to be understood by a large community of programmers, claims that a clear conceptual design can be attained are unrealistic. Equally, “since the OSS model involves a degree of product modularity that could limit the potential for setting up a distributed development team, claims that a feasible strategy for modular development for OSS can be realized is untenable” (Camara & Fonseca, 2007, p. 124). Thus, the authors suggested that rather than generalize the OSS model as applicable to the development of all OSS products, the specific nature of the OSS product should be considered within its local context.

There have been major advantages and positive impacts of OSS that researchers on the evolutionary history of OSS, its use in ubiquitous computing, and its contribution to the burgeoning information societies around the world have underlined. The researchers suggested that since the first version of OSS was released in the last half of the 20th Century, OSS has
evolved from its historical status that was associated with advanced software for computer experts to become a powerful and user-friendly software with various features that less tech-savvy users can easily install and use in their personal computers (Blansit, 2009; Campbell-Kelly & Garcia-Swartz, 2009; Coar, 2006; Colford, 2008; Elliot & Kramer, 2008; Gonzalez-Barahona, 2004; Hars & Ou, 2002; Iacono & Kling, 1996; Kling, 1996; Krishnamurthy, 2003; Murphy, 2004; Raymond, 1998; Simon, 2008; Stallman, 1996; Tiemann, 2006; Torvalds & Diamond, 2001; von Hippel & von Krogh, 2003; Valimaki & Oksanen, 2005). “Participation in the OSS development communities has expanded from being limited to persons with high technical expertise to being open to users of all skill levels” (Blansit, 2009, p. 363).

Several OSS scholars have also stated that the OSS development model allows any software programmer to modify ideas of the original developer and release the modification to a networked global community of designers who further contribute to the refinement of OSS products (Blansit, 2009; Campbell-Kelly & Garcia-Swartz, 2009; Coar, 2006; Colford, 2008; Elliot & Kramer, 2008; Gonzalez-Barahona, 2004; Hars & Ou, 2002; Iacono & Kling, 1996; Kling, 1996; Krishnamurthy, 2003; Murphy, 2004; Raymond, 1998; Simon, 2008; Stallman, 1996; Tiemann, 2006; Torvalds & Diamond, 2001; von Hippel & von Krogh, 2003; Valimaki & Oksanen, 2005). Indeed, OSS researchers have suggested that the overriding advantage of OSS is that it is freely available for download, customization and use with packages resilient enough to effectively compete and break the monopoly of proprietary software (Campbell-Kelly & Garcia-Swartz, 2009; Krishnamurthy, 2003; von Hippel & von Krogh, 2003; Valimaki & Oksanen, 2005).

Hars and Ou (2002), Krishnamurthy (2003), and von Hippel and von Krogh (2003) suggested that a networked and enthusiastic global OSS community is selflessly promoting the
use of OSS in all computing tasks at individual, organizational, national, and global levels. Researchers have also suggested that the diffusion and adoption of OSS around the world has been enhanced by:

1) the growing number of knowledgeable computer users who also understand the customization of software; 2) the community of software developers has simplified applications which are more user-friendly; and 3) the number of people and organizations who want or need to personalize software is increasing based on the applications’ robustness, stability, and superior quality, but not necessarily because it is free (Blansit, 2009; Colford, 2008; Hars & Ou, 2002; Krishnamurthy, 2003; Murphy, 2004; Tiemann, 2006; Torvalds & Diamond, 2001; von Hippel & von Krogh, 2003).

Torvalds and Diamond (2001) suggested that while OSS may neither be free nor cheap, its real advantage is that it facilitates individuals, organizations, or countries to develop their own knowledge and skill bases contrary to proprietary solutions. Commercial software not only requires continuous expenditure but also inhibits knowledge and skill development by users who, ironically, also end up none the wiser (Torvalds & Diamond, 2001). Benkler (2003) stated:

Open source software has enhanced the development of the networked information economy that is gradually replacing the well-entrenched industrial model of information production whose incumbents, oblivious to the paradigm shift in the information ecology, tend to push and pull laws, technologies, and markets to shape the dawn of a new era in the image of fading times. (p. 4).

However, there have been some limitations associated with OSS that scholars have identified. Some researchers have suggested that the major disadvantage of OSS is inherent in its networked but diverse and dispersed community of global developers with no single individual, unit, or corporation that can easily be identified to take responsibility for any contribution that could emerge from such a non-hierarchical virtual structure (Camara & Fonseca, 2007; Elliot &
Furthermore, the likelihood that interoperability problems between versions of OSS programs could occur is an ongoing concern within the OSS community (Elliot & Kramer, 2008; Simon, 2008; Valimaki & Oksanen, 2005). Another lingering setback of the OSS development model is the inherent uncertainty associated with its capacity to sustain software companies over a long period of time (Elliot & Kramer, 2008; Krishnamurthy, 2003; Murphy, 2004; Simon, 2008; Valimaki & Oksanen, 2005). Also, while the least obvious costs associated with OSS, such as training and support services had previously been ignored and underestimated, they have since emerged as some of the critical downsides of OSS (Blansit, 2009; Elliot & Kramer, 2008; Simon, 2008). Valimaki & Oksanen (2005) stated that anecdotal evidence suggests that some previously ignored and underestimated OSS costs have unpredictably turned out to be higher over the life of the software.

Distinctions between FSF and OSI licenses. Besides influencing the definition, understanding, promotion, and use of the software, the two philosophical orientations espoused by the FSF and the OSI camps have largely been responsible for determining the criteria on which a software qualifies as free or open and, therefore, eligible for a license either through the FSF or OSI. The nuances associated with FS and OSS licenses, have, over time, in no small measure, contributed to the complexity and confusion surrounding FS and OSS licenses among software developers, users, professionals, and scholars (Blansit, 2009; McGowan, 2000; Valimaki & Oksanen, 2005). The complexity and confusion was triggered by the implied ‘free’ software as proclaimed by the FSF and compounded by the provocative rhetoric used by the FS
activist to popularize and defend the FS freedoms (Iacono & Kling, 1996; Kling, 1996; McGowan, 2000; Raymond, 1998).

FS adherents stated that a basic principle of FS requires that the four essential freedoms must be observed because FS is a matter of liberty and not price (FSF, 2007; Stallman, 1996; Torvalds & Diamond, 2001). Blansit (2009) stated that if a program allows “all the four freedoms to users, then it qualifies as FS and is licensed as FS” (p. 365). The philosophy and rhetoric of the FSF is, “…superficially, granted ‘free software’ to benefit entire communities” (Valimaki & Oksanen, 2005, p. 98). Yet, in the actual sense, “the rhetoric surrounding the four freedoms is a form of technological utopianism” (Iacono & Kling, 1996, p. 88), because associated costs such as customization and maintenance of the software are never emphasized.

The rather nebulous rhetoric associated with FS, therefore, resulted in the formation of the OSI, a non-profit organization, in 1998, to ensure that alternative licenses that comply with open source licensing criteria are issued (Hamel, 2004; McGowan, 2000; Raymond, 1998, 1999).

Operating under the certified OSS certification mark and program, OSI manages and promotes the definition and ideals of the OSS community (McGowan, 2000; Raymond, 1998). The OSI ensures that five open standards requirements (OSR) are adhered to and implemented for software to be licensed and designated as truly open and not discriminating against developers and users (Hamel, 2004; McGowan, 2000; OSI, 2009; Raymond, 1998, 1999). The five OSR criteria include:

1) No intentional secrets limiting interoperability, 2) standards must be freely and publicly available and at a non-discriminatory cost, 3) essential patents to implementation of the standard must be licensed without royalties, 4) requirements should not be made before the execution of a license to implement the standard, and 5) implementation of the standard must not
require any other technology that fails to meet set criteria (Hamel, 2004; McGowan, 2000; OSI, 2009; Raymond, 1998, 1999).

Consistent with the OSR criteria, a licensor seeking to qualify a program as OSS has to comply with a licensing regime that prescribes terms of distribution that include both privileges and restrictions (OSI, 2009; Raymond, 1998, 1999). The OSR criteria have since become the basis for considering software for acquiring an OSS license to maintain the integrity of the author’s source code (Hamel, 2004; McGowan, 2000; OSI, 2009; Raymond, 1998, 1999). OSS scholars (Hamel, 2004; McGowan, 2000) have also suggested that the OSI licensing regime has facilitated the evolution of information societies around the world and enabled people to participate in information-related activities.

Blansit (2009) observed that because the FSF emphasizes the ethics of freedom in the use and redistribution of FS, it represents a social movement while a strong focus on the production methodology of OSS by the OSI, represents forms of quality and inclusiveness. Collectively, therefore, “FS and OSS or FOSS includes elements of a legal definition, a software development methodology, and a social movement” (Blansit, 2009, p. 361).

Valimaki and Oksanen (2005) stated that for the three types of software including free, open, or proprietary, three main licensing options with implied ownership structures of operating system software exist. These include: “Copyleft licensing where no one owns the software; permissive licensing where everyone owns the software; and proprietary licensing where only one owns the software” (Valimaki & Oksanen, 2005, p. 98). The GNU General Public License (GNU GPL), for example, is a typical copyleft license, the BSD and Apple Public Source License are more permissive, and Microsoft licenses are typically proprietary in nature (Blansit, 2009; Hamel, 2004; McGowan, 2000; Valimaki & Oksanen, 2005).
The FSF-issued GNU GPL license is the most popular and widely used FS license, which was first issued by the FSF following the completion and release of the essential portions of the GNU Linux kernel in 1992 (Blansit, 2009; Gonzalez-Barahona, 2004; Hamel, 2004; McGowan, 2000; Stallman, 1996; Torvalds & Diamond, 2001; Valimaki & Oksanen, 2005). FSF (2010) stated that more than half of all free software packages are licensed under the GNU GPL, most of which are under the recently issued GNU GPL version 3. Although FSF has issued several licenses compatible with the GNU GPL for GNU software, the GNU free documentation license (GNU FDL) and the GNU Affero general public license (AGPL) based on the GNU GPL are the most pervasive (FSF, 2010).

The GNU FDL provides that documentation for free software should be freely redistributed along with the software it describes in the form of a manual or textbook. The manual or textbook should assure everyone the effective freedom to copy and redistribute the software with or without modifications either for commercial or non-profit purposes (FSF, 2010). With regard to the GNU AGPL, FSF grants users who interact with the licensed software over a network to freely receive the source for that program and use it for any purpose but under similar terms of redistribution and use (FSF, 2010). McGowan (2000) stated that generally, under the GNU GPL license:

Components of GNU Linux Operating System (OS) are copyrighted and the rights are held by identifiable persons and firms. The rights are used to enforce norms of the open source community… the code may be freely copied, modified, and distributed, but only if the modifications or derivative works are distributed on these terms as well. (p. 1).

To guarantee users’ rights to freely download, use, and redistribute software on similar terms as originally accessed, Stallman, the founder of FSF, developed the copyleft idea as a general method to guide the development and licensing of FS (FSF, 2010). The notion of copyleft was
used to turn programs into FS and required the modified and derived versions to become FS as well (FSF, 2010).

Blansit (2009) suggested that while copyleft became an integral part of the GNU GPL, it is built into many FS and OSS licenses but not others. Valimaki and Oksanen (2005) observed that “there seems to be no one-size-fits-all open source operating system licensing strategy” (p. 98). However, FSF (2010) stated that before a copyleft for software is issued, the software is declared as copyrighted, then adds a legal instrument with guidelines that provide rights to anyone to use, modify, and redistribute the program’s code or any derivatives on similar terms.

In the process, FSF stated that the software is uncopyrighted, freely availed to the public to download, improve, share, and use for any purpose including freedom to convert the software to market as a commercial product for profit. Under the copyleft licensing option, therefore, the code and the freedoms, become legally inseparable as whoever redistributes the software, with or without changes, must pass along the freedom to further copy and change the program (Blansit, 2009; FSF, 2010; Hamel, 2004; McGowan, 2000; Stallman, 1996; Torvalds & Diamond, 2001; Valimaki & Oksanen, 2005).

Stallman (1996) and FSF (2010) further suggested that while developers of commercial software use copyright to deny users’ freedoms to freely access and use software to accomplish their computing tasks, FSF, on the contrary, uses copyright to guarantee their freedom by reversing copyright into copyleft. The high-sounding rhetoric notwithstanding, however, “these FSF licenses have not been tested in court and some analysts question whether they create legally binding rights and obligations” (McGowan, 2000, p. 2).

The OSI-issued licenses, on the contrary, fall into several categories. Unlike FSF whose majority of free software packages are licensed under the GNU GPL, the OSI with a more
permissive or liberal approach to licensing (everyone owns the software), had by the end of 2009 issued a total of 67 OSS licenses (OSI, 2009). The OSS licenses, developed, approved, and issued by the OSI via the license review process, are divided into several categories taking into account the various interests and concerns of diverse licensors (OSI, 2009).

Non-programming content, for example, receives separate OSS licenses for such items as articles, pictures, audio and video (OSI, 2009). Most of the popular and widely used OSS licenses, e.g., the Apache, BSD, and Apple public source licenses, reflect more permissive features with strong community involvement in their development processes (Blansit, 2009; Hamel, 2004; McGowan, 2000; OSI, 2009; Raymond, 1998, 1999; Valimaki & Oksanen, 2005). Other popular and widely used OSS licenses with ubiquitous communities include but are not limited to MIT license; mozilla public license 1.1 (MPL); common development and distribution license; and eclipse public license (OSI, 2009).

Special purpose licenses include educational community license; artistic license 2.0; and academic free license attribution (McGowan, 2000; OSI, 2009; Raymond, 1998, 1999). The OSI (2009) also listed some non-reusable licenses such as apple public source license, computer associates trusted open source license 1.1, and CUA office public license version 1.0. Other popular licenses issued by OSI include EU datagrid software license, IBM public license, Nokia open source license, OCLC research public license 2.0, python software foundation license, Sun public license, and wxwindows library license (Blansit, 2009; Hamel, 2004; McGowan, 2000; OSI, 2009; Raymond, 1998, 1999; Valimaki & Oksanen, 2005).

Among the several categories of OSI licenses, those issued under the 2.0 creative commons license, appear to require more elaborate legal procedures because they include different freedoms and restrictions for users (Creative Commons, 2008). For example, the
attribution 2.5 generic, issued under the creative commons license, is granted to ensure that free cultural works are freely shared, copied, distributed, transmitted, and remixed for adoption as long as attribution to the original author is made (Creative Commons, 2008; OSI, 2009). The free cultural work has to be attributed according to specific instructions given by the author or licensor but not in any way that suggests that the author endorses the users’ final product (Creative Commons, 2008; OSI, 2009).

The creative commons license also provides for a potential waiver of the stringent licensing conditions if permission is granted by the copyright holder or where the work or any of its elements is legally in the public domain when its status is exempted from licensing requirements (Creative Commons, 2008). The license requires that if the work is reused or redistributed, the user must clearly outline and explain to others the license terms of the original work (Creative Commons, 2008). However, the license upholds a raft of rights such as fair dealing or fair use rights, author’s moral rights, other person’s rights in the work or in how the work is used such as publicity or privacy rights, and any other applicable copyright exceptions and limitations (Creative Commons, 2008; OSI, 2009). The OSI has also listed a category of licenses that have been voluntarily retired and others that are uncategorized.

Blansit (2009) stated that the licensing structures for FS/OSS, their inherent legal ambiguities and complexities notwithstanding, “paradoxically preserve copyright, simultaneously release the code to the public, encourage the sharing of changes back to the community, and promote a cycle of rapidly incorporating improvements into future versions of the software” (p. 367). McGowan (2000) noted that “the GPL, in particular, represents an elegant use of contractual terms and property rights to create social conditions in which software is produced on a model of openness rather than exclusion” (p. 2). The networked software
communities established by the FSF and OSI licenses have extraordinarily “produced valuable software that is important to the operation of the Internet and, in the case of the GNU/Linux operating system, presented a credible source of future competition to Microsoft” (McGowan, 2000, p. 2).

The nature of proprietary software licenses. Compared with FSF/OSI-issued licenses, licenses for traditional or proprietary software tend to be restrictive. The source code to most proprietary or closed software is usually acquired at a cost and cannot be altered or redistributed without permission from owners, most of whom are private individuals or companies (Barton & Nissanka, 2001). Liebowitz and Margolis (1995) and Lieberman (1995) stated that traditional or proprietary software licenses are typically issued under exclusive legal right of the copyright holder and only give the licensee the right to use the software under certain conditions.

Developers of proprietary software, however, grant some exclusive patent rights to algorithms, software features, or other patentable subject matter (Liebowitz & Margolis, 1995; Lieberman, 1995). Typically, proprietary software licenses restrict other uses of the technology such as modification, distribution, sharing the software with others, limits the number of computers on which software can be used, and prohibits the user from installing the software on extra computers (Liebowitz & Margolis, 1995; Lieberman, 1995).

Restrictions on use are enforced using such technical measures as product activation, a product key or serial number, a hardware key, copy protection measures, or removal of some features from the distributed software or hardware (Liebowitz & Margolis, 1995). In addition, proprietary software vendors usually regard source code as a trade secret and only issue licenses allowing the distribution of the software but retain the source code or human-readable version of the software, a scheme often referred to as closed source (Liebowitz & Margolis, 1995;
Lieberman, 1995). The closed source feature of proprietary software source code prevents users from understanding how the software code works and restricts changing how the code operates, which renders most proprietary formats and protocols secret and incompatible with other software (Lieberman, 1995).

Some proprietary software and hardware vendors suggest that software is only licensed but not sold and that limitations of copyright, such as the first-sale doctrine, do not apply to commercial software (Lieberman, 1995). Besides, the specific terms of use in an end-user license agreement, which is usually non-negotiable, always hold users hostage to a specific technology because it would be a huge cost to switch or migrate to another software or hardware (Liebowitz & Margolis, 1995; Lieberman, 1995).

Yet, to gain monopoly of the software or hardware market or to leverage their market share, both hardware and software manufacturers and vendors typically use vendor lock-in mechanisms in their source code to hold users hostage to a specific technology. For example, Microsoft, IBM, Apple, and other software and hardware manufacturers carry high levels of vendor lock-in based on their extensive set of proprietary applications (Liebowitz & Margolis, 1995; Lieberman, 1995).

The American Bar Association (ABA, 2011) stated that owners of proprietary software exercise a range of exclusive rights over the software and typically restrict use, inspection, modification of source code, and redistribution of derived items, if any. However, while most proprietary software is closed, some vendors distribute the source code or otherwise make it available to customers under a non-disclosure agreement or a license that allows users to study and modify the source code but not to redistribute it (ABA, 2011). Sometimes, vendors sell software or hardware versions with licenses that may allow the use of the technology for a
limited number of ventures such as educational, non-commercial or non-profit work (ABA, 2011).

Challenges associated with OSS acquisition. While huge differences remain between licensing regimes associated with proprietary software and OSS, both licensing protocols are inherently complex. With respect to OSS acquisition in particular, although it is categorized as free, its licensing procedures, community obligations, modification, and use are not as easy to understand and follow as they sound. This is largely because the entire OSS model, including its definition, development, licensing structures, adoption, use, and redistribution, is shrouded for the uninitiated and detractors, in misinformation, confusion, and skepticism (Colford, 2008).

Because the source code for OSS is freely distributed without royalty or licensing fee, therein lies the most outstanding misconception about OSS—it is free of cost. While it may be possible that individuals, organizations, and governments may freely acquire OSS and avoid buying commercial software, the adoption of OSS may entail a raft of hidden costs in development and maintenance, especially if customization or migration is to be made to the software (Colford, 2008; Murphy, 2004). The researchers noted that such costs may translate into salaries for additional technical staff or possibly external support, development or hosting services, or exorbitant consulting services offered by multinational corporations.

Colford (2008) and Murphy (2004) suggested that just as systematic procedures are followed before proprietary software is acquired, astute software professionals should conduct a comprehensive cost-benefit analysis of the OSS product to assess and determine its comparative advantage. A cost-benefit analysis helps to strategically forestall misconceptions, confusion, and uncertainties surrounding the OSS product before its acquisition as an alternative software is pursued (Colford, 2008; Murphy, 2004).
Colford (2008) and Murphy (2004) outlined some elements that require analysis and understanding before an OSS alternative is pursued including: 1) Licensing structures and procedures; 2) Recurring fees such as maintenance or personnel costs for development and maintenance; 3) Amount and time of additional development required for missing features; 4) The benefit of contributing to the support community; 5) The ‘lock-in’ aspect of committing to a proprietary model; and 6) The ease with which the migration to a new platform, if required, can be realized.

The description of FSF/OSI licensing structures and their inherent freedoms and complexities correspond with the need to ensure that ICT stakeholders and policy makers in any given locale thoroughly grasp nuances surrounding the formation of an information policy for the adoption and use of OSS. Gaining such relevant information and knowledge about the nuances of OSS is critical if goals of bridging the digital divide, leapfrogging a country into the information society, and facilitating citizens to exploit opportunities offered by the digital-based global economy are to be realized.

OSS Use in Ubiquitous Computing

Since the first version of OSS was developed and used in the second half of the last century, the software has gone through a remarkable evolution resulting in universal use in nearly all computing tasks (Blansit, 2009; FSF, 2010; Gonzalez-Barahona, 2004; OSI, 2009). While the software was originally developed and used by highly technical people (software designers and developers), it has since morphed into a user-friendly technology to become widely used in personal, organizational, and governmental computing tasks (Altenhöner, 2005; Blansit, 2009; Elliott & Kramer, 2008; Iacono & Kling, 1996; Kling, 1996; Krishnamurthy, 2003; Murphy, 2004; Pykalainen, 2008; Raymond, 1998, 1999; Simon, 2008; Stallman, 1996;
Although the OSS model experienced stiff resistance from advocates of the traditional software development model, its inherent freedoms, passionate promotion by its adherents, and subsequent developments in the global information infrastructure have helped to accelerate its diffusion, adoption, and use in ubiquitous computing around the world (Elliot & Kramer, 2008; Fontana, 2008; Iacono & Kling, 1996; Simon, 2008). In developed economies, OSS has substantially contributed to the evolution of information societies where the use of ICTs to engage in information-related activities have become dominant features in the cultural, economic, and political lives of communities (Blancit, 2009; Elliot & Kramer, 2008; Iakono & Kling, 1996; Simon, 2008; Weber, 2004).

The software has also become a global business model to effectively contest the monopoly hitherto enjoyed by commercial or proprietary software (Altenhöner, 2005; Blancit, 2009; Fontana, 2008). Perhaps the most overriding factors responsible for the rapid diffusion, adoption, and use of OSS around the world are its relative low cost compared with commercial software, its interoperability with other technologies, and its proven potential to enable governments to provide social services to their citizens and to engage them in e-government programs (Backus, 2001; Camara & Fonseca, 2007; Comino, Stefano, Rossi, Alessandro, Manenti, & Fabio, 2010; Ghosh, Krieger, Glott, & Robles, 2002; Heeks, 2001; James, 2001; Weber, 2004; Wheeler, 2007; Wilson, 2004).

OSS use in personal computing and in libraries. Over the years, several packages of OSS have been developed and are in use by individuals around the world to accomplish their respective computing tasks. The XFree86 software, for example, has been customized and used
in personal computers (PCs) to accomplish multiple computing tasks. Gonzalez-Barahona (2004) reported that GNOME and KDE software have had the greatest impact on ordinary users because they focus on usability features that are easily manipulated, diminishing earlier notions that OSS products were primarily developed and designed for use in servers and in systems for technical people.

Vishwanath and Chen (2008) suggested that OSS, just like other technologies, has gained a degree of malleability to cater to a specific audience and its needs. “The roles and associations between technologies and people are socially constructed and culture specific, rendering an interplay between the spirit of the technology and the normative forces that act on individuals within a culture” (Vishwanath & Chen, 2008, p. 1770). The rapid developments in the OSS technology that have facilitated its easy modification and widespread use for multiple tasks by ordinary people indicate how user needs and cultural norms may define who and what the technology is used for.

The adoption and use of OSS has perhaps been most pervasive in library environments and information agencies to purposely cut costs while transforming and improving services to patrons (Breeding, 2009; Colford, 2008; Dalbello, 2005a, 2005b; Elichirigoity & Malone, 2003; Evans, 2005; Grant, 2008; Kilker & Gay, 1998). “Since libraries do not compete but seek to complement and cooperate, they, by their very nature, became ideal users of the Open Source Business Model” (Evans, 2005, p. 1).

In developed countries, the use of OSS in both public and academic libraries has facilitated an increase to access and use of information, improved education facilities, enhanced user knowledge, reduced costs, optimized resources, and facilitated e-learning (Breeding, 2009; Colford, 2008; Dalbello, 2005a, 2005b; Elichirigoity & Malone, 2003; Evans, 2005; Grant, 2008;
Kilker & Gay, 1998). The use of OSS in library environments has also helped to promote democracy and consolidated the development of information societies (Benkler, 2003; Moore, 2001; Reding, 2005).

OSS applications, such as Perl and GNOME and KDE, have especially been widely used in libraries and facilitated the sharing of resources between institutions in developed countries (Breeding, 2009; Evans, 2005). “Open Source Software runs on cheaper hardware; the library saves investment in new machines, and projects developed with Open Source Software can be shared between libraries, giving all participants access to new services to offer patrons” (Evans, 2005, p. 1). Comparing the adoption and use of OSS with proprietary software in libraries, OSS researchers suggested that libraries and related information agencies or knowledge centers need to prudently manage their scarce resources by adopting OSS to create and provide new and exciting products. They suggested that developing such OSS-based products as multimedia services can help libraries avoid purchasing expensive commercial software and thereby saving licensing fees for items such as servers from commercial software manufacturers (Breeding, 2009; Colford, 2008; Dalbello, 2005a, 2005b; Elichirigoity & Malone, 2003; Evans, 2005; Grant, 2008; Kilker & Gay, 1998).

OSS researchers noted that adoption and use of OSS in library environments does not only help to cut costs but also enables libraries as learning centers to achieve their organizational objectives (Breeding, 2009; Colford, 2008; Evans, 2005; Grant, 2008). In the United States and Canada, especially, libraries have tended to adopt OSS solutions and are routinely migrating to OSS although OSS products do not necessarily offer all the nuances of functionality found in their commercial counterparts (Breeding, 2009).
Breeding (2009) suggested that four major factors including market acceptance, support options, product development and functionality, and risk factors have accelerated the adoption of open source integrated library systems (ILS) in the United States and Canada.

While the use of open source ILS in library automation among small and medium-sized libraries isn’t so much a matter of viability as inevitability, OSS products will soon exceed functionality thresholds to gain acceptance and use in large public and academic libraries. (Breeding, 2009, p. 25).

Evans (2005) was even more emphatic and predicted that the trajectory for OSS is no longer shrouded in ambiguity.

Open Source Software is a snowball that will soon be an avalanche; there is real money to be saved and real benefits to be gained from OSS for public libraries. If your library is well-funded and your IT staff feels comfortable with Microsoft, stay proprietary! But libraries with pressed budgets and enthusiastic staff can do extraordinary things with OSS and the LAMP software suite…by opening up to the exchange of library-specific packages, libraries can benefit from each other’s development expenditures. Librarians of the world, unite - you have nothing to lose but your license fees. (p. 9).

While the use of OSS in developing countries has remained modest, it is steadily growing. The use of OSS has enabled some educational institutions to establish virtual universities and support distance education in Africa and Asia (Adeogun, 2003; Baguma, 2005; Bruggink, 2003; CIPESA, 2005; Rafiq & Ameen, 2009; Reijswoud & Topi, 2003). However, some obstacles in developing countries still inhibit extensive adoption and use of OSS in libraries. In Pakistan, for example, “lack of technological, financial, and human development, digital divide, social-cultural disparities, and conceptual confusions are major factors affecting OSS adoption in libraries” (Rafiq & Ameen, 2009, p. 608).

Use and impact of OSS in the corporate world. In the corporate arena, OSS has gained ubiquitous use and has become a multi-billion dollar global business undertaking for companies offering professional technical services. With services ranging from customization, integration,
migration, and maintenance to consultation, OSS has engendered profitable global operations (Lacy, 2006). McGowan (2000) stated that companies, such as Red Hat, Inc. and VA Linux:

Have been able to build businesses successful enough to win the approval of financial markets and maintain large market capitalizations even though they did not develop the software on which their work is based, do not employ the programmers who created and maintain it, do not control its future development, and cannot control any improvements they themselves make to it. (p. 1).

The software market, evidently, is a highly competitive arena where proprietary software vendors face significant competition introduced by Linux, Apache, and other OSS products (Blansit, 2009). Software companies, such as Red Hat, Inc. and SuSe, use and distribute GNU/Linux under different business models for desktops and servers, and MontaVista for embedded systems (Novell, 2008; Red Hat, Inc. 2011). IBM and Oracle, some of the largest multinational corporations, while they support Linux development, they also use Linux to sell their proprietary application software running on Linux (IBM, 2010; Oracle, 2010). IBM, for example, has the most pervasive patent and business interests in GNU/Linux (Oksanen, 2005).

Fontana (2008) profiled ten OSS companies that have made billions of dollars from developing and marketing OSS products around the world. The ten most prosperous OSS corporations include Kickfire, Marketcetera, Vyatta, Sonatype, Untangle, Qumranet, XAware, SnapLogic, Acquia, and Openmoko. Fontana (2008) unambiguously suggested that OSS is no longer just a “trendy conversation but a clear evolution of a community that has grown up and produced intelligent, cutting-edge technologies with an eye on making computing faster, smarter and cheaper for corporate users” (p. 1).

Fontana noted that companies such as Openmoko are contesting the mobile device market with the idea that users should control what applications are used; XAware and SnapLogic have created new data integration opportunities; Untangle has endeavored to make
computing less complex; and others have developed new products in the virtualization, databases, and trading systems realms. The decision, therefore, “is no longer a question of open source, but about what product is best at solving computing problems regardless of how it was built” (Fontana, 2008, p. 1).

OSS use in government institutions. Globally, OSS has increasingly become an alternative to proprietary or commercial software, particularly in the government or public sector because its adoption and implementation were recognized as enablers for the private sector to adopt and use this low cost software (Camara & Fonseca, 2007; Comino et al., 2010; Ghosh et al., 2002; Weber, 2004). Advancing the economic and political justification for the adoption of OSS, suggested that the widespread adoption and use of OSS in government institutions were viewed as means of reducing licensing costs and of promoting indigenous technological development (Ghosh et al., 2002; Weber, 2004; Weerawarana & Weeratunga, 2004).

Several OSS scholars stated that the possibility of accessing the software source code, avoiding being held hostage to proprietary software, advancing knowledge more quickly, and helping to set up information economies became attractive options that induced governments around the world to adopt and use OSS in their departments (Ghosh et al., 2002; Weber, 2004; Weerawarana & Weeratunga, 2004). Governments also championed the use of OSS because they possess a strong buying power that can drive the market; they fund public universities and research projects for software engineers and programmers; and because ICTs were viewed as vehicles for political participation and social and economic transformation (Wilson, 2004).

Reinforcing the political and economic rationale, Backus (2001) stated that the need to develop an e-government infrastructure compelled governments around the world to seek and use affordable technologies to engage the majority of their citizens in the governance of their
countries. E-governance refers to the use by government institutions of ICTs (e.g., wide area networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and some arms of government (Backus, 2001).

Comino et al. (2010) suggested that OSS support is stronger in countries where e-government services are more available, and where the domestic software industry is lagging behind. The European Commission, for example, following the adoption of the Lisbon Strategy and the 2002 and 2005 eEurope Action Plans, clearly stated that the main advantage of OSS was that it facilitated the spread of e-government services (Comino et al., 2010). OSS adoption and use, thus, were also “driven by the desire to pursue the general objective of giving all citizens the opportunity to participate in the global information society” (Comino et al., 2010, p. 2).

From a technical perspective, governments have been inspired to adopt OSS products because they are superior in terms of reliability, security, flexibility and maintainability of the code, given that an active community of developers helps to constantly improve the software and fix possible bugs (Wheeler, 2007). Other technology-related motivations for government involvement in the adoption and use of OSS in their departments include the availability of the source code that enables users to customize the software to their own needs and the licensing regime that inspires refinements and innovations to the original code (Wheeler, 2007).

Similarly, governments have been inspired to promote the use of OSS because the development of OSS is based on the open interfaces model that enhances interoperability or compatibility with both OSS products and others of a similar family (Ahmed, 2005; Hoepman & Jacobs, 2007; Wheeler, 2007). It is, apparently, “that in the government sector internationally, OSS is seen as a viable technology for lowering software costs, growing local software development industry, and bridging the digital divide” (James, 2001, p. 9).
Key changes in government strategies that emphasize equitable and economical distribution of services to their citizens favor the use of OSS for public institutions, such as schools, hospitals, public works, security agencies, and other government ICT infrastructure developments, that have emerged around the world (Camara & Fonsica, 2007; Comino et al., 2010; Heeks, 2001, 2004; Hoepman & Jacobs, 2007; Mtsweni & Biermann, 2008; Weber, 2004). For example, Altenhöner (2005) and Heeks (2001, 2004) described some of the European Union governments that have adopted the use of OSS in their national and local agencies for major and sensitive ICT operations.

The researchers reported that OSS has met, most especially, acceptance not only in civil service but also in commerce and the telecommunications sector. National and local governments in the United Kingdom (UK) have recognized opportunities that open source can offer as a way of cutting costs and stimulating an independent domestic ICT sector with local expertise. While OSS Watch, financed by the Joint Information Systems Committee in the UK, is charged with the task of providing OSS advisory services, the British police and intelligence agencies use GNU/Linux in their operations (Heeks, 2004). In Germany, the use of OSS in government departments “is an officially declared principle for all applications; contradictory decisions in favor of proprietary software products are pressured to justify themselves and the German parliament uses the GNU/Linux operating system to run its application software” (Altenhöner, 2005, p. 2).

Elsewhere in Europe, the ministries of culture, defense and education in France use GNU/Linux (Heeks, 2004). When the Finnish Ministry of Finance estimated that the annual savings of 26 million euros could be made by using Linux in state agencies, “Finnish Members
of Parliament (MPs) were compelled to sign a bill requiring national and local agencies to migrate their IT systems to the GNU/Linux operating system” (Heeks, 2004, p. 4).

Countries that comprise the so-called BRICS group of nations, i.e., Brazil, Russia, India, China, and South Africa, use OSS in their major operations (Camara & Fonsica, 2007; Government Information Technology Officers’ Council {GITOC}, 2003). In 2004, the Brazilian government recommended that all public institutions install Linux in all new computers (Camara & Fonsica, 2007). The Chinese government has over the years promoted the use of OSS in all its agencies based on its local version of the GNU/Linux for both cost-cutting reasons and for security purposes (Hoepman & Jacobs, 2007). In India, Delixus Incorporated, a private ICT company, implemented the 2004 edition of Delixus e-Governance Platform to extend services to rural populations (Ahmed, 2005). “The facility leveraged the strengths of Linux to provide improved services to widows, pensioners and poor farmers in the Indian state of Karnataka” (Ahmed, 2005, p. 8).

Developing countries, such as Venezuela, adopted the use of OSS technology in most of its agencies to reduce expenditures on proprietary software and to enhance national security and autonomy (Maldonado, 2007). Since 2003, countries, such as Pakistan, Singapore, Thailand, Malaysia, and Indonesia, vigorously embarked on the promotion and use of OSS in their central and local government institutions (Open Source Resource Center {OSRC}, 2007; Pakistan Software Export Board, 2008; Tan, 2005).

In Sub-Saharan Africa, the government of South Africa has promoted the use of OSS in most of its departments since 2003 to cut software costs in central and local government agencies and to inspire the development of a dynamic ICT sector with an indigenous skills base (GITOC, 2003; Mtsweni & Biermann, 2008). The South African government also approved the
implementation of an e-governance service using OSS applications to eliminate expenditure on proprietary licenses and endless maintenance costs to realize improved returns on investments (Heeks, 2003). Elsewhere in Sub-Saharan Africa, while most governments use OSS as a cost-cutting measure for public expenditure on commercial software, cultural, social, economic, technical, and political factors still constitute major bottlenecks to universal use (Bruggink, 2003; CIPESA, 2005; EACOSS-Uganda, 2008; Heeks, 2004; Mtsweni & Biermann, 2008; Reijswoud & Topi, 2003).

Except South Africa and Kenya, no government in Sub-Saharan Africa has come out with a clear-cut information policy in the form of a national law to formally recognize, adopt, and use OSS (Mtsweni & Biermann, 2008; Smith, 2012). Lack of political leadership to initiate and support OSS-related information policies on the African continent are perhaps due to inadequate funds from governments to invest in the requisite infrastructure and expertise to implement OSS-related projects (Bruggink, 2003; Heeks, 2004; Reijswoud & Topi, 2003). Camara and Fonseca (2007) suggested that the formation and implementation of a national OSS information policy in developing countries requires considerable financial investment by governments to develop an indigenous human resource and a national information infrastructure to ensure effective and equitable adoption, diffusion, and use of OSS. At the same time, government officials in Sub-Saharan Africa are reluctant to support OSS-related initiatives because they view and associate OSS as an unfamiliar application with technical uncertainties and high operational risks (Bruggink, 2003; Heeks, 2004; Reijswoud & Topi, 2003).

However, the optimistic trend in the development and use of OSS has been reinforced by the global estimates of programmers involved in OSS development projects. While current statistics on the number of programmers working on OSS projects remains scanty, it was
estimated, for example, that by the end of 2004, “more than 800,000 programmers used their knowledge for the development of OSS on about 80,000 OSS projects worldwide” (Altenhöner, 2005, p. 1). All those involved in the OSS projects around the world “attested to the creativity and quality awareness of a well-motivated community of software developers” (Altenhöner, 2005, p. 2). The potential of OSS to facilitate individuals, private businesses, and public institutions around the world to optimize the seamless opportunities offered by the digital and knowledge-based global economy is, therefore, a realistic assumption (Camara & Fonseca, 2007; Comino et al., 2010; Ghosh, et al., 2002; James, 2001).

Role of OSS in bridging the digital divide. While a wide body of research suggests that OSS has played a transformative role in reducing the digital divide around the world, OSS-related policies should assume a holistic view of the specific social context and not only focus on the acquisition of the technology (Camara & Fonsica, 2007). Research on the global adoption of OSS suggests that OSS policies that over-emphasize issues of technological determinism and ignore social, cultural, political, and economic factors hardly mitigate the effects of the digital divide. Ebo (2002), Norris (2001), Parayil (2005), and Warschauer (2003) stated that the mere development of policies for the adoption and use of OSS, and indeed other ICTs, may not necessarily provide a panacea to the digital divide and a sure pathway to the information society nor guarantee the maximization of opportunities offered by the ICT-driven global economy.

On the contrary, the possibility that the ICT-driven global economy in which the use of proprietary software alongside OSS may accentuate the digital divide across a wide spectrum of measures is a phenomenon that cannot simply be overlooked (Ebo, 2002; Norris, 2001; Parayil, 2005; Warschauer, 2003). In addition, research on digital-driven globalization suggested that the ICT revolution has to a large extent perpetuated the interests and dominance of existing
multimedia corporations over the interests of the majority of global populations (Ebo, 2002; Norris, 2001; Parayil, 2005).

The Nature of Information Policies

A considerable body of research addressing information policy issues has emerged since the problem-oriented IP discipline evolved in the second half of the last century. The research, both basic and applied, has tended to resolve, rather than solve, both the classic and the increasingly complex and dynamic information policy problems associated with rapid changes in ICT developments and their unpredictable impacts on societies. Following that research tradition, this study seeks to advance the frontier of knowledge by providing empirical and theoretically-based information to facilitate the formation of a strategic, coherent and comprehensive information policy for the adoption of OSS by Uganda.

To clarify, “although information science literature refers to information policy in the singular, no all-encompassing information policy exists in any given polity” (Hernon & Relyea, 1968, p. 1). Rather, information policies, outcomes of legislative, executive, judicial, and technical processes, often deal with specific issues that are not of a general nature (Frohmann, 1995; Hernon & Relyea, 1968; McClure, Hernon, & Railye, 1989; Maxwell, 2003).

Generally, information policies are a set of principles, laws, guidelines, rules, regulations, and procedures for the production, collection, dissemination, retrieval and use, retirement, and preservation of information (Hernon & Relyea, 1968; McClure, Hernon, & Railye, 1989).

Additionally, information policies are developed to regulate and guide the production, adoption, diffusion, use, ownership, and distribution of ICTs, including the hardware and software used in processing information-related activities and products (Braman, 2004, 2006; Castells, 1997, 1998, 2000; Cogburn, 2003; Daniel, 2000; Gil-Garcia, 2004; Hernon & Relyea,
Corporations, governments, and international organizations formulate information policies to harness and regulate ICTs to promote and protect the respective interests of their businesses, citizens, or global communities (Braman, 2004, 2006; Castells, 1997, 1998, 2000; Cogburn, 2003; Daniel, 2000; Gil-Garcia, 2004; Shapiro & Varian, 1997).

Weingarten (1989) stated that information policies are sets of all public and private laws, regulations, and policies that encourage, discourage, or regulate the creation, use, storage, and communication of information. Information policies, therefore, recognize information as a private commodity and a public resource for the improvement of human lives that must be protected and shared (Hernon, McClure, & Relyea, 1996; Hernon & McClure, 1987; Hernon & Relyea, 1968; McClure, Hernon, & Railye, 1989).

However, “while information policies address specific issues, sometimes they are fragmented, overlapping, and contradictory collections of laws and public policies” (Hernon and Relyea, 1968, p. 1). In the United States, for example, “there is no national information policy or a clear vision (or consensus on) how to achieve it” (Hernon, 1989, p. 236). “The practical policy problem, then, is that information policy appears to be a ‘fuzzy set,’ or a dissociated, and more often than not, dissonant collection of laws, regulations, and public policies” (Overman & Cahill, 1990, p. 803).

While policy makers continue to wrestle with unresolved information policy issues, evolving ubiquitous computing as a result of the rapid technological developments that dwarf their abilities to understand the impacts of ICTs on society, have further complicated the already complex information policy formation process (Hernon, McClure, 1997). To the extent that complex and dynamic ICTs are difficult to police let alone understand, an ongoing dilemma in
the information policy formation process and in scholarly endeavor has become more evident (Broman, 2004, 2006).

For example, while new media technologies offer seamless platforms to communicate and improve human lives, their dynamic and complex nature pose challenges that tend to outpace existing regulatory regimes (Broman, 2004, 2006). Broman (2004) stated that:

Rapid changes in ICTs have confronted both scholars and policy makers with the most complex and unpredictable information landscape that can only be mapped on an ad hoc basis. And, the rate of conceptualization cannot cope with the rapid emergence of new technologies whose features and functions must be learned before they are clarified. (p. 16).

Gil-Garcia (2004) referred to challenges in ICT regulation thus: “Information Technologies change very quickly, and are in constant development and improvement with policy guidelines and research findings today might be history tomorrow” (p. 559). Ultimately, “…policy development regarding the ‘information age’ has been a piecemeal effort, generally reactive to situations that have come to our attention” (U.S. Senate, 1986, p. 2).

Broadly, information policies developed by corporations, governments, and international organizations have over the years typically addressed issues related to freedom of information (FOI), privacy, data protection and security, freedom of official secrets, libraries and archives, economics of government publications, copyright and intellectual property, and patents (Braman, 2004, 2006; Castells, 1997, 1998, 2000; Cogburn, 2003; Daniel, 2000; Duff, 2001, 2004; Frohmann, 1995; Gil-Garcia, 2004; Hernon & Relyea, 1968; McClure, Hernon, & Railye, 1989; Maxwell, 2003, 2004; Moore, 1996; Shapiro & Varian, 1997; Webster, 2002, 2006). Other information policy concerns include telecommunication technologies, national information infrastructures, and international information flows or global information infrastructures.
Role of values in influencing information policies. The outlined areas addressed by information policies in the foregoing section raise policy problems, questions, concerns, conflicts, and issues that every so often, characterize information policy formation processes. Typically, information policy development does not exist in a vacuum, is not ahistorical, cannot exist outside of some exterior world, and is profoundly influenced by political, cultural, and economic factors. Correspondingly, “information policies are ideas translated into government actions that do not emerge ex nihilo, nor diffuse automatically. Rather, there must be vehicles for the creation and transmission of such ideas” (Galperin, 2004, p. 161). Information policy initiatives, therefore, are value-laden actions reflecting the political, economic, cultural, and social aspirations of individuals, communities, organizations, and states that develop and implement them (Kling, 1987; Moore, 1996).

Kluckhohn and Kroeber (1951) referred to values as shared principles, views of what is good, right, and important that guide members of a particular community, culture, or nation regarding what to prioritize and the actions to take. Rescher (1969) suggested that values guide societies and influence them on how to protect and perpetuate their shared experiences. Rein (1976) stated that “values comprise the normative propositions that affirm what the social policy of a given society ought to be and the normative moral assumptions that underlie present practices” (p. 38).

Value systems, therefore, are comprised of complex, and competing multiple interests that co-exist among individuals, groups, corporations, and polities with a potential for conflict in determining and prioritizing what is universally desirable (McClure, Hernon, & Railye, 1989).
Policy makers, therefore, are expected to balance competing values and interests of individuals to guide and regulate the production, management, use, and exchange of information for the advancement of society (McClure et al., 1989).

Moore (1996) and Overman and Cahill (1990) observed that since information policies embody values and interests of the people taking part in the process, every alternative action reflects a specific standpoint or ideology. Therefore, values held by individuals guide their attention, determine their positions, and influence their choices (Moore, 1996; Overman & Cahill, 1990). Because information policies provide a framework that profoundly affects how individuals or societies make political, economic, and social choices, they are a dynamic balancing act between conflicting public values and interests (Overman & Cahill, 1990). Thus, since information policy formation is “a political process dealing with problems and outcomes associated with value systems, there are no objective ‘truths’ in information policies,” (Rowlands, et al., 2002, p. 32).

Overman and Cahill (1990) suggested that balancing conflicting public values and interests are inherent features in information policy formation processes:

It is generally assumed that while freedom of information and open government are necessary for democracy, it is also known that national security and secrecy are also important; and while we generally believe that ownership of information and intellectual property are critical incentives for economic activity, we also feel that access to information and the public interest must still be guaranteed. (p. 803).

Whether the development of an information policy is for the regulation and use of information or for the adoption and use of a new technology, the process cannot be value neutral. Ultimately, value systems guide and are closely linked to the driving political forces behind an information policy development process (e.g., Klein & Hirschheim, 2001) as well as to their effects (Wilson & Howcroft, 2000). Thus, no information policy framework exists without integrating value
systems in its formation, implementation, and evaluation (Berger, 1993). The political ideology or orientation based on value systems that prevail in a given social context, has a direct bearing on the nature of information that is produced and consumed, how it is produced and the nature of ICTs used to produce them (Kling, 1999).

The development of information policies for the adoption and use of ICTs, logically, involves moral value judgments and decisions influenced by a given country’s cultural characteristics (Erumban and de Jong, 2006). An information policy formation process, thus, is an inevitable act of making social and technological choices based on value systems prevalent in a given locale (Kling, 1987), with value conflicts as part of the development process (Allen, 2005; Kling and Iacono, 1996).

Logically, as Castells (1998), Moore (1996), and Shapiro and Varian (1997) suggested, information policies in capitalist states are based on neo-liberal economic philosophies that emphasize market-led solutions, exploiting private capital to maximize profit:

Nations in the G8 category, countries in the European Union and Western-oriented economies such as Australia pursue information policies where governments assume a role of a facilitator and only intervene in policy implementation when fair dealing or public interests are threatened by market forces. (p. 280).

Reinforcing the neo-liberal economic orientation as a foundation on which information policies in capitalist states are constructed, Shapiro and Varian (1997) stated that government information policies that aim to adopt or implement ICT projects for which aggregate costs exceed aggregate benefits should not be adopted. Alternatively, “ICT-based projects for which aggregate benefits exceed aggregate costs are candidates for adoption, if a compelling case can be made about why the private sector will not undertake such projects” (Shapiro & Varian, 1997, p. 28).
On the contrary, socialist countries or states that pursue mixed or planned economic strategies, such as those in East Asia, develop information policies for the adoption and use of ICTs “with a strong emphasis on a holistic approach that seeks to ensure social stability and cohesion” (Moore, 1996, p. 280). Such information policies, based on a “humanist model, aim to use ICTs to stimulate social change and economic growth for all citizens as the case is in South Korea, Singapore, Thailand, and Malaysia” (Moore, 1996, p. 280). These countries draw from political, social, and cultural value systems that emphasize universal or collective welfare instead of individualism (Moore, 1996). In such contexts, information policies are government-driven with huge investments in information infrastructure development, training, and mobilization of the population to use ICTs to participate in the information economy (Moore, 1996).

In communist countries, such as Cuba, China, Burma (Myanmar), and North Korea, information policies are more restrictive in their manifestation ostensibly for security reasons (Castells, 1998; Moore, 1996). Other grounds used to restrict information policies include the preservation of the sanctity of the state and for the protection of the population from dangerous foreign influences (Castells, 1998; Moore, 1996). Except for China, which selectively pursues neo-liberal economic policies in some major cities in the country, information policies in the other communist states strictly limit access and use of information by their citizens (Moore, 1996).

ICT-inspired information policies. While ICTs were not considered to sufficiently provide all solutions to economic development, they were regarded as necessary tools for economic development and material well-being of countries, a reality that, since the 1990s, compelled policy makers around the world to consider the ICT sector as a fundamental part of their national policies (Castells, 1999). The dominant motivation factors behind the development
of information policies to promote the use of ICTs can be attributed to the emergence of computer networks as focal points around which most human activities revolved. This resulted in “the entire realm of human activity depending on the power of information, in a sequential of technological innovation that rapidly accelerated its pace” (Castells, 1999, p. 2).

Whereas the emergence and convergence of computer and telecommunication technologies have been major catalysts in the development of information policies to harness opportunities offered by the new ICT-driven global environment and while motivations for developing such information policies differed from one context to another, the overriding goals, especially for government-supported ICT policies, are remarkably similar (Moore, 1996). Most governments, especially in the wake of the ICT-driven global economy, generally pursue three major information policy goals to transform their countries into information societies (Moore, 1996). Moore (1996) stated that the first information policy goal for the adoption of ICTs is to:

Improve and provide education and training opportunities for all citizens to attain basic information and technology skills, to encourage and promote life-long learning as a precursor to a harmonious and cohesive cultural ecology of the information society, to bridge the digital divide, and to equitably distribute the economic benefits to all sections of the population. (p. 276).

This policy goal also aims to reduce levels of crime and to foster and protect racial and religious harmony (Moore, 1996). The second information policy goal is geared towards the “promotion of commercial and industrial competitiveness and productivity through the use of information for innovations, to invest in e-government programs, and to encourage private organizations to automate their operations to improve the skills of their workforce” (Moore, 1996, p. 276). The third goal aims:

To develop a National Information Infrastructure to provide cheap and efficient National information infrastructure to enable universal access and use of networks by individuals and organizations to communicate with one another, innovate, and to expand the capacity
to accommodate the ever larger flows of digital information within and from outside the country. (Moore, 1996, p. 277).

Moore also suggested that information policies “tend to enhance and strengthen the home culture and, wherever possible, promulgate it elsewhere. ICT-driven information policies also need to address a wide range of social, political and cultural issues in ways that both accommodate and facilitate economic change,” (p. 283).

However, regarding national information policy formation processes for the adoption and use of OSS, there is little empirical and theoretical based research on countries around the world. While OSS has been described not only as a new transformative technology but also as a global movement (Krishnamurthy, 2003), little systematic information exists about differences or similarities in adoption rates or processes across countries. Equally, a dearth of theoretically-based research on the adoption of OSS in the information policy context is evident.

For example, the OSS literature highlighted the adoption of Linux servers across cultures (Pykalainen, 2008) and described the relevance of culture in the adoption of OSS or in the innovativeness of a country (Erumban & Jong, 2006). The research also illuminated the effects of gender and power distance on the adoption of OSS among communities of users and developers (Pykäläinen & Fang, 2007), and the impact of geographical factors on the diffusion and adoption of OSS (Gallego, Luna, & Bueno, 2008).

However, the absence of theoretically grounded studies on the adoption, diffusion, and use of OSS in the information policy discipline is apparent. Recognizing, therefore, the absence of such research, the subsequent sections present reviews of empirically and theoretically based interdisciplinary studies illuminating the adoption and use of ICTs to lend relevant insights toward the formation of an information policy for the adoption, diffusion, and use of OSS.
Use of Stakeholder Theory (ST) in ICT Adoption Research

Developed in organizational management and business ethics, ST provides a systematic mechanism for identifying, describing, categorizing, analyzing, and understanding multiple stakeholders and their interests in a given endeavor (Donaldson & Preston, 1995; Freeman, 1984; Mitchell et al., 1997; Robert & Freeman, 2003). Stakeholders are individuals or organizations (entities) that can affect or are affected by the initiation, implementation, and completion of an endeavor or project (Burgoyne, 1994; Donaldson & Preston, 1995; Freeman, 1984; Grimble & Wellard, 1997; Mitchell et al., 1997; Overseas Development Agency {ODA}, 1995; Robert & Freeman, 2003).

The ST offers a mechanism of identifying, describing, categorizing, analyzing, and understanding stakeholders based on their attributes (Freeman, 1984). Subjecting stakeholders to a systematic examination using stakeholder attributes, such as interests, importance, influence, resources, power, legitimacy, affiliations, and salience, contributes towards an understanding of stakeholder behaviors to better design strategies and techniques to communicate with them as well as manage and appropriately respond to their multiple interests (Donaldson & Preston, 1995; Freeman, 1984; Mitchell et al., 1997; Robert & Freeman, 2003). Typically, through stakeholder attributes, the various types of stakeholders: primary, secondary, and key stakeholders involved in an endeavor, are identified. Stakeholder attributes also facilitate the identification and description of an interest category into which stakeholder(s) may fall.

In ST, primary stakeholders refer to the formal and influential members of a coalition, firm, project or organization who have a strong claim or stake in an endeavor and render their support, time, and all forms of resources for its success to benefit them (Burgoyne, 1994; Donaldson et al., 1995; Freeman, 1984; Grimble et al., 1997; Mitchell et al., 1997; Robert et al.,
Failure of an endeavor to attain its goal would translate into losses that would negatively affect primary stakeholders (Donaldson et al., 1995; Freeman 1984; Grimble et al., 1997). Examples of primary stakeholders may be policy promoters and defenders, executives or managers of an organization, targeted beneficiaries, and any other entities whose interests would be directly impacted, negatively or positively, by the success or failure of a given undertaking (Donaldson et al., 1995; Freeman 1984; Grimble et al., 1997).

Secondary stakeholders are individuals or entities that are not directly involved in the implementation of an endeavor but their environment may either affect or be affected positively or negatively by the undertaking (Burgoyne, 1994; Donaldson et al., 1995; Freeman, 1984; Grimble et al., 1997; Mitchell et al., 1997; Robert et al., 2003). Their participation or failure to participate in activities of an undertaking may not affect the existence or survival of such an undertaking as a going concern (Donaldson et al., 1995; Freeman, 1984; Grimble et al., 1997). Examples of secondary stakeholders may include most shareholders in a company, some members of the community, and government departments that are least affected by the activities of an organization or endeavor (Freeman, 1984; Freeman et al., 2004; Grimble et al., 1995; Mitchell et al., 1997).

Key stakeholders are individuals or entities that may belong to either or neither of the supporters or opposers of a policy initiative and can have a positive or negative effect on an effort (ODA, 1995; Rabinowitz, 2012; World Bank Group, 2012). Key stakeholders may be important within or to an organization, agency, or institution engaged in an effort and typically wield power, influence, importance, and resources that may shape the outcomes of a given endeavor (ODA, 1995; Rabinowitz, 2012; World Bank Group, 2012). The ST also provides mechanisms to describe and understand stakeholders’ affiliations or associations and
communication behaviors to clarify how their decisions are influenced, how they may influence other stakeholders, and how external environmental factors enhance or undermine their interests in an undertaking (Freeman et al., 2004; Grimble et al., 1995; Mitchell et al., 1997). Closely linked to stakeholder affiliations or associations are their respective relationships, their communication behaviors, decision-making processes, and conflict resolution strategies (Donaldson et al., 1995; Freeman, 1984; Grimble et al., 1997; Mitchell et al., 1997; Robert et al., 2003).

Another key concept of ST is stakeholder salience, which refers to “the degree to which managers or promoters of an endeavor give priority to competing stakeholder claims or interests” (Mitchell et al., 1997, p. 854). Where some stakeholders wield more influence and power than others (inequality) and more attention is given to managing or negotiating their interests in an organization or endeavor, then, they have more salience than others (Chung et al., 2009; Downing, Boyle, Brinner, & Osheroff, 2010; Fraas, 2010; Garcia, Robert, & Estrin, 2004; Milewa, 2008; Mitchell et al., 1997; ODA, 1995; Ramírez, 1999).

In policy formation processes for ICT adoption in particular, application of ST concepts help to identify, describe, categorize, analyze, and understand how stakeholders communicate, negotiate, forge alliances, trade off some of their interests, and move toward a consensus (Grimble et al., 1997; ODA, 1995; Rabinowitz, 2012; Ramírez, 1999; World Bank Group, 2012). ST has also proved versatile in informing stakeholder views about adoption of new technologies and in offering insights into complexities associated with relationships between stakeholder groups in diverse social contexts (O’Reilly & Paper, 2009; Pan, 2009; Ross, Weijer, Gafni, Ducey, Thompson, & Lafreniere, 2010; Wilson, 2002).
O’Reilly et al. (2009), Rabinowitz (2012), Ramírez, (1999), and World Bank Group (2012) suggested that ST iteratively and thoroughly considers and explains views, perceptions, values, interests, attitudes, power relationships, and influence of all stakeholders involved in the design, development, delivery, and adoption of any policy or technology. Within franchised network studies, for example, ST offered practical pathways towards the development of momentum for negotiations, trade-offs, conflict resolution, and fostered consensus in the adoption of new policies and ICTs (O’Reilly et al., 2009). The adoption of the electronic customer relationship management (ECRM) system was informed by, and modeled around key concepts of ST, such as attributes, values, influence, power, legitimacy, and salience of associated stakeholders, to ensure its implementation (O’Reilly et al., 2009).

Researchers on the adoption and use of computer technologies found that using ST facilitated a balancing act or equilibrium between human and computer interaction, how the technology was controlled, how its social effects on key stakeholders were leveraged, and how the interests and expectations of stakeholders were managed (Dalbello, 2005a, 2005b; Freeman et al., 2004). Recognizing, as well, that policy decisions or indeed the adoption of new ICTs may affect one or more of stakeholder groups, ST explicitly acknowledges the role of values in policy formation processes and business decisions (Chung et al., 2009; Dalbello, 2005a, 2005b; Freeman et al., 2004). Used in all contexts, ST effectively facilitates a process of “how people create value for each other” to ensure effective adoption of ICTs (Freeman, 2007, p. 10).

Donaldson (2007) suggested that processes that aim at introducing and using new technologies or for the adoption of a new policy or project, should first gain an understanding of the desires and expectations of each stakeholder group as a starting point. What is at stake is not only software and systems adoption and use but a thoughtful and thorough integration of
stakeholder interests and values with the technological components of the system to nurture and strengthen the commitment of all stakeholders to the technology or policy initiative (Donaldson, 2007). The ST, therefore, offers profound insights that “maximize all channels of communication between and among stakeholder groups involved in an endeavor such as developing a policy, implementing a project, or promoting a new technology in a given context” (Donaldson, 2007, p. 18). “A component in isolation is unlikely to fully maximize benefits and effectively inform across channels and stakeholder groups” (Donaldson, 2007, p. 18).

Applied in health care environments to inform and facilitate a harmonious adoption and use of ICTs, Hedstrom (2007) found that ST “enhanced the description, understanding, and reconciliation of multiple and competing stakeholder values such as administration values, integration values, care values, and professional values” (p. 77). Hedstrom (2007) found that the application of ST in the adoption and use of ICT in health care facilities resulted in increased information sharing and security, reduced costs, improved care services, increased understanding of other professional groups, increased interaction between health care seekers and care professionals, and enhanced the roles and visibility of care givers” (p. 80).

Wilson and Pollard (2009) stated that for effective adoption and governance of information technology (IT), the application of ST concepts help to develop a horizontal communication model in an organization to harmonize the history of the entity and to motivate and inspire staff and other stakeholders to win their support and loyalty. In addition, ST concepts enable the leadership to become “visionary enough to share the organizational ideals, consider and integrate the needs of the different stakeholders, organizational structures, recognize, include, and retain tacit knowledge into IT governance structures, communicate, and co-location between business and IT” (Wilson et al., 2009, p. 104).
Since ST offers a broad conceptualization of numerous stakeholders involved in an endeavor, this study adopted concepts from the theory to identify, describe, categorize, analyze, and understand the various actors engaged in the OSS policy formation for Uganda. This study also used the selected concepts of ST to highlight the unique and idiosyncratic antecedents and inherent dynamics which constitute the formation stage of an information policy for the adoption of OSS in Uganda.

Besides the use of ST across disciplinary boundaries, a stakeholder analysis (SA) methodology was developed in management and business sciences to systematically identify, describe, and understand stakeholders and their respective groups (Engel, 1997; Freeman, 1984; Freeman et al., 1987; Mitchell et al., 1997). The SA methodology has since evolved into a robust tool of analysis in such fields as economics, political science, game and decision theory, environmental sciences, public policy, and others (Freeman et al., 1987; Mitchell et al., 1997). Freeman (1984), Freeman et al. (1987), and Mitchell, et al. (1997) stated that SA enables a clear description and illumination of stakeholder perceptions or positions, their diverse interests, roles, legitimacy, salience, and their power and influence to facilitate a well-informed and accommodative policy formation process.

Grimble et al. (1997) stated that SA is useful in creating a “thorough understanding of stakeholders’ communication and conflict resolution behaviors and their association with external environments to develop strategic actions to manage their relationships, build consensus, and foundation to organize and launch a policy agenda” (p. 178). Underlining the value of SA in qualitative research, Burgoyne (1994) stated that the strength of stakeholder analysis lies in its techniques to interpret and create holistic awareness about complex processes or turbulent situations to competently negotiate them for positive and sustainable outcomes.
The SA methodology offers insights into institutional and policy reform processes by accounting for and often including the needs or stakes of those with vested interests in the policy agenda under consideration (Burgoyne, 1994; Grimble et al., 1997; Overseas Development Agency (ODA), 1995; World Bank Group, 2001). Stakeholder analysis, therefore, “provides a detailed understanding of the political, economic, and social impact of reform on interested groups, the hierarchy of authority and power among different groups and the actual perceptions of the policy among them, important elements for policy advocates to consider” (World Bank Group, 2001, p. 3).

Burgoyne (1994), Freeman, et al. (1987), Grimble, et al. (1994), Grimble, et al. (1995), Grimble et al. (1995), Grimble et al. (1997), ODA (1995), and World Bank Group (2001, 2012) stated that for SA to be useful, it should precede the onset of the formal presentation of a policy proposal for discussion, adoption, and implementation. This exploratory study, based on a qualitative or naturalistic research design adopted the SA methodology to identify, describe, categorize, understand, and develop a strategy to potentially manage stakeholders relationships to purposely advance the formation process of an information policy for the formal recognition and adoption of OSS in Uganda.

Use of Frame Theory in ICT Adoption Research

Despite its holistic approach to the study and understanding of information policy formation processes, frame theory has received insufficient attention in applied information policy (IP) research since its extension into the discipline in 1998. Basic IP research that extended frame theory into the discipline suggested that analyzing and understanding the thinking (frames) of people who initiate and create policies and the social contexts that shape their perceptions help to gain a thorough understanding of how values influence and shape policy
processes, especially the early stages of problem identification and agenda formation (Rowlands, 1998; Rowlands et al., 2002).

Frames are mental structures used by individuals to select, interpret, emphasize, organize, and present their perceptions based on their social experiences (Goffman, 1974). Frames guide and reflect the social reality about what exists, what happens, and what matters to individuals (Goffman, 1974). In IP research, frames are conceptualized as sets of values and concepts that individuals use to interpret and understand the dynamic and complex policy environments around them (Rowlands, 1998; Rowlands et al., 2002). Individuals also use frames as a basis to initiate, support, or oppose a given policy initiative (Rowlands, 1998; Rowlands et al., 2002).

In information policy formation processes, application of frame theory facilitates an understanding of peoples’ value systems and how they use them to make sense of their environments and how different people view and interpret the same social phenomenon quite differently (Rowlands, 1998). Rowlands et al. (2002) stated that while reality exists, it may not be fully explained or understood without considering the value system in the social context from which it emerges.

Rowlands et al. (2002) suggested that understanding frames through which people’s values are expressed, “…is fundamental to the way that information policy problems and dilemmas are perceived, and, more urgently, how problems are screened and represented by different stakeholders” (p. 32). Corresponding to ST in underlining the intrinsic association between value systems and policy development processes for the adoption of ICTs, frame theory shifts the understanding of underlying interests in information policy development from a reductionist paradigm to a more value-based perspective (Moore, 1996; Rowlands et al., 2002).
A reductionist paradigm only focuses on the technological aspects of an ICT rather than pursuing a holistic and more value-based perspective that takes into account all nuances associated with the adoption of an ICT in a given social context (Moore, 1996; Rowlands, 1999; Rowlands et al., 2002). The value-oriented approach “…considers and explains the influence of the technological, political-economy forces and the humanist or user-oriented factors in policy formation processes for the adoption of any ICT” (Rowlands et al., 2002, p. 32).

Given the “rate of change and the unpredictability of the applicability and effects of ICTs in the burgeoning information society, frames offer insights into the interactive human and social dimensions to policy formation processes for the adoption of ICTs” (Rowlands et al., 2002, p. 37). Frames politicize the discussion of information policy problems by relating policy outcomes to the role of value systems in information policy processes, reject deterministic tendencies, and ensure the possibility of changing and improving policy development processes and goals (Bawden, 1997; Moore, 1996).

Castells (1998), Chang (1995), and Rowlands et al. (2002) suggested that since elements of the information society such as the adoption and use of ICTs, patents, democracy, global networks transmitting culture, power, information, and images, knowledge, prosperity, the right to know, copyright, and fair dealing are perceived differently in various social contexts, they should be elaborated on the basis of the perceptions grounded in the unique cultural values of a given society. Since frame theory accounts for all idiosyncrasies in an information formation process and offers a holistic and clear understanding of how national information policies are initiated, formulated, and adopted (Rowlands et al., 2002), this study used frame theory to underline and understand the dynamics and complexities associated with the emerging information policy for the formal recognition and adoption of OSS in Uganda.
In addition to viewing information policy processes through frame theory, subjecting the proposed information policies to a frame analysis technique examines and helps to determine whether proposed policies are designed to promote the interests of users of information as citizens rather than as consumers (Rowlands et al., 2002). Frame analysis facilitates a distinction between market force interests and humanistic orientation toward the formation of an information policy process (Moore, 1996; Rowlands et al., 2002).

Frame analysis, also referred to as “framing analysis, is an active process that constantly questions how much framing goes on to better construct meanings from texts” (Reese, 2001, p. 7). Snow and Benford (1988) stated that frame analysis emphasizes reflexive aspects of social life—that is, the ways in which people think about what they do, and how such thinking (frames) affect their performances. Frame analysis enables the identification of frames, embedded structures in individuals’ narratives on which views, beliefs, or ideologies on any social experience are based (Benford et al., 2000; Reese, 2001; Rowlands et al., 2002).

Applied in IP studies, frame analysis, a value-centered approach to information policy processes for the adoption of rapidly changing ICTs, contributes to a clear understanding of the complex social factors associated with their adoption and use (Moore, 1996; Rowlands et al., 2002).

Use of New Institutionalism Theory in ICT Adoption Research

The new institutionalism theory, a meta theory grounded in the pragmatist tradition, offers a fairly wide scope of analyzing and understanding questions and issues in the IP discipline with perspectives on the adoption and use of rapidly changing ICTs and how they impact communities in burgeoning global information societies (Galperin, 2004). The theory
highlights three theoretical approaches: the ideological approach, the interest-group approach, and the technology-centered approach (Galperin, 2004).

Focusing specifically on the ideological approach adopted by this study, the new institutionalism theory views information policies as complex and thoroughly moderated processes influenced by ideologies (value orientations or thinking) shaped through economic, social, cultural, and political experiences or preferences of individuals, organizations, governments, nongovernmental and global institutions (Galperin, 2004).

Information policies, therefore, should be viewed, explained, and understood based on the ideological orientations of their promoters and institutions in collaboration with policy makers (Galperin, 2004). “Since ideologies that influence information policies do not emerge nor diffuse automatically, there must be vehicles (individuals or institutions) that create and transmit these ideas” (Galperin, 2004, p. 161). Oftentimes, ideological preferences espoused by interest groups and institutions are initiated and diffused by organized groups and institutions, such as professional associations, political parties, corporations, think tanks, civil society organizations, and universities (Galperin, 2004).

Galperin (2004) suggested that viewing information policy formation processes for the adoption of ICTs through the ideological approach, information policy questions and issues are better described, analyzed, and understood as translations of ideas into policies that serve to consolidate and perpetuate the ideology of dominant social groups and institutions. In the wake of the widespread adoption and use of ICTs by governments and corporate entities, the new institutionalism theory has been used to inform and guide research to create understanding about the role played by ideological orientations of institutional entrepreneurs in bringing about
institutional changes through negotiations between various actors in organizations and national states (Galperin, 2004; Lyu, 2007; Mundkur & Venkatesh, 2009; Vishwanath & Chen, 2008).

Using the new institutionalism theory, Lyu (2007) suggested that pragmatic, astute, and ideologically driven institutional entrepreneurs seeking to promote the use of ICTs or to enhance public participation in e-government activities must mobilize all institutional components including individuals for maximum effect. “Efforts to increase public’s e-participation in electronic democratic initiatives would be most effectively directed toward targeting individuals and institutions equally to support e-participation” (p. 66).

The value of the new institutionalism theory lies in its clear identification and unambiguous depiction of champions of e-government and strong supporters of ICT adoption in institutions as ideologically driven individuals seeking to transform their environments (Criado, 2009; Knutsena & Lyytinen, 2008; Mundkur & Venkatesh, 2009). From an ideological approach, Mundkur et al. (2009) suggested that advocates of ICT adoption in any social context should be viewed “not as disinterested altruistic agents of greater systemic effectiveness or efficiency but whose advocacy of institutional change is inseparable from their own particular material and ideological interests” (p. 27).

Adherents to the new institutionalism theory suggested that since there is a normative influence within the culture of a given society, (i.e., ideological interests, group interests, and technological interests), that normative influence should be analyzed, understood, and strategically harnessed to effectively shape the utilization of a specific technology for the performance of a specific function (Criado, 2009; Galperin, 2004; Lyu, 2007; Mundkur et al., 2009; Vishwanath et al., 2008; Wang et al., 2008). This study used the ideological approach from the new institutionalism theory to underscore the unique and idiosyncratic antecedents and
the contradictory perspectives associated with the evolving information policy for the adoption of OSS in Uganda.

Use of SCOT Theory in ICT Adoption Research

The social construction of technology (SCOT) theory suggests that the adoption, diffusion, and use of a new technology do not occur automatically but through “interplay between the social, the economic, the technical, the scientific, and the political forces in a given social context” (Bijker, 1995, p. 13). SCOT also diminishes assumptions about meanings and utilities of a technological artifact and suggests that they are derived through an interpretive flexibility, a socially constructed process of assessments and outcomes emerging from a dynamic social process involving various actors (Bijker, Hughes, & Pinch, 1987; Pinch & Bijker, 1984, 1986).

Interpretive flexibility, a key concept of SCOT, recognizes that decisive outcomes on the meanings, adoption, diffusion, and use of a technological artifact are not based on deterministic narratives but are products or outcomes of protracted and fluid intergroup negotiations based on their perceptions about a given artifact (Bijker, 1995; Pinch & Bijker, 1986). In addition, through the concept of technological frames, SCOT suggests the inclusion of all elements that influence the interactions within relevant social groups that facilitate “the attribution of meanings to technical artifacts that constitute a technology” (Bijker, 1995, p. 123).

Bijker (1995) considered a technological frame as a fusion and an illumination of cognitive, social, and material elements, such as goals, problems, practices, design methods, and the artifacts themselves. In information policy formation processes, technological frames and interpretive flexibility concepts are useful in describing and understanding the dynamic relationship between individuals, relevant social groups, institutions, their negotiated meanings
attributed to a technological artifact and an emerging information policy initiative (Kling, 1987, 1999).

A growing body of research has applied the SCOT theory to create understanding of how communities or relevant social groups negotiate and assign meanings and adopt technologies to suit their specific needs, contexts, and environments. The SCOT theory, developed in the mid-1980s, has over the years emerged as an alternative to both the traditional systematic and user-centered frameworks used to explain technology developments (Bijker, 1995; Bijker, Hughes, & Pinch, 1987; Bijker, & Law, 1994; Kling, 1987, 1999).

Bijker (1995) and Kling (1987) suggested that developing and assigning meanings to ICTs was an ongoing social and political process. SCOT views “technological developments as a process of negotiation, where different relevant groups with different interests and values influence and impact the development and change of technologies” (Bijker, 1995, p. 24). SCOT offers a clear pathway to defining the interest groups by using the “technological frame concept as a denominator” (Bijker, 1995, p. 123). A technological frame structures the interaction between the different members or individuals in a group and includes the elements that create members’ perceptions of the artifact (Bijker & Law, 1994; Law & Bijker, 1992; Orlikowski & Baroudi, 1991; Orlikowski & Gash, 1994). Elements that can be included in a technological frame are goals, key problems, problem-solving strategies, artifacts, and current perceptions or theories (Bijker, 1995).

The adoption and use of any ICT is a result of a process of negotiation, where associated and diverse relevant social groups (Bijker, 1995) hold and promote various, and sometimes, conflicting values to influence the design, use, and evaluation of an ICT. During the development process, group values are exposed to negotiations, where some values become
accepted as part of the new ICT policy, while others are excluded (Bijker, 1995). Bijker (1995) and Kling (1987) observed that a social constructivist approach is ideal for examining the development, adoption, and use of ICTs because it can accommodate the multiple conceptions of ICTs held by the various relevant groups, and thus help explain the often confusing responses to traditional evaluation techniques.

Rather than focusing on whether these conceptions are inherently true or false, the social constructivist approach encourages researchers to situate them in the context of each group, and concentrate on how members of the group negotiate these conceptions (Bijker, 1995; Kling, 1987). Kling (1987) stated that the development of processes to adopt and use ICTs should be viewed and understood as an intrinsically social activity influenced by peoples’ values and interests. The adoption of new ICTs are, therefore, socio-political processes (Kling, 1987), that include developing, implementing, as well as using ICTs (Kling and Iacono, 1996).

Social influences on technology-related attitudes and behavior by social groups strongly influence the extent to which such groups interpret, understand, use, and commit themselves to a new technology (Fulk, 1993). While technologies should be embraced as enabling tools, “they have to be shaped as part of larger socio-technical systems to yield the anticipated benefits” (Fulk, 1993, p. 921). As a useful analytical approach, SCOT accounts for multiple ‘branches’ of a technology coexisting to meet the needs and interpretations of diverse social groups (Day & Schuler, 2004; Kilker & Gay, 1998; Kling, 1987; Shin, 2007, 2008; Vishwanath & Chen, 2008). Kilker and Gay (1998) stated that:

SCOT enhances the examination of varied conceptions held by these relevant social groups involved in a technology’s development, and then follows the social construction of each group’s technology to examine how it engages in flexible negotiations to interpret and understand the meaning of a technology and how it reaches closure, that is, how it is conceptually frozen in the view of that group and then across multiple groups. (p. 60).
Using concepts of SCOT theory to study national information infrastructures and community-based ICT projects in diverse social contexts, Shin (2006, 2007, and 2008) concluded that if societal and culturally specific input into ICT infrastructure development is overlooked, such technologies eventually become white elephants and prone to collapse. Shin suggested that elitist, economic, and political preferences and interests of powerful social groups should not replace societal participation in the conceptualization, development, ownership, and evaluation of national, organizational, or community ICT projects. In addition to ensuring that intermediation in developing community-based ICTs is integrated in projects, equal participation of all relevant social groups should not be limited to particular development stages but involved in the entire policy process including formation, implementation, and evaluation (Shin, 2006, 2007, 2008).

Further, Shin (2006, 2007, and 2008) stated that while the use of SCOT’s concept of interpretive flexibility facilitates the identification of participatory deficiencies in negotiating and assigning meanings to a technological artifact, it also offers insights through which corrective measures can be applied. As a useful systematic theory, SCOT ensures that the ownership and identity of interest groups are accounted for and determines whether “services, activities, functions, and processes of a technology are integrated in the goals, needs, and culture of the people involved” (Day & Schuler, 2004, p. 15). While “technological change is a social process; technologies can and do have social impacts, they are simultaneously social products that embody power relationships and social goals and structures” (Edwards, 1995, p. 260).

Applying the relevant social groups and interpretative flexibility concepts, Kilker and Gay (1998) evaluated the making of the American digital library process and found that technologies are embedded in complex social systems and are comprised of many interest
groups. Kilker and Gay (1998) suggested that enthusiasm of early users of digital technologies should go beyond the immature or initial outcomes and limited holdings to ensure a thorough grasp of what digital artifacts mean and their full benefit. The role of social interactions in the development of technologies and the inherent ambiguities of engineering design that are increasingly impacting the meaning and adoption of technologies are better described, analyzed, and understood through SCOT (Kilker & Gay, 1998).

Drawing from the SCOT theory, Haddon and Silverstone (1996) stated that processes and outcomes associated with the adoption of ICTs are “…rhetorical (i.e., symbolic) as well as social, political, and economic” (p. 49). Further, Haddon and Silverstone suggested that technologies, such as radios or computers, should be considered “…as if it were a text, whose final meaning (if there is one) is never predetermined nor prescribed, but rather evolves from specific historical, sociological situations” (p. 50). “Users or consumers are active, not passive, as they too participate in the creation of meanings for these texts” (Haddon & Silverstone, 1996, p. 59).

Building on that line of research, Mansello and Silverstone (1996) suggested that the process of creating meaning, designing, adopting, and implementing any ICT in all contexts is inherently turbulent, prone to conflict, and inequities. “Just as in any set of proximate relationships where people do not meet on equal terms, relevant social groups or entities do not meet on equal terms when they engage in framing, describing, and using electronic artifacts” (Mansello and Silverstone, 1996, p. 110).

Supporting the utility of SCOT in assigning meanings and understanding technological artifacts, Vishwanath and Chen (2008) suggested that the theory facilitates a clear illumination of the dynamic interplay between the spirit of the technology and the normative forces that act on
individuals within a culture to underline the extent to which each technology caters to a specific community and its needs. Through SCOT, “…the roles and associations between technologies and society are socially constructed and culturally specified” (Vishwanath & Chen, 2008, p. 1770).

Where, for example, relevant social groups, in a perfunctory manner, assign meanings to a technological artifact and adopt its use before it attains broad cultural acceptance and presence (unlike the bicycles or fluorescent lights described by Bijker, 1995), SCOT processes of closure and stabilization would remain incomplete and subject the artifact to reconsideration or rejection (Clement & Halonen, 1998).

Extending the SCOT theory to OSS development environments, Iivari (2010) stated that since OSS is perceived as texts written by the writer-developers, read by the reader-users, the development model is analogous to a repudiation of technological determinism and the highlighting of interpretive flexibility of technological artifacts (Bijker & Law, 1992; Pinch & Bijker, 1994). The SCOT theory also enhances self-identity, self-determination, and materialization (Iivari, 2010). Thus, the process for the adoption of a technology or the technology itself cannot be viewed as value neutral (Klein & Hirschheim, 2001; Mumford, 1981; Winner, 1999). Rather, such processes embody the values and interests of the people taking part in the adoption of the artifact.

The ultimate value of SCOT theory, therefore, lies in its reframing of the technological artifact in a given social context as much as in providing opportunities to groups to negotiate its meaning, understanding, use, and improvement (Bijker, 1995; Clement & Halonen, 1998; Kling, 1999). SCOT also indicates that during the adoption process for a new technological artifact, relevant groups are especially critical in their early encounters with the technology but soon
after, the most influential and powerful groups negotiate, compromise, exploit, and benefit (Bijker, 1995; Clement & Halonen, 1998; Kling, 1999; Shin, 2008; Vishwanath & Chen, 2008).

Kling (1999) suggested that through SCOT, “social-technical research becomes more formative in helping to shape the meaning, understanding, and design of new systems and services” (p. 62). Similarly, Kilker and Gay (1998) stated that meticulous application of SCOT concepts enable policymakers to determine what “…improvements in the quality of socio-economic and technically mediated lives might mean” (p. 226). For governments to adopt technologies, therefore, there should be interplay between the new technology and the cultural forces that act on individuals within a social context.

Thus, through SCOT theory, the negotiation of meanings assigned to OSS, the formation of policies to adopt and use OSS to bridge digital divides and leapfrog communities into the information society, should be viewed as an intrinsic social-technical activity influenced by peoples’ values and interests. This study used the selected concepts of SCOT to spotlight the unique and idiosyncratic antecedents and inherent dynamics constituting the formation stage of an information policy for the adoption of OSS in Uganda.

Use of the DOI Theory in ICT Adoption Research

The diffusion of innovation (DOI) theory suggests that the diffusion of an innovation or a new concept occurs when the adoption of an idea, practice, or object spreads by communication through a social system (Rogers, 1995; Rogers & Kincaid, 1981). The DOI theory examines and explains the communication flow of new ideas into a community and how targeted communities respond positively or negatively to the ideas disseminated to them through both formal and informal communication networks (Rogers, 1995).
The theory describes the importance of innovation pioneers who shape the meaning of the innovation or the new idea, initiate a communication process by using existing formal and informal communication networks to disseminate information and to talk to other people about the new idea (Rogers, 1995; Rogers & Kincaid, 1981). During the diffusion process, innovation pioneers articulate the relevance, simplicity, flexibility, and usefulness of the idea (Rogers, 1995; Rogers & Kincaid, 1981). Gradually, some people are persuaded to become early adopters and then more people adopt the innovation when they start observing its benefits to pioneers and early adopters until the rate of adoption increases and a critical mass is achieved before the process levels out (Rogers, 1995; Rogers & Kincaid, 1981).

The DOI theory also suggests that innovation champions or opinion leaders, who are key members of a society champion, support, and elevate the cause and profile of a new idea (Backer & Rogers, 1998; Rogers, 1995). Innovation champions or opinion leaders elevate the innovation to prominence on the public agenda, secure resources for its promotion in society, and eloquently articulate the politics of the innovation to positively influence public opinion to gain its acceptance and adoption (Backer & Rogers, 1998; Rogers, 1995).

In policy formation processes, especially for the adoption and use of a new ICT, innovation pioneers and champions play a pivotal role in gaining support and resources for a policy agenda for a new ICT (Howard, Anderson, Busch, & Nafus, 2009; Rogers, 1995; Wainwright & Waring, 2006). A considerable body of research on the adoption and use of ICTs has applied the DOI theory as a dominant approach to understand how societies diffused and adopted the technologies. Using the DOI theory, research suggested that most ideas about new ICTs are diffused through available communication networks to gain acceptability, adoption, use, or rejection (Howard et al., 2009; Minishi-Majanja & Kiplang’at, 2005; Rogers, 1995;
Rausa, Fluggeb, & Boutellier, 2009; Wainwright & Waring, 2006; Zhao, 2009). Thus, Dalbello
(2005a, 2005b), Howard et al. (2009), Minishi-Majanja et al. (2005), Rogers (1995), Rausa et al.
(2009), Wainwright and Waring (2006), and Zhao (2009) suggested that understanding issues
relating to socio-economics, human resources, politics and culture is critical to ensure successful
diffusion, adoption, and use of a new ICT in any social context.

Zhao (2009) observed that the diffusion and usage of ICTs, such as the Internet, in a
given locale is influenced by a combination of several factors including structural factors and
individual differences. “The information needs, conditioned by the modes of production,
influence individuals’ information seeking behaviors, which in turn affect adoption inclination
and intensive usage” (Zhao, 2009, p. 142). Studying the macro level of ICT adoption through the
application of the DOI theory, Wainwright and Waring (2006) found that diffusion of ICT
innovations is “politically constrained, perceived, and motivated within organizational
environments and could influence a degree of resilience” (p. 6).

Minishi-Majanja et al. (2005) found that because the diffusion arenas are volatile, they
are subject to political control and overlap with several institutional regimes with different
interest and going concerns. “The dynamics that constitute diffusion arenas can deeply shape the
direction and pace of diffusion processes for ICTs” (Minishi-Majanja et al., 2005, p. 223). To
effectively negotiate such volatile environments, innovation pioneers should endeavor to recruit
a champion of high social status to shape and spearhead a diffusion campaign that will bring
major political, financial, and social actors on board (Minishi-Majanja et al., 2005).

While DOI is appropriate for developing countries, researchers must refrain from
perceiving their reality through foreign concepts and ideologies because such a perception does
not enable them to get to the main issues affecting development (Rogers, 1995). Rather, focus
should be on equity issues instead of simply emphasizing the adoption and use of a new ICT (Rogers, 1995). Rogers (1995) observed that often, it is the socio-economic reality as well as other issues of finances, human resource capacity, politics and culture that have great influence on the diffusion of any innovation rather than the complexity of the new idea, artifact, or an ICT itself.

Howard et al. (2009) stated that DOI helps to benchmark the impact of variations of political culture, and allows a closer mapping of the particular impact of telecommunications policy reform on technology adoption in a country. Application of the DOI theory, thus, “offers mechanisms to innovation pioneers and investors in the ICT sector to identify roadblocks that may arise through the political culture of the country; the bureaucratic state can either enable or constrain technology adoption because in some countries, corruption sets up roadblocks with tolls!” (Howard et al., 2009, p. 214).

Similarly, Sagasti (2004) stated that since the spread of ICTs all over the world involves diffusion, absorption, and reinterpretation of new knowledge, the “…spread of technology involves interaction between the imported scientific knowledge and the traditional modes of speculative thought” (p. 2). Zhao (2009) and Wainwright and Waring (2006) suggested that if pioneers of a new ICT can win and receive the endorsement and support of a champion to articulate the politics and social meaning of the technology in addition to influencing the national agenda toward the formation of the relevant policy, the diffusion process gains momentum and favorable adoption conditions.

If a national or local technology innovation champion, a successful ICT startup, or a high profile policymaker champions a broadband initiative, it can mean the difference between having a pool of ICTs with a population of sophisticated ICT users and having neither of them. (Howard et al., 2009, p. 210).
Ultimately, the value of the DOI theory lies in facilitating understanding that the diffusion of a technology in a particular country often means explaining and reflecting social factors that make a country unique relative to its neighbors (Howard et al., 2009).

Furthermore, the relative importance of the political and cultural aspects of the diffusion of ICTs should be understood in order that cultural expectations become the basis, not only for what is adopted, but also for the rate at which diffusion and adoption take place (Howard et al., 2009). This study used the selected concepts of DOI to illuminate the unique and idiosyncratic antecedents and the inherent dynamics and complexities constituting the emerging information policy for the adoption of OSS in Uganda.

Convergence of concepts from the theoretical frameworks. From the foregoing review, it became increasingly evident that a convergence exists between the selected concepts from stakeholder, frame, new institutionalism, social construction of technology, and diffusion of innovation theories in informing, describing, analyzing, and facilitating the understanding of complex processes associated with the formation of policies for the adoption and use of ICTs in diverse social contexts. As mutually reinforcing theoretical frameworks, ST, frame theory, new institutionalism theory, SCOT theory, and DOI theory highlight the extent to which value systems influence perceptions, interests, and meanings individuals, social groups, institutions, and nations attach to an information policy formation process for the adoption, diffusion, and use of any technological artifact.

In frame theory, for example, individuals use frames, sets of values that shape their perceptions, to describe, analyze, understand, and assign meanings to an ICT as well as interpreting and understanding the dynamics and complexities associated with the formation of an information policy for the adoption of an ICT (Rowlands, 1999; Rowlands, et al., 2002).
Correspondingly, the technological frame concept from SCOT theory underlines the fusion of cognitive, cultural, social, and material values of social groups that facilitate “…the attribution of meanings to technical artifacts that constitute a technology” (Bijker, 1995, p. 123). Viewed through the convergence of concepts from frame and SCOT theories, information policy formation processes for the adoption of any new ICT, are framed and understood as socio-political processes influenced by peoples’ values and interests (Bijker, 1995; Kling, 1987; Rowlands et al., 2002).

The reciprocity between the new institutionalism and SCOT theories constructively reflects “…actions of institutional entrepreneurs as akin to bricolage—a reassembling and recombining of available cultural materials designed to garner support from ideologically heterogeneous social groups” (Mundkur et al., 2009, p. 28). Mundkur et al. (2009) suggested that research on ICT adoption or e-governance can optimally benefit from a diligent combination of concepts from ST, frame, SCOT, new institutionalism, and DOI theories to understand how institutional entrepreneurs strategically negotiate between heterogeneous groups, strike compromises, influence the development of ICT policies to guide the design, development, and use of technologies to realize structural transformations in governmental delivery of services.

The pragmatic application of key concepts offered by ST, SCOT, new institutionalism and DOI theories can effectively enhance the harmonization of “key institutional components e.g., various government departments as well as between governments and other stakeholders such as the private sector and civil society to allay their fears and cause the adoption of a new technology or e-government operation to promote accountability and transparency” (Mundkur et al., 2009, p. 28).
Following a similar pragmatic tradition, Criado (2009), Knutsena and Lyytinen (2008), and Vishwanath and Chen (2008) stated that complementary concepts from ST, SCOT, new institutionalism, and DOI theories, prudently applied, may yield a holistic understanding of how policies for the adoption and use of new ICTs evolve.

The prevalence of a technology is a function of historical factors such as the time of introduction of the technology, its rate of diffusion, the degree of innovativeness of the people, the economic and public policy of the nation, and the existence of supportive institutional mechanisms. (Vishwanath & Chen, 2008, p. 1772).

This study used the selected concepts from the five theories to complement each other in highlighting the unique and idiosyncratic antecedents and inherent dynamics that constitute the formation stage of an information policy for the adoption of OSS in Uganda. Given the foregoing review of theoretical frameworks that inform and enhance the understanding of the adoption, diffusion, and use of ICTs in any locale, the next section discusses information policies for the adoption and use of OSS by governments around the world.

**Government Information Policies for the Adoption of OSS**

A comprehensive review of all government OSS policy initiatives across the world facilitated by the Center for Strategic and International Studies indicated that OSS policies are divided into four categories (Lewis, 2008). These categories include research (where use of OSS is mostly for research purposes); mandates (where the use of OSS is required); preferences (where the use of OSS is given preference but not mandated); and advisory (where the use of OSS is permitted) (Lewis, 2008).

Out of the two hundred sixty-eight open source software policy initiatives reviewed, only six (3.4%) mandated the use of OSS, while a similar number recommended the use of OSS for research purposes. Lewis (2008) found that 56 policies (31.6%) required government entities to
show a preference for OSS in acquisition decisions. The study found that initiatives establishing a preference for the use of OSS were more likely to be approved at the regional or local level, while national level authorities were more likely to approve advisory initiatives for OSS (Lewis, 2008).

The study found that while the majority of approved initiatives in Europe and Asia involve research programs, the majority of approved initiatives in Latin America were found to mandate and prefer the use of OSS in government acquisitions. Lewis (2008) observed that changes in the software industry have affected OSS policies with many software companies creating new business models that blend proprietary and OSS development. The study concluded that the OSS debate is being subsumed into a search for business models that can profitably integrate open and proprietary processes and products (Lewis, 2008). While public adoption and advisory are the most common type of interventions in Europe, more and more developers are increasingly integrating the use of OSS alongside proprietary software with a gradual emergence of a hybrid model of the two technologies in the United States and several other contexts in developed countries (Lewis, 2008).

Most government policy initiatives for the adoption of OSS technology around the world have been influenced by political, economic, technical, and educational factors. The major goal driving most governments to adopt the use of OSS is to primarily bridge the digital divide, secure affordable technology, develop an e-government infrastructure that would engage the majority of their citizens in the governance of their countries, and enable them to participate in the burgeoning global economy (Ahmed, 2005; Altenhöner, 2005; Backus, 2001; Baguma, 2005; Camara & Fonseca, 2007; Comino et al., 2010; Ghosh, et al., 2002; Heeks, 2001, 2004; Hoepman
Since 2002, most European Union countries have developed information policy initiatives for the adoption of OSS to facilitate and promote e-government services and economic opportunities for their citizens (Comino, et al., 2010). The government of Venezuela, a developing country in South America, adopted an OSS policy to stimulate an appropriate, diversified, and inclusive ICT strategy that would reduce inequality, create and nurture a new generation of ICT workers, and enhance national security and autonomy (Maldonado, 2007). The Venezuela government OSS policy of 2002 was based on the principle: “Open Source whenever possible, proprietary software only when necessary because 75% of the funds for software licenses went to foreign nations, 20% to foreign support agencies and only 5% to Venezuelans” (Maldonado, 2007, p. 5).

In 2004, the government of Thailand adopted an OSS policy that aimed to have 5% of its computers running Linux as a pilot project before rolling out to other government departments (Camara & Fonsica, 2007). The 2003 government OSS policy in Pakistan mandated the Open Source Resource Center (OSRC), the vanguard of OSS promotion in Asia, to train programmers and users around the country (OSRC, 2007). By the end of 2004, the OSRC had trained over 8,900 programmers and users during 118 workshops and awareness-raising seminars (OSRC, 2007). While the adoption and use of OSS has met with some degree of success in countries such as Pakistan, Singapore, Malaysia, and Indonesia, the debate dominating the formation of OSS policy is whether to enforce common standards for business models that use a combination of proprietary and OSS or not (OSRC, 2007; Pakistan Software Export Board, 2008; Tan, 2005).
The government of South Africa was the first in Sub-Saharan Africa to adopt an OSS policy to promote the use of OSS to inspire the development of a dynamic ICT sector with an indigenous skills base (GITOC, 2003; Mtsweni & Biermann, 2008). The South African government also approved the implementation of an e-governance service using OSS applications to eliminate licensing and endless maintenance costs to realize improved returns on investments (Heeks, 2003).

Challenges to OSS policy initiatives in developing countries. In Sub-Saharan Africa, South Africa, based on the strength of its advanced national information infrastructure, has been the only country to develop and support an OSS policy to promote the use of OSS on servers and desktop environments in government departments and in the private sector (GITOC, 2003; Heeks, 2004; Mtsweni & Biermann, 2008). The government of Nigeria implemented an OSS-based e-governance service (a short messaging system to provide helpdesk functionality to residents of Lagos, the largest city in the country (Heeks, 2004). But the project was marred with regular breakdowns and a chronic lack of funding (Heeks, 2004). Recently, the government of Kenya adopted an OSS policy as an ICT strategy to enable its citizens to develop solutions to fairly compete with proprietary software in the country and in the region (Smith, 2012; The East African, 2013).

Across Africa, several governments have acquired and are using various OSS applications without the requisite information policy regimes to promote their use nationally or train manpower to maintain them (Bruggink, 2003). In many Sub-Saharan African countries, most OSS projects are implemented by international nongovernmental organizations (NGOs), universities and multinational corporations (Bruggink, 2003; Weddi, 2009). The few government departments in Africa that use OSS acquire the technology on the advice of foreign consultants.
who also recommend hiring foreign experts to maintain the technologies or repair the systems whenever they break down (Bruggink, 2003; Weddi, 2009).

Bruggink (2003) further stated that despite various benefits of OSS compared with proprietary software, it still faces social, political, economic and philosophical challenges in Africa. Heeks (2004) and Reijswoud and Topi (2003) suggested that even the few OSS projects implemented by government departments in Sub-Saharan Africa suffer regular failures because of the high and widespread apprehension of government bureaucrats towards the new OSS technology. The skepticism towards OSS initiatives is also compounded by the countries’ long association with commercial software whose acquisition comes with a warranty compared with the new OSS technology which lacks such a guarantee (Bruggink, 2003; Reijswoud & Topi, 2003).

In countries, such as Uganda, Tanzania, and Burkina Faso, such obstacles as limited availability of OSS products due to an absence of vendors, lack of specialized OSS technical support, and the costly and unreliable Internet connection, systematically inhibit the widespread adoption and use of OSS (Bruggink, 2003). In Burkina Faso, for example, research suggested that large hierarchical organizations are hesitant to use OSS and risk the wrath of a dominant organizational culture. Similarly, “widespread misconception persist that while the Linux operating system is the only real open source application, that type of software is less user-friendly than proprietary alternatives (Bruggink, 2003, p. 9).

Reijswoud and Topi (2003) observed that most governments in Africa are skeptical of OSS because they lack the expertise to develop and maintain OSS on top of having poor Internet connections that would engender real time collaboration with global OSS communities. In South Africa, although the OSS policy was adopted following the implementation of pilot projects in
government institutions, the implementation of the policy has largely failed because not all stakeholders were involved (Mtsweni & Biermann, 2008).

While the government of South Africa conducted several studies prior to the adoption of the OSS policy and found that OSS was a viable alternative to proprietary software, the lead government departments of communications and public service and administration were remarkably slow in implementing the OSS policy (Heeks, 2004; Mtsweni & Biermann, 2008). “Because the OSS policy was government-inspired and never involved all the key stakeholders, it failed to envisage, highlight or recommend suggestions to problems that would be encountered during the actual implementation of the OSS policy” (Mtsweni & Biermann, 2008, p. 978).

Recommendations for a strategic OSS policy formation process. Bureaucratic skepticism about the new OSS technology is not limited to Sub-Saharan Africa alone. Camara and Fonseca (2007) stated that in Brazil, where government ICT specialists share similar profiles with their counterparts in Europe, they exhibit a conservative trend that is reflected in their reluctance to change and adopt the use of OSS. The researchers suggested that if the conservative approach to OSS is not changed in Brazil and in other developing countries through “direct intervention of governments to set up suitable information policies, OSS use will grow at the fringes of public and private companies and their core applications could remain based on proprietary software” (Camara & Fonseca, 2007, p. 123).

While government intervention to support the formation of strategic and inclusive information policies for the adoption of OSS could materialize, the need to generate “enough capital for a massive shift from one technology to another should be thoroughly considered and addressed” (Maldonado, 2007, p. 5). Of particular significance to developing countries, however, information policies for the adoption of OSS:
Should be viewed not only as a choice of software, but also as a means of acquiring knowledge; OSS has to be used as a way to gain knowledge about the technology itself and as a way of creating technology products that fit their specific needs. (Camara & Fonseca, 2007, p. 121).

Therefore, OSS should be regarded as a catalyst that plays a significant role in supporting development goals of developing countries to enhance the mastery of the technology of software development through harnessing local skills to create new products. Braa, Monteiro, and Sahay (2004) recommended that information policies for the adoption and use of OSS in developing countries need to rely on a thorough understanding of the knowledge embedded in the new OSS technology to ensure sustainability. Braa, et al. (2004) suggested that sustaining the new OSS technology should also include practical skills to develop, repair, and maintain OSS technology in addition to ensuring that expertise to migrate and interoperate OSS with other technologies is harnessed.

Sustainability is the challenge to make an information system work, in practice, over time, in a local setting, involving shaping and adapting the systems to a given context, cultivating local learning processes, and institutionalizing routines of use that persist over time. (Braa et al., 2004, p. 338).

Reed (2000) suggested that new technologies respect and preserve indigenous knowledge and techniques and that technologies have to be well chosen to meet social and human development goals of countries lest the new knowledge exacerbates the hitherto alarming levels of exclusion and inequality. However, “while the adoption of OSS by developing countries is not a silver bullet for longstanding development issues, its transformative potential of computing creates new opportunities to make progress on development problems that have been intransigent” (Reed, 2000, p. 254).
Furthermore, while OSS could facilitate the generation of new technologies and advance the ICT sector, most OSS policies tend to impose new and restrictive rules and practices in the software industry, a potential setback that should be resolved before any OSS policy or development model for software projects is adopted (Camara & Fonseca, 2007; Weber, 2004).

Similarly, because information on migrating from proprietary to OSS is hard to find in developing countries, the provision of specific tool kits with appropriate and relevant information on migration from proprietary software to OSS is necessary (Brugging, 2003). In addition, Wang et al. (2008) recommended that developing countries should strategically plan the adoption of OSS based on their domestic social capital:

To ensure adoption, optimization, and sustainability of OSS or any other technology, the planning of the adoption process should consider and strategically address three factors: Organizational factors or the adoption itself by governmental offices, economic factors or the response of the private sector to OSS, and the innovative factors of the proposed policies. (p. 324).

To better evaluate and understand the rationale, motivations and consequences of government interventions in information policy formation processes, a clear identification and description of the various roles played by policy makers, the diverse stakeholders, their interests, and the different categories of software involved should be illuminated (Comino et al., 2010). To that end, a review of the evolution of the ICT sector in Uganda to highlight the environment from which ICT stakeholders in the country proposed a policy for the adoption of OSS follows.

Evolution of the ICT Sector in Uganda

The evolution of the modern ICT sector in Uganda can be traced from 1986 when the current National Resistance Movement government captured power after a five-year guerilla war that ended nearly two decades of political instability and economic stagnation. The ICT sector, which by 1986 mainly encompassed ICT service activities dominated by state-owned agencies,
gradually opened up over the years to private sector investment (Ministry of ICT, 2006). However, as the case was in 1986, the nascent sector still comprises only services with no recognizable ICT manufacturing activities; practically all ICT products sold in the country are imported (Ministry of ICT, 2006).

Following the liberalization of Uganda’s economy in 1989, the first telecommunications company in East Africa, Celtel Uganda, was licensed in 1993 to provide mobile services in the country, making Uganda the first country to adopt telecommunication liberalization policies within the region (Lange, 2010; United Nations Development Program {UNDP}, 1998). In 1996, Uganda adopted a policy framework that liberalized the telecommunication sub-sector resulting in radical changes that gave birth to one of the most vibrant, dynamic and competitive as well as best regulated ICT sectors in Africa (International Monetary Fund {IMF}, 2008; Ministry of ICT, 2006; UNDP, 1998; World Bank, 2008).

The liberalization of the sector significantly reduced barriers to market entry, simplified, and consolidated the licensing regime, and increased competition (Lange, 2010). New players including the South African-based Mobile Telecommunications Network (MTN) in 1998, Uganda Telecom Limited (UTL) in 2001, the Middle-East-based Warid Telecom in 2008, and HITS Telecom, in which a French mobile company, Orange Telecom’s bought a majority stake in 2009, have since come on board (IMF, 2008; UNDP, 1998; Ministry of ICT, 2006; World Bank, 2008). The four telecommunications companies joined Celtel (now re-branded Zain/Bharti) which launched the first network in 1995 (IMF, 2008; Lange, 2010; Ministry of ICT, 2006; Mulira, Kyeyune, & Ndiwalana, 2010; UNDP, 1998; World Bank, 2008).

The liberalized ICT sector in Uganda intensified competition and resulted in accelerated subscriber growth, a price war and a fall of average revenue per user, and enabled Uganda’s ICT
sector to significantly impact the economy as it grew at a phenomenal rate with statistics indicating that telephony, data communication, and broadcasting expanded more than 50% between 1995 and 2004 (IMF, 2008; Lange, 2010; Ministry of ICT, 2006; Mulira et al., 2010; UNDP, 1998; World Bank, 2008). However, the major activities in the ICT industry still remain telecommunications, postal, and broadcasting services. These activities are predominantly in mobile devices, computer applications, information processing, storage, and dissemination with scattered Internet points of presence at district levels (Ministry of ICT, 2006).

As a result of its cross-cutting nature, the dynamic ICT sector played a pivotal role in employment, job creation, quality and efficiency in other service delivery, and significantly contributed to Uganda’s economy as one of the fastest and most consistently growing economies in Africa (IMF, 2008; UNDP, 1998; World Bank, 2008). Sector analysts suggested, for example, that with revenue from the telecom sector reaching 560 million dollars in 2009, contributing approximately 183 million dollars in tax revenue, and forecasting a Gross Domestic Product growth of between 6% and 8% annually for the next five years, the prospects for the continued growth for the sector are bright (IMF, 2008; World Bank, 2008).

The results of an attractive ICT environment were evidenced in more investments in the sector that enhanced broadband services in the country. In 2009, for example, the country’s national fiber backbone was connected to the global broadband network via three marine fiber optic cables straddling the East African coast (Lange, 2010; Mugabe, 2009b; Mulira et al., 2010; Schlindwein, 2010; Tentena, 2010; Wafula, 2010). The linking of Uganda to the three marine fiber optic cables: SEACOM, TEAMS, and the East African Submarines System, has since resulted in the provision of both inexpensive and high speed bandwidth between this previously
e-landlocked country to the rest of the world (Mugabe, 2009b; Lange, 2010; Mulira et al., 2010; Wafula, 2010; Tentena, 2010; Schlindwein, 2010).

The connection to several international submarine fiber-optic cable services that linked Africa to Europe and Asia via the Middle East marked a revolutionary transformation in Internet access and affordability to the previously e-landlocked Uganda, which depended entirely on the prohibitively expensive satellite technology for its international Internet connectivity (Lange, 2010; Mugabe, 2009b; Mulira et al., 2010; Schlindwein, 2010; Tentena, 2010; Wafula, 2010). The four telecommunication companies that originally provided Internet, voice, and digital data solutions were joined by multinational corporations and medium-sized Internet service providers to offer both fixed and wireless Internet services (Kulabako, 2009; Lange, 2010; Wafula, 2009).

The Worldwide Interoperability for Microwave Access and 3G mobile portable devices, fixed and wireless Internet service with wide network coverage and high bandwidth are now available in Uganda (Kulabako, 2009; Lange, 2010; Wafula, 2009). The service, now widely used on laptops and mobile phones irrespective of geographical location, facilitates data transfer and Voice Over Internet Protocol around the clock (Kulabako, 2009; Lange, 2010; Mulira et al., 2010; Schlindwein, 2010; Wafula, 2010). The addition of wireless technologies to the already fiercely competitive ICT market environment helped to bring the Internet within reach of a sizeable section of the elite population and dramatically contributed to a reduction in the cost of Internet services by 2010 (Lange, 2010; Mulira, et al., 2010).

The intense competition compelled telecom companies to become more innovative in generating and providing new ICT products such as mobile money transfer and mobile banking services to tap into the nearly 80% unbanked population around the country that also lacks Internet connection (Baguma, 2009; Kasita, 2009; Lange, 2010; Lyatuu, 2010; Mugabe, 2009a;
Muwanguzi & Musambira, 2011; Wakefield, 2010). On its part, the government has, since 2010, allocated funds to kick-start the business process outsourcing (BPO) segment of the ICT sector to help create jobs for the educated but largely unemployed youth and to tap into the lucrative global BPO revenue that is estimated at $160 billion, the bulk of which goes to India and the Philippines (Tentena, 2010; Wafula, 2010).

While the enabling legal and regulatory frameworks and other overarching policies, such as economic liberalization and privatization, are responsible for the positive indicators in Uganda’s ICT sector, its market penetration remains well below the African average requiring more investments in ICT infrastructure to ensure a wider coverage of the entire country (Lange, 2010; Ministry of ICT, 2006). For example, while the connection to the marine fiber optic cables could have been a windfall for the entire nation, the lack of basic infrastructure, such as a telephone cables network and electricity, means high speed Internet still remains out of reach for most Ugandans (Schlindwein, 2010). By the end of 2010, about 2.5 million Ugandans, out of an estimated population of 33 million, had access to the Internet (Bogere, 2010).

As a result, the government fast-tracked the construction of the multi-million dollar national data transmission backbone and the e-governance infrastructure to link the entire country to the Internet and to implement aspects of the e-governance project, such as video conferencing, between some of its agencies (Tentena, 2010). At the same time, telecom companies are investing heavily to upgrade and to build new infrastructure to cover the entire country (Lange, 2010; Ministry of ICT, 2006). The Ministry of ICT forecasts that the enhanced infrastructure will further transform the ICT environment and facilitate the diffusion of services for the transfer of converged voice, data and video/entertainment throughout Uganda.
Impact of policy and legal regime on ICT sector. While fiber, mobile broadband and mobile banking are revolutionizing Uganda’s telecom sector (Lange, 2010), the Uganda ICT sector has been greatly influenced by various policies, statutes, laws, acts, and regulations that were passed and enacted to help the country become one of the most investor-friendly ICT markets in the region (IMF, 2008; Ministry of ICT, 2006; UNDP, 1998; World Bank, 2008). Three major policy and regulatory frameworks have been responsible for facilitating and guiding the ICT sector to its current liberalized status that brought about a radical socio-techno transformation and impressive economic performance. The more relevant ICT-related policies are: 1) The Uganda Telecommunications Policy Framework (1996); 2) The Communications Act (1997; and 3) the National Information Technology Authority Act-Uganda {NITA-U}, 2009).

1). The Uganda Telecommunications Policy Framework, (1996). This policy framework liberalized the telecommunication subsector and resulted in radical changes that gave birth to a dynamic and fiercely competitive ICT service sector (Ministry of Works, Housing, and Telecommunications, 1997). The main objective of the policy was to increase the penetration and level of telecommunication services in the country through private sector investment rather than government intervention. The policy framework focused on the provision of infrastructure under minimum competition known as the exclusivity or duopoly licensing arrangement

This exclusivity or duopoly licensing arrangement referred to a minimum competition period during which two private telecommunications companies; Uganda Telecom Limited (UTL) and MTN Uganda Ltd., were offered incentives to invest in the ICT sector and provide telecommunications services for a period of five years without any competition (Ministry of Works, Housing, and Telecommunications, 1996, 1997). The five-year exclusivity or duopoly licensing arrangement started in July 2000 and ended in July 2005 (Ministry of ICT, 2006;
Ministry of Works, Housing, and Telecommunications, 1996, 1997). The Ministry of ICT (2006), which took over the supervisory role of the ICT sector from the Ministry of Works, Housing, and Telecommunications in 2006 reported that this limited competition (exclusivity or duopoly arrangement) was a key strategic pillar in the national ICT policy framework that attracted private sector investments in a small-sized market.

2). The Communications Act (1997), the Press and Journalist Act (1994), and the Electronic Media Act (1996). These three related statutory instruments resulted in the formation of the Uganda Communications Commission (UCC), the Media Council, and the Uganda Broadcasting Council. These three government agencies were charged with the task of jointly overseeing the regulatory functions and promotional developments of the ICT sector including telecommunications and postal services and the print and electronic media (Ministry of Works, Housing and Telecommunication, 1997; Broadcasting Council, 2000; Media Council, 2007).

The Ministry of ICT (2006) reported that the Uganda Communications Act (1997) provided for the restructuring of the communications industry in Uganda and authorized the Uganda Communication Commission (UCC) to regulate the telecommunication sector to license and guide operations of telecommunications companies in Uganda. The act also provided for incorporation of Uganda Telecom Limited and Uganda Post Limited. At the end of the exclusivity or duopoly period in 2005, UCC guided the liberalization and competition in the industry by eliminating the duopoly strategy that was previously pursued.

The Press and Journalist Act (1994), which provided for the creation of the Media Council in 1995, mandated the Media Council to regulate the mass media with the objective of ensuring the freedom of the press and to arbitrate any dispute within or related to the industry (Media Council, 2007). The Media Council activities also cover the operations of the electronic
media that communicate messages to the public via television, radio, video, and cinema or by any other electronic apparatus (Media Council, 2007).

The Electronic Media Act (1996), which provided for the establishment of the Broadcasting Council, mandated the Broadcasting Council to develop a modern broadcasting sector and infrastructure in Uganda by introducing and exercising control and supervising all broadcasting activities in the country (Broadcasting Council, 2000). The Broadcasting Council was also charged with the task of taking responsibility for the standardization, planning and management of the frequency spectrum dedicated to broadcasting in the country (Broadcasting Council, 2000). The Broadcasting Council was also mandated to allocate spectrum resources to ensure the widest possible variety of programming and optimal utilization of the spectrum resources and to coordinate communication on electronic media with the relevant national and international organizations (Broadcasting Council, 2000).

3) The National Information Technology Authority Act-Uganda {NITA-U}, 2009). The NITA-U Act of 2009 provided for the creation of the National Information Technology Authority-Uganda (NITA-U). The NITA-U was mandated to coordinate, promote and monitor information technologies development within the context of national social and economic development. The authority was charged to facilitate a knowledge-based, globally competitive Uganda where social transformation and economic development are supported through ICT-enabled services (NITA-U, 2009).

NITA-U was also charged with: 1) Integrating ICT in national programs by focusing on the establishment of coordinated and harmonized national ICT systems; 2) Providing first-level technical support and advice for critical government ICT systems; 3) Identifying and advising government on all matters of ICT development, utilization and deployment; 4) Formulating and
implementing national ICT policies, strategies, and master plans; and 5) Promoting e-
Governance, e-Commerce, and e-Living, amongst others.

The Ministry of ICT (2006) reported that for the last twenty years, the government and licensed operators have been the two major players in the ICT sector working jointly to enhance a privately driven industry to promote access to ICT services and link the population to local, regional, and international destinations. The government of Uganda, through the Ministry of ICT, has been playing the role of a facilitator by providing strategic policies and introducing ICT in educational institutions to diffuse digital opportunities to the population (Ministry of ICT, 2006).

Positive ratings of the ICT sector. Industry analysts, scholars, and observers credit the Ugandan government with pioneering the most liberalized media and telecommunication policies in the East African region (IMF, 2008; Kannyo, 2004; Kasfir, 2000; Muwanguzi & Musambira, 2009; Mwesige, 2004; UNDP, 1998; World Bank, 2008). Although not without its critics and skeptics (Hauser, 1999; Mwenda, 2007), Uganda has been one of the most vaunted economic and political success stories on the African continent in the last two decades (IMF, 2008; Kannyo, 2004; Kasfir, 2000; Muwanguzi & Musambira, 2011; Mwesige, 2004; UNDP, 1998; World Bank, 2008).

However, Uganda’s pioneer role and impressive ICT experience in Africa has only recently begun to generate interest and closer scholarly attention (Akpan-Obong, Thomas, Samake, Niwe, & Mbarika, 2009; Muwanguzi & Musambira, 2009; Mwesige, 2009). Akpan-Obong et al. (2009) for example, emphasized Uganda’s importance as an initiator in the systematic adoption of information technologies on the African continent and suggested that the country’s experience could offer a blueprint for other developing countries in how to use ICTs
for political conflict resolution and national reconciliation. Mwesige (2009) stated that Uganda’s ICT experience, especially with the liberalization and proliferation of fm Radio around the country, has enhanced and undermined the democratic process at the same time. Muwanguzi and Musambira (2009) suggested that the ICT revolution in Uganda, especially with the use of the cellular phone as a portable banking device, is contributing to the economic transformation of rural areas in East Africa’s third largest economy.

The foregoing overview of the evolution of the ICT sector in Uganda provides and extends some understanding of the environment from which the proposed OSS policy initiative is emerging and thus aims to contribute to the literature on how a national information policy will be formulated to adopt the new OSS technology as an integral part of existing national regulatory regimes. The next section presents the history and current status of OSS in Uganda as a way of creating some understanding of whether the policy proposal to adopt the use of OSS is a realistic or idealistic endeavor.

History of OSS in Uganda

Although no definite timeline has been documented to suggest exactly when OSS was first introduced and used in Uganda, reports on the use of OSS that emerged in 2003 suggested that government agencies, non-profit organizations, and private companies had started using OSS by 2001 (Bruggink, 2003; Reijswoud & Topi, 2003). Thus, while OSS availability in Uganda predates 2003, activities related to its promotion and use became more pronounced when the International Institute for Communication and Development (IICD), a non-profit foundation that specializes in the promotion of ICT as a tool for development, launched its operations in the country.
In December 2003, the IICD entered into a joint venture with a private company (Linux Solutions) and the Uganda Martyrs University for sustainable promotion and use of OSS in the country (East Africa Centre for Open Source Software {EACOSS}-Uganda, 2008). The IICD-supported venture in Uganda resulted in the formation of the East Africa Centre for Open Source Software (EACOSS)-Uganda, a nongovernmental organization with an overriding mission of creating a base for the sustainable promotion and use of OSS in the country (EACOSS-Uganda, 2008). The goal of the EACOSS-Uganda program was to deploy OSS to ensure the availability of ICT systems in hitherto unexpected localities and communities to benefit or at least, access and use ICTs more easily than previously envisaged (EACOSS-Uganda, 2008).

The organization was established primarily to benefit system and network operators in the public and private sectors, big organizations, graduates of secondary schools, and civil society organizations. Since it opened in Uganda, the IICD-supported Uganda country program has offered training and certification facilities on OSS, provided up-to-date access to OSS manuals and handbooks at low costs, and helped to stimulate software development (EACOSS-Uganda, 2008).

Current status of OSS use. Since 2008, the current status of OSS use in Uganda indicates that it has gained a sizeable base of users and a relatively growing pool of local technicians and developers (Collins, 2010; Weddi, 2009). The EACOSS has conducted multiple OSS promotional activities, implemented the certification training for OSS specialists, and offers courses in computer literacy, Web site development, and basic and advanced Linux networking and system administration. The EACOSS activities in Uganda are helping to increase understanding of the role of OSS in social transformation (Collins, 2010; EACOSS-Uganda, 2008; Weddi, 2009). Activities of the center are contributing to national development by
reducing barriers to accessing and using ICTs, equipping people with appropriate skills to
develop and use OSS, and enhancing their entrepreneurial skills to engage in gainful
employment (EACOSS-Uganda, 2008; Weddi, 2009). The center is also contributing to the
development of the local ICT industry, raising awareness about the benefits of OSS, and training
system and network administrators in the country (EACOSS-Uganda, 2008).

Baguma (2005), Bruggink (2003), and EACOSS-Uganda (2008) stated that as early as
2003 and by 2005, most of the Internet cafés in the main towns around the country and major
corporations with Internet connectivity or some form of wide area networks were using Linux to
provide services like mail, firewalling, proxy, and other functions. Over the years, several
government agencies, universities, non-profit organizations, and corporations in Uganda have
adopted the use of OSS for some of their computing needs (Bruggink, 2003; Reijsward & Topi,
2003; Weddi, 2009).

Some of the major government departments, universities, and private organizations which
use OSS to accomplish some of their computing tasks include but are not limited to the
Parliament of Uganda, Ministry of Water and Environment, Ministry of Lands, Ministry of
Tourism, Trade and Industry, the Civil Aviation Authority, Makerere University, Uganda
Martyrs University, International Health Sciences University, International Air Ambulance,
Women of Uganda Network, Mountbatten Hosting, and the Uganda Carbon Bureau (Weddi,
2009). EACOSS-Uganda (2008) and Weddi (2009) reported that unlike in the past, presently,
newspapers regularly advertise for information technology administrators with Linux Expertise.
Meanwhile, academic institutions such as Makerere University, the oldest in East Africa, offer
training in Linux to complement student computing skills and broaden their software knowledge
(Weddi, 2009).
At the Uganda Martyrs University, Nkozi, all computer laboratories are running OSS (Reijswoud & Topi, 2003). Further, by 2005, Makerere University had already planned to migrate some of its computer laboratories to OSS applications (Baguma, 2005; EACOSS-Uganda, 2008). At the same time, some rural-based schools and nongovernmental organizations are using an installed base of over 1,000 Inveneo low-power solar PCs running off Linux around the country (EACOSS-Uganda, 2008). In addition, there are now more than 20 companies offering OSS-related support services in Uganda (EACOSS-Uganda, 2008).

Elsewhere in the country, several OSS communities have emerged and established themselves as vanguards in the use and promotion of OSS. Among them include the Uganda Linux User Group whose goal is to promote the use of OSS and how to get OSS use more into the public domain (Open Source Initiatives in Uganda, 2003; Uganda Linux User Group, 2010). The Women of Uganda Network, a civil society organization with members from various professions has been established with the aim of promoting the use of OSS products in business and all other activities that empower women and enhance their freedoms (Women of Uganda Network, 2010).

To offer support to the Uganda OSS movement, Open Source Africa held its annual ‘source’ event in the country in 2006. The theme of the conference emphasized migration and adoption of OSS, alternative access, education and resource centers, using OSS for information handling and advocacy, citizen’s media, and localization (Open Source Africa, 2006). The majority of participants who attended the “source” event in Uganda were professionals working with nongovernmental organizations in different parts of Africa (Open Source Africa, 2006). Currently, evidence exists, given the progress of OSS use and activities in Uganda, that OSS is
not only gaining presence and significance in society but is showing signs that it can effectively
compete with proprietary software (EACOSS-Uganda, 2008; Weddi, 2009).

Collins (2010) suggested that in Uganda, high license fees for commercial software and
the risks associated with rampant software piracy are some factors compelling strategic business
leaders in the country to switch to OSS. In addition, the need to avoid viruses that frequently
target proprietary software and aspirations by the business community to become part of the
global community that uses the Linux-based cloud computing, migration to OSS has increasingly
become a smart economic move in Uganda (Collins, 2010).

Challenges to OSS adoption and use. EACOSS-Uganda (2008) reported that despite the
progress made towards the promotion of OSS technology in the country, Uganda still needs more
certified OSS System developers and administrators. For example, while the server environments
of most ministries and Internet service providers run on Linux, they have to fly in expensive
support personnel and consultants from Europe and the USA to repair the systems in case of
breakdowns and for periodic maintenance (Bruggink, 2003; Collins, 2010; EACOSS-Uganda,
2008). Further, EACOSS-Uganda stated that due to lack of highly technical managers to run its
operations in addition to their limited knowledge of the OSS community in the country, progress
towards sustainability of the development and use of OSS is still a long way off. Of more
concern, however, is that while Linux is no longer an unfamiliar concept in various forums in
Uganda, it is unclear as to what perceptions the government, organizations, and individuals hold
about OSS in general (Collins, 2010; EACOSS-Uganda, 2008; Weddi, 2009).

Researchers on the use of OSS in Uganda have made numerous recommendations
supporting the formalization, adoption, and use of OSS in Uganda (Baguma, 2005; Bruggink,
2003; CIPESA, 2005; Collins, 2010; EACOSS-Uganda, 2008; Weddi, 2009); Reijswoud & Topi,
Since 2003, activities of OSS advocates and stakeholders have resulted in the use of OSS in government ministries, institutions, universities, the private sector, and even in civil society organizations and schools located in remote parts of the country (EACOSS-Uganda, 2008; Weddi, 2009). The proposal, therefore, by ICT stakeholders in the country, urging the government to change the existing ICT policies and laws and develop a policy in a form of a national law for the formal recognition and adoption of OSS, came as a logical step in a protracted and systematic campaign. The objective of the OSS policy proposal was to gain legal standing for OSS solutions, break the monopoly of proprietary software, and, possibly, bridge the digital divide to transform the country into an information society (Collins, 2010; Weddi, 2009).

However, whether the adoption and use of OSS will indeed enable Uganda to evolve from an agrarian country and transformed into an information society, fundamental information policy questions needed to be addressed to ensure that the information policy for the adoption and use of OSS in Uganda is inclusive, coherent, and consistent with the country’s development goals. To generate the necessary information for policy makers to arrive at informed and strategic decisions in executing their legislative mandates, this study was guided by the overarching question:

What are the underlying interests of ICT stakeholders in Uganda to propose a new policy for the formal recognition, and adoption of OSS as an alternative choice alongside proprietary software?

Addressing the overarching question and a set of specific research questions outlined in Chapter 1 and in Chapter 3 offered a clear sense of the emerging OSS policy in Uganda. Examining the questions created an understanding of the underlying stakeholder interests, their perceptions and
knowledge about OSS and the process through which Uganda’s national information policies are conceptualized and formulated.

Chapter summary. This chapter reviewed the streams of research on the evolution of the FS/OSS movement since the late 1960s, the general FS/OSS definitions and various characteristics of OSS, and the extent to which OSS has been embraced and used in computing tasks around the world. This chapter also reviewed relevant streams of research pertaining to information policy formation processes on ICT adoption to underline the information policy discipline in which this study is grounded. The review also provided a synopsis of pertinent studies on stakeholder, frame theory, new institutionalism theory, social construction of technology theory, and diffusion of innovation theory in the adoption and use of ICTs.

This chapter reviewed relevant government information policies on the adoption and use of OSS around the world, presented some recommendations toward the formation of OSS policies in developing countries, described the evolution of the ICT environment in Uganda, and the current status of OSS in the country to highlight the setting from which the proposed OSS policy initiative for Uganda is emerging. Finally, the chapter stated the overarching research question that guided this study. The study design, including the research approach, strategy, research methods, and data analysis techniques is presented and elaborated in Chapter 3 below.
CHAPTER 3
STUDY DESIGN

Chapter Overview

First, this chapter describes the research approach, strategy, and techniques that were adopted to conduct the study, which are consistent with the pluralistic pragmatist paradigm. The utility of the pragmatist paradigm lies in its capability to link a selected approach directly to the complexity of a phenomenon, purpose of study, and the nature of the research questions raised (Creswell, 2003; Tashakkori & Teddlie, 2002). Second, the collection of documentary evidence and sampling techniques in the selection and description of study participants is presented.

Third, the process followed to have the research approved by the Institutional Review Board of the University of North Texas is presented. Fourth, the procedures that were followed during face-to-face interviews and the focus group discussion in Uganda are described. Finally, the data analysis process, including the various techniques used for data analysis, is presented.

The Research Approach

The research design was based upon a qualitative or naturalistic research approach because it targeted discovering, describing, and creating a holistic understanding of the complexities and dynamics of the processes through which social phenomena evolve (Guba & Lincoln, 1988; Patton, 2002). A naturalistic research approach incorporates an evolving design, the research process cannot be precisely determined in advance of fieldwork activities (Miles & Huberman, 1994). Data collection and analysis evolved through an iterative and interactive process.
The qualitative or naturalistic approach is also consistent with the pluralistic pragmatist paradigm, which suggests the use of multiple techniques for data collection and analysis within the research process (Creswell, 2003; Tashakkori & Teddlie, 2002). Inherent within the pragmatist paradigm are its insightful appeal, opportunity to investigate problems of interest and concern through a variety of research methods, using research findings to solve practical social problems, and making a contribution to existing knowledge (Creswell, 2003; Tashakkori & Teddlie, 2002).

Guba and Lincoln (1988) and Patton (2002) suggested that a naturalistic or qualitative research approach is useful and justified in exploratory studies because it affords the researcher enough flexibility to effectively investigate and discover most nuances surrounding a social phenomenon, generate descriptive data, and capture a holistic understanding of processes and contexts. The qualitative research approach is also inductive and does not test hypotheses but aims at identifying patterns in the data, developing themes, and discovering relationships associated with a complex phenomenon (Guba & Lincoln, 1988; Patton, 2002).

Creswell (2003), Guba and Lincoln (1988), and Patton (2002) suggested that the qualitative research approach is primarily concerned with process rather than outcomes or products, is interested in how people make sense of their lives, how they interpret experiences, and how they structure their social world. This approach was most suitable for the study of an information policy formation process, a social phenomenon in which diverse stakeholders negotiate and come to a consensus on how a societal issue should be addressed, resolved, and/or handled.

The qualitative research approach focuses on discovery through an inductive and exploratory process and does not prescribe the use of hypotheses for testing, nor does it test the
generalizability or predictive power of research findings (Creswell, 2003; Miles & Huberman, 1994). The researcher selected and utilized this approach for this study because it allowed a holistic examination and understanding of the open source software (OSS) policy formation process in Uganda.

This research approach was also consistent with the purpose and goal of this study, which focused on collecting data through a variety of techniques that use an inductive analysis methodology in conjunction with a constellation of relevant concepts from several theoretical frameworks. Fidel (1993) suggested that descriptive data collected using a multimethod strategy in qualitative research and subjected to a variety of analytical tools is sufficiently suitable to create a systematic understanding of multifaceted social problems. This study pursued that strategy to make sense of the evolving OSS policy initiative in Uganda.

A Case Study Strategy

The emerging information policy in Uganda was used as a case study to account for the dynamics and complexities highlighting the evolution of a national information policy for the formal recognition and adoption of OSS. The selection of a revelatory case study methodology was based on its capacity to generate descriptive data that enhances a thorough understanding about a phenomenon previously not studied (Yin, 2003). The strength of a revelatory case study is based on its effectiveness in rendering a profound and meticulous investigation into most underlying elements inherent in a social phenomenon that may otherwise not be illuminated through experimental research (Yin, 2003).

During this study, the goals of exploration and description rather than generalizability and predictability were prioritized. Data for this study were collected onsite in Kampala, Uganda. A case study strategy supplemented by documentary evidence enabled a thorough
description and understanding of the OSS policy initiative in Uganda from the viewpoint of multiple participants. Each of the data sources provided the study with specific but also overlapping types of information to address the study goals, the overarching question, and the specific research questions raised. While findings from this case study based on the evolving OSS policy formation process in Uganda may parallel developments in other contexts, they should not be generalizable. Yin (2003) suggested that a case study methodology is premised on the assumption that while the problems discovered in a particular case may be common to other cases as well, they are neither generalizable nor predictable.

The Study Process

In compliance with United States federal laws regulating the use of human subjects in research and in conformity with research ethics, the researcher completed and submitted an Expedited or Full Board Review Application seeking permission from the Institutional Review Board (IRB) of the University of North Texas (UNT) before conducting research in Uganda. Other documents submitted alongside the IRB Expedited or Full Board Application included an informed consent form, invitation letter for non-UNT participants, and two research protocols for the face-to-face (semi-structured) interviews and focus group discussion. The researcher informed the IRB that the study would strictly be for academic purposes. The UNT IRB approved the application to conduct the study in Uganda. See Appendices A and B for the IRB letter of approval and extension.

While conducting the study, the researcher made every effort to ensure that laws and regulations governing the research process were followed to provide confidentiality and maximum protection for participants. While the laws in Uganda do not require researchers in social-scientific disciplines to seek permission before conducting interviews with human
subjects, the researcher drafted an invitation letter for non-UNT participants informing them about the forthcoming study and inviting them to voluntarily take part in the research. See Appendix C for the approved copy of the invitation letter for non-UNT participants.

Following a UNT-generated format, the researcher compiled an informed consent form that introduced him to possible participants. The letter stated the academic purpose of the research and requested participants to voluntarily take part in the study. The informed consent form provided the contact information of the researcher and stressed that the anonymity of the participants would be strictly observed. The researcher distributed the consent form to the potential study participants in Uganda, allowed them to read and understand its contents, and assured that both parties would sign it before the interviews and the discussion commenced. See Appendix D for the approved informed consent form.

Research Participants

A purposeful sampling technique (Creswell, 2003; Guba & Lincoln, 1988) was utilized to identify and select potential study participants from multiple stakeholders in the information and communication technology (ICT) sector in Uganda. The participants were selected from members of ICT associations and OSS communities in the country, such as Linux User Group, I-Network, Mobile Monday, ICT Cluster, and Uganda ICT Solutions, and related stakeholders who provided their unique perspectives on the evolving OSS policy in Uganda. The strength of purposeful sampling lies in its capability to facilitate the identification and selection of knowledgeable individuals who can provide valuable information that describes, clarifies, and enhances a holistic understanding of a complex process or phenomenon (Creswell, 2003; Guba & Lincoln, 1988; Krathwohl, 1997).
The employed sampling technique assisted in generating information that contributed toward a clearer identification, description, and categorization of ICT stakeholders in the country. The sampling technique also increased knowledge about stakeholder interests, roles, orientation, and perceptions about OSS and proprietary software. In addition, the technique yielded useful information that facilitated a better understanding of stakeholder influence, importance, power, interest, legitimacy, and salience in the evolving OSS policy.

Selected participants were assumed to have a diversity of knowledge in areas including but not limited to characteristics of OSS, policy formation, and legislation as well as ICT adoption, use, benefits, and limitations, among other related issues. The goal of interviewing knowledgeable participants was to collect data that highlighted and enhanced a thorough understanding about the availability of OSS for Uganda. The resultant information should potentially facilitate policy makers in their decision-making process when developing an information policy to formalize and adopt the use of OSS. The information might also enable Uganda to create a policy that will help transform the country, bridge the digital divide, and guide it towards becoming an information society.

The researcher targeted policy makers including Members of Parliament and bureaucrats (civil servants or public sector employees), academicians, ICT professionals, software developers and vendors, OSS users, journalists, and other related professionals to take part in the study. Participants were identified and contacted through multiple associations for ICT stakeholders in Uganda and after reviewing public information about the ICT sector and associated key players.

Simultaneously, a snowball technique (Atkinson & Flint, 2000) was utilized to identify and select additional participants who took part in the study. A snowball technique, used as a
referral system, is particularly effective in finding and gaining access to key respondents who are acquaintances of interviewed participants (Atkinson & Flint, 2000). Through the snowball technique, the researcher gained access to Members of Parliament on the ICT Committee of the Parliament, government bureaucrats in the Ministry of ICT, National Information and Technology Authority-Uganda (NITA-U), Uganda Communication Commission (UCC), other government ministries and agencies, as well as local and international organizations. The researcher contacted ICT stakeholders in higher institutions of learning and in nongovernmental organizations (NGOs) through members of OSS communities employed in institutions that are at the forefront of promoting and using OSS in Uganda.

Before commencing field activities, the researcher contacted key members in the various OSS communities and ICT associations in the country and requested lists of members affiliated with these organizations. The researcher identified and selected the most suitable members for potential participation in the study. The researcher contacted them via e-mail and telephone. The researcher based the selection of possible participants on various criteria that included but were not limited to their levels of education, their experience with OSS and other ICT-related activities, knowledge of policy formation processes, recommendations from peers, and through the examination of public information on leading ICT stakeholders in Uganda. The researcher also used Web sites operated by NITA-U and the UCC, several NGOs, and private entities to identify and select participants.

Since several organizations operate Web sites with copious information concerning major activities and key players in the ICT sector (Weddi, 2009), the researcher reviewed such public information as preliminary sources that also informed the selection process. These preliminary sources of information together with online interactions with key members of the OSS
communities and other ICT stakeholders helped the researcher identify potential participants and
develop the procedure to select the study’s purposeful sample, including a degree of gender
equity. However, the gender equity criteria proved difficult to realize because the ICT sector in
Uganda is still male-dominated (Ministry of ICT, 2010).

Drawing from Yin (2003), no specific number of participants was predetermined for this
study. However, twenty participants were purposefully identified and selected from the various
segments of ICT stakeholders and interviewed until a point of data saturation was reached. Data
saturation or redundancy refers to a point during the data collection process when the
information from participants appears to reveal no more new concepts or insights into the
phenomenon being studied (Glaser & Strauss, 1967; Kreps, Herndon, & Arneson, 1993).
Interviewing participants continues until their responses reflect a repetitious pattern
already evident in previously conducted interviews; at which point, redundancy is reached and
the interviews stopped (Kreps et al., 1993). As soon as the point of saturation was recognized,
after interviewing twenty participants, the interviews ended. The researcher rightly anticipated
that the collected information, at the point when saturation was reached, was sufficient to address
the overarching research question and a set of specific research questions.

Data Collection Techniques and Procedures

Three primary techniques were pursued during the data collection process: 1)
Documentary evidence or public access reports; 2) Face-to-face (semi-structured) interviews;
and 3) A focus group discussion. The data collection process using these three techniques was
consistent with the qualitative research approach and revelatory case study methodology, which
offer a framework for designing a systematic data collection process using multiple techniques to
provide a holistic account of contexts, activities, participants, and processes (Guba & Lincoln, 1988; Miles & Huberman, 1994; Patton, 2002; Yin, 2003).

Multiple data collection techniques for this study were also justified by an extensive literature review of the historical development of OSS and two dominant philosophical orientations (i.e., Free Software Foundation (FSF) and Open Software Initiative (OSI)). The review covered research on the impact of OSS on ubiquitous computing and the evolution of information societies, OSS licensing categories, and OSS use in diverse contexts. The review of literature also included studies on the nature of information policies for ICTs, theoretical frameworks, OSS trends in developing countries, the evolution of the ICT sector in Uganda, as well as the status of OSS in the country and its relevance to the study.

The review of literature supported the rationale for this study and for the researcher to design systematic data collection, data reduction, and data analysis processes as iterative and interactive research activities. The collection and analysis of data evolved, informed, and guided the researcher to purposely collect supplementary data through conversations with various individuals in the ICT sector via phone calls and e-mails to follow-up and clarify information. The application of multiple sources of evidence increased confidence in the results, strengthened validity of findings, and reduced possible methodological bias.

The use of multiple data collection techniques and different sources enhanced a deeper and broader understanding of the dynamics and complexities associated with the information policy formation process in Uganda. In information policy research in particular, the use of multiple techniques to collect data from various sources is most appropriate because it facilitates the generation of valuable information that renders a comprehensive description, evaluation, and holistic understanding of complex processes associated with the formation, implementation, and
evaluation stages of information policies (Moen, McClure, Koelker, & Stewart, 1997; Rist, 1995).

Documentary evidence or public access reports. The data collection process commenced with finding and selecting relevant documentary evidence of important historical information describing the ICT environment and the existing policy-making activities in Uganda from which the proposed OSS policy is emerging. Examination of the documents and reports helped to make sense of the evolution and current status of the ICT sector as well as related legislation and associated statistics.

The body of literature on the status of the ICT sector in the country helped to capture, document, assess, and understand the current ICT environment in Uganda. Information from these documents facilitated a reasonable degree of understanding during the face-to-face interviews and the focus group discussion and increased confidence in the results of the study. The documents that were reviewed and examined included but were not limited to ICT policy frameworks, reports, programs, vision statements, strategies, statutes or Acts, and ministerial and agency statements. Some of the major and relevant national ICT instruments that have guided and regulated the evolution of the ICT sector in Uganda from which the OSS policy initiative is emerging are shown in the two tables below. Table 1 shows the various ICT policy instruments reviewed and analyzed for this study. A detailed analysis of these policies, strategies, or reports is presented in Chapter 4. Table 2 shows the various ICT statutes, laws, or acts of Parliament reviewed and analyzed for this study. A detailed analysis of these acts or statutes is presented in Chapter 4.
Table 1

**ICT Policy Instruments Reviewed and Analyzed for this Study**

<table>
<thead>
<tr>
<th>Policy/Program/Strategy/Report/Vision</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status of ICT in Uganda: Preliminary Baseline Study</td>
<td>(Scan-ICT Project, 2002).</td>
</tr>
<tr>
<td>ICT Sector Thematic Paper for the National Development Plan</td>
<td>(Ministry of ICT, 2009).</td>
</tr>
<tr>
<td>National Information Technology Policy</td>
<td>(Ministry of ICT, 2010).</td>
</tr>
<tr>
<td>Information Management Services Policy</td>
<td>(Ministry of ICT, 2011).</td>
</tr>
<tr>
<td>Digital Migration Policy Framework</td>
<td>(Ministry of ICT, 2011).</td>
</tr>
<tr>
<td>Uganda -Telecoms, Mobile, Broadband and Forecasts</td>
<td>(Lange, 2012).</td>
</tr>
</tbody>
</table>

A section with results from the information policy descriptive assessment techniques applied to the collected documents showed in Table 1 above is presented in Chapter 4.
Table 2

ICT Statutes, Laws, or Acts of Parliament Reviewed and Analyzed for this Study

<table>
<thead>
<tr>
<th>Laws/Statutes/Acts</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press &amp; Journalist Act</td>
<td>(Ministry of Information, 1994).</td>
</tr>
<tr>
<td>Electronic Media Act</td>
<td>(Ministry of Information, 1996).</td>
</tr>
<tr>
<td>Uganda Communications Act</td>
<td>(Ministry of Works, Housing, and Telecommunication, 1997).</td>
</tr>
<tr>
<td>Access to Information Act</td>
<td>(Ministry of Information and National Guidance, 2005).</td>
</tr>
<tr>
<td>Uganda Broadcasting Corporation Act</td>
<td>(Ministry of Information and National Guidance, 2005).</td>
</tr>
<tr>
<td>National Information Technology Authority-Uganda Act</td>
<td>(Ministry of ICT, 2009).</td>
</tr>
<tr>
<td>Interception of Communications Act</td>
<td>(Ministry of ICT, 2009).</td>
</tr>
<tr>
<td>Electronic Signatures Act</td>
<td>(Ministry of ICT, 2011).</td>
</tr>
<tr>
<td>Computer Misuse Act</td>
<td>(Ministry of ICT, 2011).</td>
</tr>
<tr>
<td>Electronic Transactions Act</td>
<td>(Ministry of ICT, 2011).</td>
</tr>
<tr>
<td>Uganda Communications Act</td>
<td>(Ministry of ICT, 2013).</td>
</tr>
</tbody>
</table>

A section with results from the information policy descriptive assessment techniques applied to the collected ICT-related statutes showed in Table 2 above is presented in Chapter 4.

Data collection protocols. The researcher developed two separate but related interview protocols: One that was used to guide the face-to-face (semi-structured) interviews and the other that guided the focus group discussion. The interview protocols included guidelines that were followed during the face-to-face interviews and the focus group discussion. These included how the researcher introduced himself to the interviewees and participants, the reading and signing of the consent form before the commencement of interviews and discussion, and how the interviews and focus group discussion were conducted.

The interview protocols had two sections. The first section of each interview protocol was a form into which the researcher entered demographic information on each of the study interviewees and participants. This information included age, gender, nationality, level of education, profession or occupation, and duration using OSS including involvement in OSS.
development, among others. The second section of the protocols included open-ended questions that guided the researcher to solicit detailed responses from the participants.

Topics around which the open-ended questions coalesced included stakeholder perceptions and knowledge about OSS, the policy and legislative structures and processes in Uganda, envisaged benefits and limitations of OSS, prospects for OSS development in Uganda, its diffusion, adoption, use, maintenance, and the implications of competition between OSS and proprietary software. See Appendices E and F for the two data collection protocols.

Face-to-face interviews. The researcher conducted twenty face-to-face (semi-structured) in-depth interviews with participants from the various categories of ICT stakeholders in the information policy environment in Uganda. The twenty participants were interviewed individually at mutually agreed locations. All but three interviews were conducted in participants’ (interviewees’) offices, which were held in three different restaurants. All participants, working in the private and public sectors, were playing active roles in the ICT sector. They included Members of Parliament and some civil servants or government bureaucrats who are frontline representatives of the executive branch that is directly involved in policy formation, implementation, and evaluation processes for information and communication technologies.

This diverse set of ICT stakeholders also included other civil servants not directly involved in ICT-related policy processes, OSS developers and service providers, academicians, journalists, members of various ICT associations, OSS communities, and OSS users involved in the OSS policy initiative and advocacy activities. The researcher identified and selected these study participants based on their knowledge about OSS from the various OSS communities and through a snowball technique.
The researcher selected the participants without emphasizing a specific age limit. The rationale for an open age range was to capture experiences of various categories of age groups involved in the ICT sector and to ascertain whether variations in age groups would yield some insights into levels of expertise and knowledge about OSS, interest to adopt and use OSS, and influence, power, and salience in the OSS policy formation process. Table 3 below shows a summary of demographic information of participants in the face-to-face interviews.

Participants’ demographics. The twenty participants (interviewees) included eighteen males and two females with ages ranging from 26 to 64 and with an average age of 37.6 years. The youngest participant, 26 years, was female while the youngest male participant was 28 years. The median age for all the twenty participants was 37.5 years, a relatively equal participation of ICT stakeholders within the age range. The ratio of male to female participants was 9-1. The age range for male participants was 36, ranging from 28-64 years.

Participants belonged to four nationalities; 17 Ugandans, one American, one Briton, and one Dutch. The inclusion of this demographic feature was to ascertain whether the nationality of participants contributed to early use of OSS, knowledge, and expertise in developing OSS. The identification of participant nationalities also aimed to better understand whether differences in cultural backgrounds impacted the OSS policy initiative. Seventeen participants identified themselves as Ugandan nationals, the youngest was 26 and the oldest was 64. Three male participants were foreign nationals, the youngest was 28 and the oldest was 42.

Participants included individuals with varying levels of education, knowledge, expertise, and experience in developing OSS solutions. One male participant held a doctorate in veterinary medicine, nine held master’s degrees in various fields such as engineering, computer science, information technology (IT), and business administration. One participant held a post-graduate
diploma in IT and seven held bachelor’s degrees in various fields of specialization including engineering, computer sciences, IT, and journalism. Two male participants with the lowest level of education held high school diplomas and were foreign nationals. The inclusion of this demographic feature on education was important to understanding how their levels of education influenced their degrees of knowledge, expertise, and experience with OSS and their roles in the emerging OSS policy initiative.

All participants were employed by different entities including government ministries and agencies, multinational corporations, international and local organizations, universities, vocational institutes, or had set up OSS-based private companies. Two participants were Members of Parliament and sat on the ICT Committee of Parliament.

Five participants identified themselves as civil servants but their roles in the OSS policy formation process were different. While these five were IT professionals, their substantive positions and roles in the civil service were characterized by high levels of variations in the power, influence, and importance they wielded in ICT-policy related processes. Two of them were directly involved in the formation, implementation, and evaluation of ICT policies and laws on behalf of the executive branch. Their views, roles, positions, and responsibilities were, therefore, consistent with those of the executive branch. The two were affiliated with international software organizations and one reported affiliation with Microsoft, a leading global developer of proprietary software.

The other three civil servants were only working in IT departments of government ministries with no executive influence on ICT-related policy processes. While these three had used OSS for over five years, two of them were involved in developing OSS solutions and affiliated with multiple local, continental, and international OSS communities where their
interests in OSS development and use are promoted. Three of the twenty participants were directly involved in teaching at three of the 31 universities in the country. One of the twenty participants was an IT instructor at a vocational training institute that exclusively uses OSS.

Four of the twenty participants including an engineer, two IT professionals, and one computer scientist were directly employed by multinational corporations and organizations in the country. The purpose of identifying participants’ professions and employers was to find out whether their professions or employment contributed to their knowledge about OSS and influenced their perceptions of the emerging OSS policy.

All but five participants reported affiliation with at least one OSS community either in Uganda or abroad. The majority of participants belonged to I-Network, Linux User Group and/or Mobile Monday, the most active OSS communities in the country. Other participants belonged to continental OSS communities, such as Free/Open Source Software Foundation for Africa (FOSSFA), and international OSS communities, such as FSF and OSI.

Three of the twenty participants reported no affiliation to any software organization either in Uganda or abroad. The goal of identifying stakeholder affiliations or membership to OSS or other ICT organizations was to ascertain whether their interests in the OSS policy formation process were influenced by ideologies held by the respective organizations, associations, groups, or coalitions. All participants had used OSS for at least more than three years before the interviews were conducted between September 15 and October 12, 2012. The duration participants had spent using OSS and developing OSS solutions were essential to ascertaining their knowledge and experience with OSS, in establishing their legitimacy in the OSS policy formation process, and to gaining insights into their underlying interests in the policy process.
Variations in these two demographics were reflected through age, nationality, education, profession, and places of work.

While all participants reported using OSS solutions in their various computing tasks, some used OSS for economic purposes, others for academic and community-based activities, and others for accomplishing individual computing tasks. Five of the twenty participants reported that they were only users of OSS and not involved in OSS development activities. The more experienced participants customized and developed OSS solutions for commercial purposes, started business ventures to offer maintenance and migration services, to cut costs of purchasing proprietary licenses by their employers, and/or for personal use.

Six of the twenty participants with diverse levels of OSS expertise and knowledge, self-identified themselves as OSS entrepreneurs operating private businesses. They included four Ugandans and two foreign nationals. Their companies develop, market OSS solutions, and provide OSS services in Uganda, Africa, and around the world. One Ugandan national has developed proprietary software known as Mbuni based on an OSS platform, 80% of which is marketed internationally. The four local Ugandan OSS entrepreneurs reported to have engaged in OSS development activities for periods ranging from 5 to 10 years, with experiences that paralleled their two foreign national counterparts.

Regardless of their diverse demographic characteristics, all participants were very conversant about OSS, its advantages, challenges, its potential for Uganda, and the extent to which OSS had contributed to the emergence of the burgeoning information societies around the world. All but two participants identified themselves as deeply vested and interested in OSS, fully supporting the proposal to change the existing ICT policies and laws by embracing a new policy in the form of a national law for the formal recognition and adoption of OSS in Uganda.
Their interests in the proposed change of the ICT laws ranged from economic, social, and academic to political. During the in-depth face-to-face interviews, the researcher guided participants to share their perceptions about OSS and their respective roles and interests in the proposed OSS policy. All interviews, conducted in English, were recorded by the researcher’s assistant using digital and cassette tape recorders. Each interview lasted approximately 50 minutes. The researcher transcribed the recordings for analysis.

Since the qualitative approach assumes that the researcher is the primary instrument that personally mediates data through direct contact with the people in a natural setting of the phenomenon (Creswell, 2003; Guba & Lincoln, 1988; Miles & Huberman, 1994; Patton, 2002), the face-to-face interviews afforded the researcher a degree of flexibility to pursue new directions that generated useful data. The researcher also posed follow-up questions that solicited clarification on specific issues and answers from participants. Besides, the use of face-to-face interviews to understand complex social problems is functionally constructive because it empowers participants to freely put their experiences into their own words rather than the words of the researcher (Tanno & Jandt, 2002).

In case study research, in-depth interviews are productive and effective techniques because they enable researchers to capture the total experiences of participants about a social reality since their voices are given prominence during the process (Yin, 2003). To further enrich the data, the researcher made follow-up e-mails and phone calls with some of the interviewed participants to seek more information and answers to clarify emerging issues and questions as the data analysis process evolved.

The researcher also held three unrecorded face-to-face interviews with a member of the executive branch and two Members of Parliament. The three also declined to provide their
demographic information. The researcher also contacted and held telephone conversations with other previously selected participants who were not available to take part in face-to-face interviews. These stakeholders who also provided more relevant information to this study, included two female university professors holding doctorates in engineering and education, two civil servants working with the Parliament and specialists in government legislative processes, two journalists, one operating an OSS-based Short Messaging Service company and the other working with an international public relations firm. The researcher also contacted an OSS developer and training consultant and three graduate students majoring in computer science, IT, and library sciences.

The pursuit of new and useful data continued as understanding about the evolving information policy for the adoption of OSS by Uganda developed. The diversity of the purposefully selected sample afforded the study a broader and deeper exploration of the process and helped to render a better understanding of the OSS policy formation initiative in Uganda by capturing experiences of the multiple ICT stakeholders. Results of the face-to-face interviews are presented in Chapter 4.
<table>
<thead>
<tr>
<th>P#</th>
<th>Age</th>
<th>Sex</th>
<th>Nat.</th>
<th>Educ.</th>
<th>Work Place</th>
<th>Affiliations</th>
<th>Yrs in OSS Devt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>64</td>
<td>M</td>
<td>Uganda</td>
<td>Ph.D.</td>
<td>Kampala</td>
<td>I-Network &amp; ICT4D</td>
<td>Nil</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>M</td>
<td>Uganda</td>
<td>Masters</td>
<td>Parl.</td>
<td>I-Network</td>
<td>Nil</td>
</tr>
<tr>
<td>3</td>
<td>45</td>
<td>M</td>
<td>Uganda</td>
<td>Bac.</td>
<td>Serval Ltd</td>
<td>LUG</td>
<td>10 yrs</td>
</tr>
<tr>
<td>4</td>
<td>42</td>
<td>M</td>
<td>Netherlands</td>
<td>Bac.</td>
<td>Mouthaften</td>
<td>Fruit of Thought</td>
<td>10 yrs</td>
</tr>
<tr>
<td>5</td>
<td>42</td>
<td>M</td>
<td>Uganda</td>
<td>Masters</td>
<td>Parl.</td>
<td>I-Network &amp; LUG</td>
<td>Nil</td>
</tr>
<tr>
<td>6</td>
<td>41</td>
<td>M</td>
<td>Uganda</td>
<td>Bsc IT</td>
<td>GMC</td>
<td>MM</td>
<td>8 yrs</td>
</tr>
<tr>
<td>7</td>
<td>41</td>
<td>M</td>
<td>Uganda</td>
<td>Masters</td>
<td>MOICT</td>
<td>ISACA/PM I/ISOC</td>
<td>Nil</td>
</tr>
<tr>
<td>8</td>
<td>40</td>
<td>M</td>
<td>Uganda</td>
<td>Masters</td>
<td>MTN</td>
<td>None</td>
<td>8 yrs</td>
</tr>
<tr>
<td>9</td>
<td>40</td>
<td>M</td>
<td>Uganda</td>
<td>Masters</td>
<td>DS (U)</td>
<td>I-Network</td>
<td>10 yrs</td>
</tr>
<tr>
<td>10</td>
<td>38</td>
<td>M</td>
<td>Uganda</td>
<td>Bsc</td>
<td>Cured Ltd</td>
<td>FOSSFA/LUG /ICANN/ISOC</td>
<td>5 yrs</td>
</tr>
<tr>
<td>11</td>
<td>37</td>
<td>M</td>
<td>Uganda</td>
<td>Masters</td>
<td>Parl.</td>
<td>I-Network</td>
<td>8 yrs</td>
</tr>
<tr>
<td>12</td>
<td>36</td>
<td>M</td>
<td>Uganda</td>
<td>MBA</td>
<td>MUK</td>
<td>None</td>
<td>Nil</td>
</tr>
<tr>
<td>13</td>
<td>36</td>
<td>M</td>
<td>United Kingdom</td>
<td>Dip.</td>
<td>ITE-Tec</td>
<td>LUG/ICTAU/UNXCP</td>
<td>3 yrs</td>
</tr>
<tr>
<td>14</td>
<td>34</td>
<td>M</td>
<td>Uganda</td>
<td>Bsc IT</td>
<td>S7 ProProject</td>
<td>LUG</td>
<td>3 yrs</td>
</tr>
<tr>
<td>15</td>
<td>33</td>
<td>M</td>
<td>Uganda</td>
<td>Masters</td>
<td>Parl.</td>
<td>None</td>
<td>5 yrs</td>
</tr>
<tr>
<td>16</td>
<td>32</td>
<td>M</td>
<td>Uganda</td>
<td>Masters</td>
<td>NITA-U</td>
<td>Microsoft</td>
<td>Nil</td>
</tr>
<tr>
<td>17</td>
<td>29</td>
<td>M</td>
<td>Uganda</td>
<td>Grad Dip.</td>
<td>IHSU</td>
<td>FOSSFA</td>
<td>1 yr</td>
</tr>
<tr>
<td>18</td>
<td>28</td>
<td>M</td>
<td>United States</td>
<td>Dip.</td>
<td>IMG</td>
<td>UIXP</td>
<td>10 yrs</td>
</tr>
<tr>
<td>19</td>
<td>28</td>
<td>F</td>
<td>Uganda</td>
<td>Bsc CS</td>
<td>Solar Sister</td>
<td>Solar Sister</td>
<td>8 yrs</td>
</tr>
<tr>
<td>20</td>
<td>26</td>
<td>F</td>
<td>Uganda</td>
<td>Bsc IT</td>
<td>Courts</td>
<td>COSS/LUG/FOSSFAI-Network</td>
<td>5 yrs</td>
</tr>
</tbody>
</table>

See Appendix G for a list of abbreviations used in Table 3 above with their full explanation.

The focus group discussion. From the purposeful sample, the researcher selected five participants for the focus group discussion, three of whom had taken part in the face-to-face interviews. Owing to differences in the schedules of the diverse participants, it proved difficult to
get participants together at the same time for a group discussion, especially those who had taken part in the interviews. One participant included in the focus group discussion had taken part in an earlier incomplete interview with the researcher. The fifth participant had not taken part in previous interviews but was purposefully included in the focus group discussion on the basis of her knowledge and use of OSS, her level of education, and availability. The focus group discussion was held at the campus of one of the private universities where all academic programs are offered online and all computer applications are based on OSS.

During this focus group discussion, the researcher posed questions for discussion seeking additional information and clarifications about issues that emerged during the face-to-face interviews as well as other aspects of the information policy formation process. The discussion was conducted in English and lasted approximately 80 minutes. Questions and answers were recorded using digital recorders and transcribed by the researcher for analysis.

Participants’ demographics. The five participants included four males and one female with ages ranging from 28 to 53 years, with a mean age of 39.2, and a median age of 36. The youngest participant, 28 years, was male, while the only female participant was 50 years old. Four participants were foreign nationals: two Americans, a Briton, and an Irish. Only one Ugandan took part in the discussion. The education levels of the participants ranged from high school diplomas to a doctorate. The participant with the highest level of education was a female with a doctorate in education. The Ugandan possessed a post graduate diploma in IT and worked as an IT manager with a private international university.

The oldest participant, an American, held a bachelor’s degree and was a director of a vocational institute that offers computer training that exclusively uses OSS. Two participants held high school diplomas with one running his own OSS-based company, while the other was a
chief information officer of an international medical organization. The female participant was not affiliated with any OSS community but two participants were affiliated with local, regional, and international OSS organizations including Linux User Group, FOSSFA, UNXP and ICTAU. One participant was affiliated with the Uganda Internet Exchange Point.

All the participants had at least used OSS for more than five years. The female participant, who had used OSS for the longest duration, had not engaged in any OSS development activities. The three foreign nationals had engaged in OSS development activities for periods ranging from three to 10 years. The youngest of these foreign nationals, 28 years, had engaged in OSS development activities for the longest time. The Ugandan national had engaged in OSS development for only one year.

The focus group discussion afforded participants an opportunity to share ideas and experiences about OSS, its potential benefits and limitations for Uganda, and other issues characterizing the formation process for an information policy for the formal recognition and adoption of OSS. The data from the focus group discussion enriched the data collected during the interviews and contributed to a better understanding of the emerging information policy for the adoption of OSS.

Fontana and Frey (1994) suggested that focus group discussions empower participants to share their respective experiences and supplement each other’s perspectives by contributing incremental pieces to the collective understanding of a research problem. Focus group discussions are also productive techniques in cultural and social scientific research because they provide participants a forum to freely share experiences as a group and offer their own insights on a particular subject that affects them (Tanno & Jandt, 2002).
Table 4

*Summary of Demographic Information for Participants in the Focus Group Discussion*

<table>
<thead>
<tr>
<th>P#</th>
<th>Age</th>
<th>Sex</th>
<th>Nat.</th>
<th>Educ.</th>
<th>Work Place</th>
<th>Affiliations</th>
<th>Yrs in OSS Devt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>53</td>
<td>M</td>
<td>United States</td>
<td>Bac.</td>
<td>S7 Project</td>
<td>S7 Project</td>
<td>4 yrs</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>F</td>
<td>Ireland</td>
<td>Ph.D.</td>
<td>VUU</td>
<td>None</td>
<td>Nil</td>
</tr>
<tr>
<td>3</td>
<td>36</td>
<td>M</td>
<td>United Kingdom</td>
<td>Dip.</td>
<td>ITE Tec</td>
<td>LUG/UNXP/ICTAU</td>
<td>3 yrs</td>
</tr>
<tr>
<td>4</td>
<td>29</td>
<td>M</td>
<td>Uganda</td>
<td>Grad Dip.</td>
<td>IHSU</td>
<td>FOSSFA</td>
<td>1 yr</td>
</tr>
<tr>
<td>5</td>
<td>28</td>
<td>M</td>
<td>United States</td>
<td>Dip.</td>
<td>IMG</td>
<td>UIXP</td>
<td>10 yrs</td>
</tr>
</tbody>
</table>

See Appendix G for a list of abbreviations used in Table 4 above and their full explanations.

**Data Analysis Process**

The data analysis process, consistent with the research approach pursued by this exploratory and descriptive study, constantly evolved with data collection and data analysis occurring iteratively. Appropriate and rigorous data analysis techniques adopted from the grounded theory approach (Glaser & Strauss, 1967) were used for data analysis. The grounded theory approach offers an inductive data analysis methodology through which descriptive data are systematically and iteratively generated (Glaser & Strauss, 1967).

The grounded theory methodology has been widely adopted as a procedure for conceptualizing and analyzing data in diverse disciplines (Lacey & Luff, 2001; Strauss & Corbin, 1990; Taylor & Gibbs, 2011). A key element of the grounded theory methodology, the constant comparison technique, was adopted for this study. This technique is used to compare categories or concepts that emerged from one stage of analysis with categories or concepts that
emerge at a previous stage (Glaser & Strauss, 1967; Strauss, 1987). The constant comparison technique is continuously applied until a point of data saturation is reached (Kreps et al., 1993; Glaser & Strauss, 1967). Strauss and Corbin (1990) stated that the appeal of the constant comparison procedure is to allow a researcher the ability to frequently revisit the data in the light of emergence of new categories or concepts as data collection and analysis progress. The researchers stated that the ideas that develop are viewed as provisional until proven by the data or through further analysis using other analytical tools for validation (Strauss & Corbin, 1998).

Data Familiarization, Organization, Reduction, and Description

This process involved summarizing information from the relevant ICT-related documents and transcribing data from interviews and the focus group discussion. Lacey and Luff (2001) and Miles and Huberman (1994) suggested that because an entire qualitative data set constitutes a large body of information, it requires familiarization, organization, reduction or summarization, and description for effective and meaningful interpretation or analysis. The researcher reviewed the entire dataset from the three data sources and developed some preliminary categories. "A category is a group of words with similar meaning or connotations and must be mutually exclusive and exhaustive" (Weber, 1990, p. 37). Mutually exclusive categories should indicate that no text unit falls between two data points, and each unit should be represented by only one data point (Lacey & Luff, 2001; Miles & Huberman, 1994). The requirement of exhaustive categories is met when the data language represents all recording units without exception (Weber, 1990). These preliminary categories reflected identifiable sets of characteristics that formed a checklist that the researcher constantly reviewed during the development of a codebook to purposely eliminate any ambiguities.
The Coding Process

The researcher adopted an open coding technique for this study that involved the constant comparison of the data by sweeping through the transcripts and marking text segments with codes that represented the semantics of the text (Strauss & Corbin, 1998). A segment is a text, a set of words, sentences, paragraphs, or responses derived from a given dataset (Hruschka, et al., 2004; Stemler, 2001; Weber, 1990).

Coding data, an integral part of the data analysis process, involved the researcher familiarizing himself with the data by reading and re-reading the selected relevant documents, abstracts and summaries, field notes, listening to recordings and reading transcribed data from the face-to-face interviews and the focus group discussion. The researcher then organizes the data by closely examining the relevant documents and reflective notes as well as giving labels to transcriptions.

This process involved constant review and close examination of the data and extracting sections of text units, such as words, phrases, sentences or paragraphs, and assigning different codes or labels. The researcher systematically pursued this process to purposely identify data to address the overarching and the specific research questions. Assigning labels or codes to segments of data enabled the researcher to easily retrieve them at a later stage to further compare, analyze, and identify any apparent patterns, relationships, or associations.

Patton (1990) suggested that coding the data enables researchers to search and identify patterns and themes in the data. Glacer and Strauss (1967), Lacey and Luff (2001), Miles and Huberman (1994), Owen (1984), Strauss and Corbin (1998), and Taylor and Gibbs (2011) developed some common procedures to analyze qualitative data to look for categories or themes from data to describe and explain social phenomena.
The procedures involve close analysis of the data to find relationships and patterns between the categories or themes identified (Taylor & Gibbs, 2011). Lacey and Luff (2001), Strauss (1987), and Strauss and Corbin (1998) suggested that the categories or themes are inductively derived (i.e., they ‘emerge’ from the data). A rigorous examination of the data facilitated the development of coding categories and the identification of regularities, patterns, and topics in addition to using words or phrases to represent topics and patterns.

Owen (1984) proposed three criteria in qualitative research for identifying and creating categories and themes. The three criteria include: 1) recurrence or the extent to which a certain meaning pervades the data; 2) repetition or the frequent use of an expression in the data; and 3) forcefulness or the emphasis in tone identified in the data (Owen, 1984). Data collected using the three techniques were sorted, organized, and managed to ensure their effective and meaningful analysis.

Passages of texts found in the data were coded using descriptive labels or codes based on emerging themes, ideas, terms, phrases or keywords that clearly identified and described the various categories. The descriptive codes with meaningful names were used to give an indication of the idea or concept that supported the theme or category. Any parts of the data that related to a code topic were coded with the appropriate label. Where a theme was identified from the data and did not quite fit existing codes, a new code was created. Thorough and continuous examination of the data by the researcher helped to determine the creation of new codes as more topics or themes became apparent.

Taylor and Gibbs (2011) suggested that during the coding process, several techniques to manage data can be used. For purposes of this study, the researcher used the simple but practical MS Word technique of copy and paste to code and categorizes the data. The technique involved
literally copying transcripts into smaller units for analysis. These were individual words, phrases, sentences, or paragraphs. These text units were pasted onto separate pages for easier sorting and re-sorting. The pages were labeled and saved as MS Word documents, which ensured that texts were easily identified and traceable to their original contexts.

Several copies of text units were created to ensure that text units that had earlier been sorted into different categories or themes were not lost. Categories of data were further compared and collapsed into common themes. All the MS Word documents were kept in electronic folders according to their respective categories. Throughout the coding process, the researcher wrote and kept memos to record reflective thoughts and ideas about codes such as their definitions, significance and relationship to other codes.

Taylor and Gibbs (2011) suggested that memos should include the researcher’s explanations as to why a certain code was created, details about the code and what the coded text reveals, why some codes are re-labeled, some thoughts and questions about the analysis that occurs during the coding process, and as a point of reference for others to enhance the credibility of the process.

The Code Book

The process of developing a codebook involved a further review and closer examination of the data to identify relationships, patterns, and associations in the words, concepts, phrases, and sentences in the dataset. Question-specific codes were developed instead of general or global codes (codes that can be applied to any question) which are more difficult for coders to understand. The researcher used small sets of codes that were specific to each question and every text segment and for every code.
Smaller segments of texts were used for developing the codebook. Responses to each question were coded one at a time and the codes were further consolidated and reduced for purposes of clarity. During the development of the codebook, transcripts were constantly reviewed and segmented into small, clear, and understandable text units, and codes were defined and redefined to ensure clarity.

The researcher constantly assessed whether each code was relevant to a research question and whether the codebook definition of each code reflected what it was meant to capture. The researcher created a set of themes, further reviewed and analyzed the data and developed a master list of codes that operationalized the themes; paid close attention to how relevant the codes were to the study goals and whether the code actually emerged in the text. For each code, the researcher derived a set of rules by which a decision was made as to whether a specific unit of text represented or did not represent an instance of that code.

This was done to purposely ensure that codes were relevant and meaningful to the purpose of the study. Several codes that were developed could be applied to any specific text segment, indicating that coders could identify more than one idea in a text segment. However, different coders may vary in their interpretation of a segment or the content in a text. The constant process of revising and refining the codebook helped to clarify terms and definitions by eliminating redundant codes and codes with overlapping definitions to ensure that coders understood them. A consolidated checklist was finally developed and used by two coders to independently code the data. The coding process consisted of deciding for every text segment and for each code whether the idea indexed by the code was present or absent in the segment.

The researcher segmented the entire dataset into 2484 small units (lines) using word phrases and sentences that represented an idea. Each data segment or line was assigned a unique
identification number that ranged from 1-2484. The researcher assigned 10 definitions (codes) to the 10 categories that emerged from the entire dataset. These categories included: 1) Historical context (HC),
2) Key policy instruments (KPI), 3) Emerging issues (EI), 4) Participant Id Number (PIN), and 5) Knowledge and perception of OSS.

Other definitions (codes or categories) included: 6) Stakeholder identification, interests, and affiliations (SIIA), 7) Stakeholder attributes and affiliations (SIA), 8) Implications of OSS adoption (IOA), 9) Legislation structures & processes (LSP), and 10) Comments and suggestions (CS).

This final segmented dataset was given to two coders to code. The two independent human coders used the codebook (described above) as a guide to analyze and code the data. See Appendix H for a sample of the codebook.

Intercoder Reliability

Intercoder reliability assesses the degree to which codings of text by multiple coders are similar (Hruschka, et al., 2004; Stemler, 2001; Weber, 1990). The coding process involved the distribution of the dataset to independent coders to code the data according to instructions included in the answer sheet that was based on the code book. The researcher developed the answer sheet on which the two independent coders recorded their responses. See Appendix I for a sample of an answer sheet.

The researcher trained the two independent coders to code the data. Both coders were graduate students; a Ph.D. candidate and a master’s student. Due to limited time and resources, a single coding iteration on each of the segment was conducted by the two independent coders. During the coding process, the two independent coders were able to decide whether the code
applied or did not apply to the text segment. A 90.5% agreement was registered by the two coders on the entire dataset. Although a 95% agreement (intercoder reliability) is recommended (Steimler, 2001), for this exploratory study, an overall intercoder reliability percentage of 90.5% was sufficient to proceed with further analysis of the data from which conclusions were drawn.

Krippendorff (1980) and Miles and Huberman (1994) suggested that calculating intercoder reliability based on the percentage of agreement between independent coders in exploratory studies is a required step before any conclusions can be derived from the data. This reasonably high percentage of agreement between the two independent coders offered the researcher a degree of confidence to proceed with inductively deriving themes, meanings, and drawing conclusions from the data. However, given the exploratory nature of the study, the findings and conclusions from this research should be applied with caution.

The coding process helped to increase intercoder reliability and reduced the number of coding rounds to reach acceptable levels of intercoder reliability. The reliable coding of text was a necessary criterion for ensuring quality control during the research process. After the entire dataset was coded, the final intercoder reliability for the entire dataset was assessed in terms of percentage and not necessarily based on statistical standards set by Cohen (1960). This process of establishing intercoder reliability based on the percentage of agreement between the two independent coders facilitated the reduction of error and bias that would have been generated had the researcher single-handedly processed the voluminous amount of text-based data that were collected through this qualitative study.

This inter-coder reliability was an important criterion because it conveyed a sense of respectability as it was also a useful assessment of the quality of the process by which data became conclusions. Additionally, the use of multiple sources of data, built into this qualitative
research design, in the form of triangulation, lent credibility to the findings by incorporating multiple theoretical concepts and data analysis techniques (Steimler, 2001).

For purposes of this study, the coded data were further subjected to specific data analysis techniques to directly address the overarching question:

What are the underlying interests of ICT stakeholders in Uganda to propose a new policy for the formal recognition and adoption of OSS as an alternative choice alongside proprietary software?

The data analysis techniques described in the subsequent sections were used in the context of answering the five specific research questions:

RQ 1. Who are the various stakeholders behind the proposed national information policy for the recognition, adoption, diffusion, and use of OSS in Uganda and what information about OSS technology do they possess?
RQ 2. What are the complementary and competing interests among the various stakeholders in supporting an information policy that would recognize and formalize the adoption and use of OSS as an alternative to the use of proprietary software in Uganda?
RQ 3. How consistent is the proposed OSS policy with the existing legislation on the use of ICTs in fostering an integrated and inclusive information policy in the attainment of Uganda’s national development goals?
RQ 4. What are the characteristics of the policy development structures and processes in Uganda and how have the legislature and government used them to respond to the OSS policy initiative?
RQ 5. What recommendations should be made to improve the policy formation structures and processes to enhance the legitimacy of national policies?

Data Analysis Techniques

Four data analysis techniques were used to make sense of the data: descriptive information policy assessment methodology, stakeholder analysis (SA), frame analysis, and thematic analysis. These data analysis techniques further refined the categorized data and threshed out pertinent issues relevant to the information policy formation process for the adoption of OSS in Uganda.
Descriptive information policy assessment methodology. To better understand the historical context from which the OSS policy initiative for Uganda is emerging, descriptive information policy assessment techniques (McClure, Moen, & Bertot, 1999) were used to analyze the historical and prevailing broader legal and information policy environment in Uganda. McClure, Moen, and Bertot (1999) stated that “because it relies primarily on existing policy and literatures, descriptive information policy assessment methodology is a useful technique that facilitates the description, analysis, and understanding of an information policy area by viewing it from its proper context” (p. 314).

Three descriptive information policy assessment techniques (McClure, et al., 1999) were used to inform and provide a descriptive and valuable context in which this empirical information policy research was conducted, facilitating an understanding of the ICT environment in Uganda and offering insights into the policy formation processes and structures in the country.

Documenting the historical context was a technique used to describe the historical and political context in which the OSS policy initiative for Uganda is evolving. Major ICT policies, laws, reviews, strategies, and ministerial statements were thoroughly examined to describe the evolution of the Uganda ICT sector from the early 1990s to its current status. The illumination of a historical perspective facilitated an understanding of the previous and current policy frameworks that enabled the use of ICTs in the country and helped in the identification of key ICT stakeholders and those behind the OSS policy initiative.

Historical analysis helped to shed light on the factors that have led to the emergence of the OSS policy initiative, identified selected components that relate to the evolving OSS policy, as well as potential benefits and challenges to the new initiative. This technique helps to “clarify
issues and to identify stakeholders, relevant themes and issues, and modification of policy goals” (McClure et al., 1999, p. 322).

The technique to examine key policy instruments was used to review and analyze the major policy instruments, such as acts of Parliament or policy frameworks that created the basis for the emerging OSS policy for Uganda. These instruments were identified, described, and their relevance to the new OSS initiative examined and placed into perspective. The National Information and Technology Authority Act-Uganda (NITA-U (2009) and the National Information and Technology Policy (2010) were the major instruments scrutinized using this technique.

The act and the policy were examined to purposely identify and describe their missions, visions, mandates, goals, and objectives to ascertain whether they were clear enough and had specific relevance in the consolidation of a private sector-driven IT environment that made the OSS policy proposal possible. The analysis also helped to lay a solid foundation for the evaluation of the emerging OSS policy initiative in the newly created information technology (IT) sector.

The key issues identification technique helped in the identification and description of the critical elements in the IT sector that highlight the current status and areas of contention for a particular policy initiative. The key identification technique was applied to inform and strengthen the evolving research design oriented towards iterative data collection, data reduction, and data analysis process. McClure, Moen, and Bertot (1999) suggested that the use of this technique contributes to the strengthening of “an emergent research design with an enriched study methodologies, diverse stakeholder participation in data collection activities, pertinent research
questions and valid policy recommendations based on empirical data collection activities” (p. 324).

The iterative data collection, reduction, and analysis procedures described in the previous sections of this chapter were utilized in the application of the three techniques to make sense of the available and relevant documentary evidence. The application of these three descriptive policy assessment techniques provided unique but complementary information that laid a foundation for the understanding of the Uganda information policy environment into which the OSS policy initiative is emerging. These techniques also informed and enriched the other research activities: face-to-face interviews and the focus group discussion.

Stakeholder analysis (SA). This study used the SA methodology to analyze the coded data to identify, describe, analyze, understand, and categorize stakeholders involved in the OSS policy process. The use of the iterative SA process uncovered information about stakeholder knowledge about OSS and proprietary software, their diverse interests, influence, importance, power, legitimacy, resources, salience, and roles in the OSS policy process.

The initial procedure of this SA involved a systematic review and an understanding of background information about a proposed endeavor to ensure robust and useful outcomes (Burgoyne, 1994; Freeman, 1984; Freeman et al., 2004; Grimble et al., 1995; Mitchell et al., 1997). Drawing from Burgoyne (1994) and Freeman (1984), the initial SA procedure that involved a review and examination of documentary evidence on the evolution of the ICT sector in Uganda was guided by the following questions to identify ICT stakeholders and their respective interests and other attributes in the OSS policy formation process:

• Who would be affected, positively or negatively, by the proposed OSS policy initiative?
• Which individuals, institutions, or organizations had the highest interests in the OSS policy initiative?
• Who wielded official positions, influence, power, and resources relevant to the proposed OSS policy?
• Which names of individuals and organizations came up more often with regard to the proposed policy?

These questions were also consistent with the overarching research question and the five specific research questions that guided this study. In addition to the review of documentary evidence, the SA process was also applied to data directly collected from the ICT stakeholders involved in the OSS policy formation process. The researcher also exchanged electronic correspondences and conducted telephone conversations with other identified ICT stakeholders to gather additional background information that enhanced the SA process.

The application of systematic SA procedures to the data resulted in 1) Identification, description, and categorization of the various stakeholders, and highlighted their levels of interest and legitimacy in the OSS policy initiative; 2) Illuminated the values, perceptions, and roles the diverse stakeholders attached to the proposed OSS policy; 3) Described the levels of influence, importance, power, resources, and salience the various stakeholders wielded; and 4) Identified stakeholders’ affiliations, associations, or institutions to which they belonged or those they could be reasonably associated with, and identified their communication strategies.

This dynamic SA process provided useful information that facilitated a better understanding the stakeholders involved in the OSS policy process, enhanced their categorization, and contributed toward the development of a strategy to manage their relationships to the OSS policy process.
Burgoyne (1994), Freeman (1984), Freeman et al. (2004), Grimble et al. (1995), and Mitchell et al. (1997) suggested that SA facilitates an empirical discovery of existing patterns of interaction, an analytical improvement of interventions, a management of policy-making processes, and helps to predict conflict. The application of the SA technique to the data yielded useful and timely information to coincide with the formative stage of the OSS policy in Uganda. The various facets of stakeholder attributes also offered insights into their capabilities to promote or block the policy initiative, build alliances of support or opposition to the process. The use of SA on the data resulted in the identification of three types of stakeholders involved in the process and the four interest categories into which they fell.

Frame analysis. This study applied a frame analysis technique to the data to facilitate an understanding of how stakeholders involved in the OSS policy formation process in Uganda perceived and described their experiences with OSS and their views on how the policy for the formal recognition and adoption of OSS should evolve. The application of a frame analysis technique to the data highlighted frames, politicized the discussion of information policy problems by relating the policy process to value systems, and offered a clear understanding of the diverse stakeholders in the ICT environment, how contrasting value systems and perceptions influence the development of information policies and laws, and how institutional cultures shape the ICT sector in Uganda.

Drawing on Rowlands et al. (2002) who stated that “…there can be no objective truths in information policy” (p. 32), the application of the frame analysis technique to the data enhanced an understanding of how underlying interests from multiple stakeholders are influencing the formation process for an information policy for the formal recognition and adoption of OSS in Uganda.
The application of frame analysis, a value-centered approach, described and offered a holistic account of the influence of technical, political-economic forces and the humanist or user-oriented factors in shaping the evolving information policy for the adoption of OSS. The use of frame analysis, therefore, enhanced a thorough examination of the participants’ narratives to identify their frames of references that underlined their experiences with OSS and their perception about the OSS policy initiative.

The use of frame analysis to participants’ narratives uncovers the richness of the data, its depth and diversity, and highlights patterns and associations between concepts to gain meaningful interpretations and conclusions about an emerging information policy initiative in any social context (Moore, 1996; Overman & Cahill, 1990; Rowlands, 1998; Rowlands et al., 2002). Rowlands et al. (2002) stated that “emphasizing value systems makes the understanding of information policies more explicit and enhances a transparent debate about what kind of information policy environment is needed and how to achieve it” (p. 36).

The application of the frame analysis technique also provided a clear sense of whether the proposed OSS policy aimed to promote the interests of OSS users as active citizens participating in a technologically transforming Uganda or as mere consumers of the new software. The technique facilitated a comparative analysis of the divergent frames of the stakeholders by sketching them along five dimensions to describe and understand their contrasting experiences with OSS and the policy formation process. This technique underpinned the usefulness of how a value-centered approach highlights and underlines complex social factors associated with information policy formation processes similar to the evolving OSS policy in Uganda.

Thematic analysis. Drawing from Aronson’s (1994) pragmatist approach to thematic analysis, which is also consistent with the perspective in which this research is grounded, this
study applied the strategy to facilitate the pursuit of a systematic and rigorous procedure for examining data. This technique helped to capture and understand a holistic OSS policy process and ideas that emerged from the research process. The pragmatist view of thematic analysis “focuses on identifying themes in the data from patterns of experiences, perceptions, knowledge, behaviors, and attitudes shared, expressed, and displayed by each participant regarding a process or phenomenon under investigation” (Aronson, 1994, p. 1).

The technique enabled the researcher to closely scrutinize and review participants’ statements and list patterns of experiences from direct quotes and to paraphrase common ideas. Thematic analysis enables researchers to combine corresponding patterns from transcriptions, catalogue or label, and categorize into sub themes to obtain a comprehensive view of the information with a discernible pattern emerging (Aronson, 1994). Aronson (1994) suggested that if gaps are identified in the patterns of sub themes, the researcher solicits more clarification from participants to include the feedback in the analysis to develop a composite and logical view articulated by the participants.

This technique enabled the researcher to develop valid arguments for choosing the themes by constantly revisiting the literature, a process that enhanced logical inferences from the data to construct compelling themes that clearly described the evolving policy process. “The process of interweaving the literature with the findings helps the story line to stand with merit, and enhances a holistic understanding of the process and the phenomenon” (Aronson, 1994, p. 3). Reiterating the utility of thematic analysis, Taylor and Bogdan (1989) stated that the methodology facilitates the development of “themes from patterns such as conversation topics, vocabulary, recurring activities, meanings, feelings, or folk sayings and proverbs” (p. 131).
Themes are identified by bringing together components or fragments of ideas or experiences for analysis because, when viewed alone, they are meaningless" (Taylor & Bogdan, 1989, p. 60). Spradley (1979) stated that using a thematic analysis technique enables the researcher to piece together common ideas, narratives, and direct quotes from participants to form themes that capture a comprehensive picture of their collective experience. Leininger (1985) noted that the value of a thematic analysis technique lies in its systematic procedures that help fit together “different ideas or components into coherent and meaningful themes” (p. 60). The coded data were therefore subjected to a thematic analysis that facilitated a holistic understanding of the formative stage of an information policy for the adoption of OSS.

Theoretical analysis. In addition to methodologies used to analyze the data, this study also applied some theoretical concepts to inform and consolidate the data analysis process. The concepts were adopted from the new institutionalism theory, the social construction of technology (SCOT) theory, and the diffusion of innovation (DOI) theory.

The application of the new institutionalism theory, a meta theory grounded in the pragmatist tradition, views information policy processes from three theoretical approaches: the ideological approach, the technology-centered approach, and the interest-group approach (Galperin, 2004). This study used the ideological approach to inform the description, interpretation, and understanding of narratives by participants involved in the OSS policy process in Uganda.

Viewed from the ideological approach, the researcher perceived, described, and explained the value-centered perspectives, attitudes, behaviors, positions, and interests held and espoused by the multiple stakeholders as ideas that served to consolidate and perpetuate the political ideologies of the social groups and institutions they represented. This approach
facilitated an understanding of how the underlying value-centered ideologies represented by the multiple stakeholders informed and influenced their views and attitudes about OSS and the OSS policy initiative.

The two concepts from the SCOT theory included interpretive flexibility and technological frames (Bijker, 1995). The application of these concepts enhanced the examination and understanding of how stakeholders involved in the OSS policy process, in their individual and institutional capacities, presented contrasting viewpoints in negotiations to describe and assign meanings to OSS and how they viewed the evolving policy. Viewed from these two SCOT concepts, narratives from these heterogeneous groups reflected how value systems profoundly influenced perceptions, interests, and the meanings individuals and institutions attributed to an information policy formation for the adoption of OSS.

This study also adopted two concepts from the DOI theory: innovation pioneers and innovation champions or opinion leaders (Backer & Rogers, 1998; Rogers, 1995; Rogers & Kincaid, 1981). The researcher used these two concepts from DOI theory to ascertain whether the pioneers and early adopters of OSS in Uganda, who were at the forefront of promoting the policy initiative had clearly defined and articulated the usefulness and relevance of OSS to Ugandans and utilized the existing communication networks to educate the population about OSS and to promote the initiative among policy makers.

The researcher used the concept of innovation champion from DOI theory to examine narratives from the stakeholders to ascertain whether OSS policy promoters had identified and recruited any influential national leader to articulate the politics of the initiative and persuade both government bureaucrats and policy makers to place the OSS policy proposal on the national and legislative agenda. The analysis of the data through these two concepts provided insights
into the status of the OSS initiative with respect to how effectively the stakeholders had managed the process for the diffusion of OSS and how the respective branches of government had responded to the initiative.

Viewed from the combination of concepts from SCOT, new institutionalism, and DOI theories, the researcher uncovered important characteristics, categories, dimensions, and interrelationships from the data to better describe and contribute towards an understanding of the evolving information OSS policy in Uganda.

Value of triangulation. The triangulation of data collection techniques (i.e., multiple sources of data), data analysis techniques (e.g., descriptive information policy assessment techniques, SA, frame analysis, and thematic analysis), all occurring in an iterative and interactive process, rendered a high degree of confidence in the study results. While the multiple analysis techniques illuminated complementary aspects of the same phenomenon, divergent points in the data that were identified provided interesting insights in the OSS policy development process. Denzin (1978), Lincoln and Guba (1985), and Patton (1990) suggested that in qualitative or naturalistic research, triangulation should be viewed and used as a technique to ensure that an account is rich, robust, comprehensive, and well-developed.

The triangulation of data analysis techniques is a productive exercise because, if diligently applied and contradictions identified in the data set, researchers should pay closer attention to such divergences to derive deeper and broader understandings that may not otherwise be explicitly evident (Denzin, 1978; Patton, 1999; Rist, 1995). Triangulation is justified, as well, because it enables researchers to better understand the totality of a social phenomenon than when a single technique is used to collect and analyze data (Denzin, 1978; Patton, 1999; Rist, 1995). The triangulation of data collection and analysis techniques
contributed to the attainment of the main goals of this study: 1) To provide relevant information about underlying interests of the various stakeholders involved in the OSS policy initiative; 2) To provide relevant information about OSS for Uganda’s policy makers to render informed decisions on an appropriate national OSS policy compared with proprietary software; and 3) To generate descriptive data to create an understanding of the dynamics and complexities associated with information policy formation processes in the country.

Chapter summary. This chapter described the design used in this exploratory study on the formation of an information policy for the adoption of OSS in Uganda. The chapter discussed the qualitative or naturalistic research approach and the case study methodology pursued in this study. The chapter described the research process that involved the application to the IRB at UNT for permission to conduct the study in compliance with the U.S. Federal Government guidelines on research involving human subjects. The chapter described the criteria for identifying and selecting research participants and highlighted the multiple data collection techniques and the data analysis process and procedures that were iteratively applied to address the overarching and specific research questions. The results of the study that emerged from this iterative research process are presented in Chapter 4.
CHAPTER 4

RESULTS

Chapter Overview

This chapter presents the results of research conducted to understand the formation stage of an information policy for the recognition and adoption of open source software (OSS) in Uganda. The first section of the chapter presents results from three descriptive information policy assessment techniques: documenting the historical context, examining key policy instruments, and identifying key issues. Secondly, the chapter presents the results of the stakeholder analysis, delineating the types of stakeholders in the OSS policy process, their interest categories, and strategies that could be adopted to manage relationships among stakeholder categories and the policy process. The third section of the chapter presents results from the frame analysis technique that contrasts perceptions of the diverse stakeholders. The fourth section of this chapter presents the results from the thematic analysis technique.

The results highlight the consistency (convergence) or divergence of the data with the research reviewed in Chapter Two. These results also delineate linkages with concepts drawn from stakeholder theory (ST), frame theory, social construction of technology theory (SCOT), new institutionalism theory, and diffusion of innovation (DOI) theory that were implemented to inform, guide, and ground this study in the interdisciplinary information policy discipline. Linking the results with the adopted theoretical concepts, the literature review, the evolving research approach, and the research questions accentuated the iterative design and pragmatist approach pursued for this study.
Results of the Descriptive Information Policy Assessment Techniques

This section presents the results from the three information policy descriptive assessment techniques applied on relevant information policy documents in Uganda and other related literature. The three techniques utilized included 1) documenting the historical context, 2) examining key policy instruments, and 3) identifying key issues.

Document Historical Context

The government of Uganda broadly conceptualized the information and communication technology (ICT) sector as comprising all forms of media including 1) oral and print, 2) broadcasting (radio, television, and film), and 3) technologies that enable the generation, processing, transmission, storage, and dissemination of information in such forms as voice, text, data, graphics and video (Ministry of Works, Housing, and Telecommunications, 1996). The government also viewed ICTs as fast and easy communication channels for information exchange in all directions for end-users to access, store, and retrieve a broad range of information (Ministry of Works, Housing, and Telecommunications, 1996).

When the government embraced an economic liberalization and privatization policy in 1989, traditional media, including print and broadcasting, were the first to be affected (IMF, 2008; Kannyo, 2004; Kasfir, 2000; UNDP, 1998; World Bank, 2008). The government first liberalized radio, television, and print communications to break the monopoly of the state-owned media and allow private sector participation. To license and regulate the nascent but expanding and liberalized print and broadcast media environment, the government enacted the Press and Journalist Act (1994) and the Electronic Media Act (1996).

The Press and Journalist Act of 1994 ensured the freedom of the press and provided for a council regulate mass media and provided the establishment of an Institute of Journalists of
Uganda (Media Council, 2007). The Electronic Media Act of 1996 provided for the setting up of a broadcasting council to license and regulate radio and television stations as well as consolidated laws governing the electronic media (Broadcasting Council, 2000). These initial acts that reflected the government’s vision aimed to transform and lead the country into an information society. As a result of these pioneering policies that liberalized the print and broadcast media, there are now over 50 newspapers, over 250 FM radio stations, and 50 television networks in Uganda (Ministry of ICT, 2012a; Tentena, 2012; UCC, 2013a, 2013c).

The telecommunication policy framework (1996). The current telecommunications policy and regulatory environment in Uganda was established through the Telecommunications Policy Framework of 1996. This policy instrument espoused the national vision of universal access to ICTs to promote human development through an expanded telecommunication infrastructure and an improved penetration of telephone services in the country based on private sector investments and not government financial intervention (Ministry of Works, Housing, and Telecommunications, 1996).

The main goal of the policy was to ensure that “…a new and digitized national network became the pillar to new spectrum utilization and value addition to enable the emergence of new innovations and services, such as data communication, Internet services, Internet-based applications, effective broadcasting (FM-radio) and courier services” (Ministry of Works, Housing, and Telecommunications, 1996, p. 7). This policy also aimed at unbundling the state-owned Uganda Posts and Telecommunications Corporation (UPTC) to create privately owned companies to provide telecommunications services more efficiently. The Ministry of Works, Housing, and Telecommunications (1996) stated that the key strategy for the policy was to create an independent regulator of the ICT sector to implement a limited competition period referred to
as the exclusivity period or duopoly licensing arrangement to provide basic telephony services, such as cellular telecommunications and satellite infrastructure.

The exclusivity (duopoly) license regime referred to a five-year period during which incentives were offered to private investors in the telecommunications sector to attract investments at a time when the ICT market size was assumed to be small (Ministry of Works, Housing, and Telecommunications, 1996, 1997). During the exclusivity period, only two operators, UTL and Mobile Telephone Networks (MTN) Uganda Ltd, were licensed to provide some telecommunications services for a period of 5 years, from July 2000 to July 2005 (Ministry of Works, Housing, and Telecommunications, 1996, 1997).

The policy framework introduced liberalization and competition and a new licensing regime for multiple operators in the nascent ICT sector and resulted in the enactment of the Uganda Communications Act in 1997 (Ministry of Works, Housing, and Telecommunications, 1997). This law provided for the establishment of an independent regulatory body, the Uganda Communication Commission (UCC) to oversee the development and regulation of the telecommunication industry.

The Ministry of Works, Housing, and Telecommunications (1997) stated that the act resulted in the unbundling of the UPTC to create three independent companies: Uganda Telecommunications Limited (UTL), Uganda Posts Limited (UPL), and Posta Bank Limited (PBL). The telecommunications policy framework (1996) and the Uganda Communication Act (1997) facilitated an increase in the penetration and level of telecommunication infrastructure and services through private sector investments. The ministry reported that by 2003, UTL was the dominant operator in the provision of fixed telephony services while MTN Uganda, Ltd. was
the dominant operator in the provision of mobile telephony services followed by Celtel Uganda, which had launched a mobile telephony service in 1995.

The Uganda Communication Act (1997) mandated the UCC to regulate radio communications and approve types of equipment to be used; regulate postal services including practice and procedure; enforce fair competition, licensing, universal service, interconnection regulations in the sector, and tariff and accounting procedures for all stakeholders (Ministry of Works, Housing, and Telecommunication, 1997). The act mandated the UCC to guide and regulate activities of the sector, arbitrate disputes, and impose penalties on violators of ICT regulations (Ministry of Works, Housing, and Telecommunication, 1997).

The 1996 policy and the 1997 act facilitated the establishment of the current ICT sector and resulted in the emergence of identifiable ICT stakeholders. These stakeholders continue to include the government, corporations, ICT professionals, educational institutions, academicians, vendors, international organizations, and users at various levels (IMF, 2008; Scan-ICT Project, 2002; UNDP, 1998; World Bank, 2008). These two instruments created an ICT environment that enabled stakeholders to understand and conduct their businesses within an enabling legal framework in which the government only played the role of a facilitator (IMF, 1998; Scan-ICT Project, 2002; UNDP, 1998; World Bank, 2008).

The Uganda Investment Authority (UIA, 2011) stated that under the 1996 policy framework and the 1997 act, most of the set targets were attained, especially the national vision of universal access to ICTs to promote human development. The liberalization of the ICT sector resulted in rapid expansion of the sector and the acquisition, use, and application of a wide range of ICTs. These included cellular and mobile telephone networks, mobile radio communication, paging services, courier services, and multipurpose community telecenters that offered a variety
of services, such as fax, telephone, computer, Internet, e-mail, and media services, books, and other reading materials (IMF, 2008; UIA, 2011; UNDP, 1998; World Bank, 2008). However, the policy framework and the act emphasized only communications and broadcasting aspects of ICT and paid little attention to information technology (IT) services (UIA, 2011).

Although IT was not emphasized at the time, the government and financial institutions started embracing IT through automation of some of their basic functions (Scan-ICT Project, 2002; UIA, 2011; UNDP, 1998; World Bank, 2008). In 1998, the Uganda National Council of Science and Technology (UNCST) commenced consultations to review the national telecommunication policy framework of 1996. In the same year, an initiative to promote investments and training in ICTs was launched through the Presidential Round table Forum to promote the universal access and use of ICTs (IMF, 2008; MOWHT, 1997; Scan-ICT Project, 2002; UIA, 2011; UNDP, 1998; World Bank, 2008).

In 2002, the Ministry of Education launched computer studies in secondary schools and Makerere University introduced diploma, bachelor’s, and master’s degree courses in computer science (Scan-ICT Project, 2002; UIA, 2011). Given its cross-cutting nature, ICTs continued to play a transformative role in job creation and enhanced efficiency in service delivery (Scan-ICT Project, 2002; UIA, 2011). Although the ICT sector revolved mainly around telecommunications, postal, and broadcasting services, with very limited data handling services, it grew at a phenomenal rate over the first decade (IMF, 2008; Scan-ICT Project, 2002; World Bank, 2008). Areas that witnessed growth included mobile devices, computer applications, information processing, storage and dissemination, including broadcasting and Internet points of presence at district levels, e-finance, global connectivity, and online trading (IMF, 2008; UIA, 2011; World Bank, 2008).
The Rural Communications Development Policy (RCDP), 2001. To ensure universal access to ICTs and coverage of the entire nation, the government implemented the RCDP in 2001 with a key objective of providing basic communication services within reasonable distance to all Ugandans (Uganda Communication Commission {UCC}, 2001). The RCDP emphasized three key areas: 1) coverage, 2) connectivity, and 3) content. These three areas aimed to help populations in rural areas improve their lives and transform into information society (UCC, 2001). Coverage was considered vital to extend ICT access and to reduce the percentage of underserved populations while attaining the World Summit on the Information Society target for access to basic ICT services set in 2003 and 2005 respectively (UCC, 2005, 2009; UIA, 2011; World Summit on Information Society {WSIS}, 2013). Studies are currently underway by UCC to assess the impact of the RCDP activities in the communities where they have been implemented and toward national development (Mulira et al. 2010).

The National Information and Communication Technology (ICT) Policy (2003). In 2003, the National ICT Policy was adopted to fill a growing vacuum for appropriate policy and legislative framework to fully guide and regulate the dynamic and increasingly critical ICT sector (Ministry of Works, Housing, and Telecommunication, 2003). Besides seeking to bring all ICT-related matters under one governmental ministry providing policy leadership, the key objective of the new policy was to ensure that there was nationwide ICT coverage and the means to solve challenges encountered in the maintenance and sustainability of ICT development initiatives.

Recognizing the increasing importance and cross-cutting nature of ICT in national development, the 2003 National ICT Policy embraced three key areas:

1) Information as a resource for development,
2) Mechanisms for accessing information, and

3) ICT as an industry, including e-business, software development and manufacturing

(Ministry of Works, Housing, and Communication, 2003).

These three areas were to simultaneously lead to convergence between media and telecommunications and result in integrated national development (Ministry of Works, Housing, and Communication, 2003).

The principle guiding the 2003 ICT Policy was derived from Uganda’s constitutional requirements, such as freedom of expression, universal access and use of information including ICTs, promote media pluralism to enhance cultural identity and national sovereignty and conformity to rights espoused in binding international conventions and treaties reflecting principles regarding human rights and freedoms to communicate (Ministry of Works, Housing, and Communication, 2003). The policy vision was to achieve national development through the promotion of human development and good governance, sustaining and accelerating efficient application and use of ICT, including timely access to information (Ministry of Works, Housing, and Communication, 2003). The major policy goal aimed to facilitate the access and use of ICTs in all sectors to enhance transparency and accountability in governance, eradicate poverty, deliver quality health services, and provide world class education especially in science and technology (Ministry of Works, Housing, and Communication, 2003).

Additionally, the policy sought to improve agricultural production, increase the generation of energy, and protect the environment, increase business and trade, and collaboration with global communities to improve peoples’ lives. Other key goals were to develop new policies to ensure the integration and mainstreaming of ICTs in all sectors of the Ugandan

Policy objectives included financing and coordinating ICT training at all levels in the education sector, recognizing the value of intellectual assets, and financing ICT innovations to turn them into productive enterprises enabling Ugandans to fully participate in the information society (Ministry of Works, Housing, and Communication, 2003). The policy recognized that since the pace of change in ICTs was so fast, acquiring the relevant new knowledge and skills meant that ICT education had to become a continuous process.

The policy also aimed to harmonize a legal and institutional framework to ensure a coordinated approach to overall development of ICT in the country, guide and direct ICT investments to the country, ensure gender mainstreaming in all ICT programs, address intellectual property rights, security of information, confidentiality, anti-piracy, censorship, and info-ethics (Ministry of Works, Housing, and Communication, 2003). The policy encouraged public and private sector participation in ICT awareness programs and embraced the global shift to an information society (Ministry of Works, Housing, and Communication, 2003). The 2003 national ICT policy highlighted a vision by the government of Uganda to develop integrated and inclusive ICT policies to attain the country’s development goals.

The ICT sector performance review, published in 2005 by the Uganda Communication Commission, two years after the adoption of the national ICT policy in 2003, recommended the establishment of a Ministry of Information and Communication Technology to offer clear political leadership and policy guidance to enhance the transformation of Uganda into an information society (UCC, 2005). The review recommended a harmonized and flexible legal
framework to address the dynamic ICT sector and its increasingly competitive and complex market and to include more actors to guide the sector to achieve the desired national development goals (UCC, 2005).

The review stated that despite government policy interventions, different aspects of ICT remained scattered within different ministries, leading to fragmentation and lack of coordination in development and implementation of ICT programs (UCC, 2005). The 2005 sector review also recommended the termination of the exclusivity period, a strategic licensing arrangement that had led to the expansion of telecommunication infrastructure and services in the country (UCC, 2005). The recommendations resulted in the implementation of major reforms that opened up the sector to full liberalization and the establishment of the Ministry of ICT in 2006 (IMF, 2008; Lange, 2010, 2012; UIA, 2011; World Bank, 2008). The telecommunications policy environment was re-structured, ending the exclusivity period and ushering in full liberalization and competition within the ICT market that was previously segmented into two categories, service and infrastructure (IMF, 2008; Lange, 2010, 2012; UCC, 2009; UIA, 2011; World Bank, 2008).

The new telecommunication market structure created at the end of the exclusivity period also resulted in the adoption of a technology neutral licensing regime that allowed operators the freedom to select and use technologies of their choice (IMF, 2008; Lange, 2010, 2012; Ministry of ICT, 2009; Mugabe, 2010; Mulira et al., 2010; UCC, 2009; UIA, 2011; World Bank, 2008). The new licensing regime was viewed as a catalyst to innovation compared with the previous licensing arrangement that limited competition and innovation (UCC, 2009, 2013a).

The UCC also created two service licenses to encourage the emergence of new businesses in the ICT sector. The first type, the voice and data license, considered service neutral, recognized capabilities of modern technologies to provide both voice and data at
minimal cost while the second type, a capacity resale license, was issued for service resale operators using technologies of other operators (IMF, 2008; UCC, 2009, 2013c; UIA, 2011; World Bank, 2008). The second category enabled providers of calling card services and providers of Voice over Internet Protocol call termination services to operate in Uganda (Mulira et al., 2010; UCC, 2009, 2013c). The segmentation of the ICT market and the issuance of various categories of licenses became a catalyst to the growth of the ICT sector and the creation of a flexible and favorable investment environment (IMF, 2008; UCC, 2013c; UIA, 2011; World Bank, 2008).

Despite the technology neutrality approach in licensing, the global system for mobile communication continued to dominate as a mobile standard compared with VoIP (Mulira et al., 2010; UCC, 2009, 2013c). The technology neutrality approach also created loopholes in the use of ICTs as operators dumped some inferior technologies on the Ugandan market due to laxity in enforcement of quality control guidelines (IMF, 2008; Lange, 2010, 2012; World Bank, 2008).

The impact of the enhanced liberalization policy of the mobile telephony sector in 2005 revolutionized the ICT environment in place since 1995 when Airtel, formerly Celtel (later Zain/Bharti), launched the first network in the country (IMF, 2008; UCC, 2013a, 2013c; World Bank, 2008). MTN Uganda Limited had earlier launched its operations in the country in 1998, UTL followed in 2001, and Warid Telecom in 2005 (UCC, 2013a, 2013c; World Bank, 2008). HITS Telecom, which entered the ICT market in 2008 but sold its majority shares to Orange, France’s Telecom’s mobile unit in 2009, was followed by Smile Communications Uganda in the same year (UCC, 2013a, 2013c; World Bank, 2008). By December 2012, about 50 providers had been issued licenses by UCC under the new licensing regime to provide infrastructure, services or both (Business Monitor International {BMI}, 2012a, 2012b, 2013; Lange, 2012; Ministry of
ICT, 2012a; UCC, 2013c). BMI (2012b, 2013), Lange (2012) and UIA (2011) suggested that the growth of the telecommunication sector continued to rise mainly due to favorable ICT policies, increased investments from the private sector, and the diversification of products, such as data and value-added services in the market.

The mobile market remained the major revenue driver in the ICT sector, accounting for 63% of the telecom revenue followed by the fixed line segment (BMI, 2012a, 2012b, 2013; Lange, 2012; Ministry of ICT, 2012a; UCC, 2013a; UIA, 2011). Telecom headset revenue distribution continued to rise as indicated by the increase in mobile telephony subscriptions that grew to over 17 million by mid 2012 compared with 276,000 in 2001 (BMI, 2012b; Lange, 2010; Ministry of ICT, 2012a; UCC, 2013a). The enabling policies and statutes that contributed to the evolving ICT environment became catalysts that led to the development of sector-specific strategies, programs, projects, and draft policies designed to embrace and adopt ICTs in their respective activities. The Ministry of Education and Sports developed a draft ICT policy that integrated ICTs in the training of teachers, as instructional materials, and as tools for learning (Ministry of Education and Sports, 2006). From 2006, the National Planning Authority (NPA) developed a strategy to integrate ICTs in the national development planning process alongside the Poverty Eradication Action Plan (PEAP) as critical tools in its mandate to coordinate the national development planning process (Ministry of ICT, 2009c; National Planning Authority {NPA}, 2006). The Vision 2040 integrated ICTs as strategic tools to transform Uganda from a predominantly peasant and low income country to a modern, prosperous, and competitive upper middle income country within 30 years (NPA, 2012).

In 2009, the Ministry of ICT developed an ICT sector thematic paper for the National Development Plan (NDP) to integrate ICTs in the implementation of the Poverty Eradication
Action Plan (PEAP) for 2009-2014 (Ministry of ICT, 2009c). Consistent with ICT-related research on information policies, Uganda’s ICT policies pursued from 1996 were designed to achieve three major goals, namely: 1) To improve and provide education to citizens by providing equitable access and use of ICTs, promote life-long learning, bridge the digital divide, and enable the country to evolve into an information society (Castells, 1997, 1998, 2000; Cogburn, 2003; Moore, 1996); 2) To optimize ICT use for commercial and industrial productivity and competitiveness, and invest in e-government programs (Castells, 1997, 1998, 2000; Cogburn, 2003; Moore, 1996); and 3) To develop a national information infrastructure to enable the population to access and use global digital networks for communication and innovation (Castells, 2000; Moore, 1996; Shapiro & Varian, 1997).

The broadcasting sector was the first that Uganda liberalized in 1992. Uganda pioneered the liberalization of the media in Africa by allowing private radio and television to operate after the government lifted the monopoly over the airwaves in 1992. From 1996, the Uganda Broadcasting Council took over the responsibility of licensing and regulating radio, television, and video/film activities including the granting of frequencies according to the provisions of the Electronic Media Act of 1996 (Mukasa, 2007). Following the merger of the Uganda Broadcasting Council and the UCC in 2010, the UCC under the provisions of the Uganda Communication Act (1997) became the regulatory authority of all ICT activities in the country (Ministry of ICT, 2012a; Musoke, 2010).

The Uganda Broadcasting Corporation Act (2005). The Uganda Broadcasting Corporation (UBC) was established by an act of Parliament in 2005 as a successor to state-owned Uganda Television and Radio Uganda. Fully owned by the government of Uganda, UBC
was established to operate independently in a commercially sustainable manner and to foster national unity as a public broadcaster (UBC, 2005; Ministry of ICT, 2012a; UCC, 2013a, 2013c).

Key objectives of UBC included but were not limited to: develop the broadcasting bodies into a public national broadcasting center of excellence; provide electronic media and consultancy services to educate and guide the public; achieve and sustain comprehensive national radio and television coverage; and sustain a common carrier status (UBC, 2005; UCC, 2013a, 2013c). The main function of the corporation was to provide radio and television broadcasting services and programs to contribute to social and economic development with emphasis on national unity in cultural diversity (UBC, 2005).

The Access to Information Act (2005), a significant piece of legislation, was enacted to implement Article 41 of the Uganda Constitution of 1995, which required all government ministries, departments and agencies to appoint information officers to undertake the responsibility of providing information to people who request it (Ministry of Information and National Guidance, 2005; Media Council, 2007). In 2011, the government adopted the Digital Migration Policy Framework for television broadcasting with a goal of switching over from analogue to digital broadcasting services by 2015 as stipulated by the International Telecommunications Union (Ministry of ICT, 2011a). The International Telecommunications Union is responsible for the standardization and regulation of radio and telecommunications worldwide (Ministry of ICT, 2011a; UCC, 2013c).

The Uganda Communications Act 2013. Owing to numerous challenges emerging as a result of the rapidly expanding telecommunications sector in Uganda, the Broadcasting Council and the Communication Commission were merged in 2013 to consolidate and harmonize the objectives, functions and powers of the Uganda Communications Act (1997) and the Electronic
Media Act (1996). This act dissolved the Uganda Communications Commission and the Broadcasting Council and reconstituted them as the Uganda Communications Commission (UCC, 2013f). The 2013 act mandated the UCC to develop a modern communications sector, including telecommunications, broadcasting, radio communications, postal communications, data communication, and infrastructure (UCC, 2013f). The objectives were to be attained by establishing one regulatory body for communications in accordance with international best practices to enhance national coverage of communications services (UCC, 2013f).

Evolution of Internet services in Uganda. The Internet services and market are nascent phenomena in Uganda. By 1996, the existing telecommunication infrastructure in the country could not support the new Internet technology, diffusion, and use of the Internet (Akpan-Obong et al., 2009; IMF, 2008; UNDP, 1998; World Bank, 2008). Although Internet services attracted minimal emphasis from the government at the time, the first Internet license was issued in 1996 to Infocom, an Internet service provider that operated primarily in Kampala (Ministry of Works, Housing, and Communication, 2003). Unlike mobile telecommunication devices that were comparatively less expensive to acquire, adopt, diffuse, and use, Internet technology and services were expensive to establish and provide (Ministry of Works, Housing, and Communication, 2003; UCC, 2005).

For the early adopters and users, Internet services in Uganda were provided through the following companies and technologies:

- Dial-up broad Internet services provided by Infocom;
- Digital Subscriber Lines (DSL) mainly offered by Uganda Telecom Limited, with speeds ranging from 64 bps to 256 kbps;
• Private Very Small Aperture Terminals (VSAT) satellite wide area network provided by AfSat (Scan-ICT Project, 2002; UCC, 2005).

While the adoption and use of Internet technology was slow, about 20 Internet service providers, mainly based in Kampala, had been licensed to primarily offer Internet/email access services by the end of 2002 (UCC, 2005). Although the government encouraged providers to extend their services in other towns, nongovernmental organizations (NGOs) became the first responders together with the Rural Communication Development Program, which helped to establish telecenters to offer Internet, computing, e-mail, telephone, fax, and photocopying services (UCC, 2005). Before 2008, the previously e-landlocked Uganda had no direct access to the international fiber backbone. Internet service providers (ISPs) used earth stations and satellite links for international voice, Internet, and data traffic (UCC, 2005). This was a highly expensive technological service reflected in user fees paid by the few customers, mainly international corporations and NGOs, embassies, and select government agencies (Akpan-Obong et al., 2009; IMF, 2008; Mulira et al., 2010; UCC, 2005; UIA, 2011; World Bank, 2008).

By the end of 2008, Uganda had only 22,000 fixed-line Internet subscribers (Akpan-Obong et al., 2009; UCC, 2009). However, the entire Internet market landscape was radically transformed following the introduction of mobile Internet devices in the country by 2008. Mulira et al. (2008) suggested that the mobile Internet market segment followed a similar trend taken by the mobile voice market because of its easy accessibility, mobility and availability, resulting in a rapid expansion of global system for mobile networks with fixed telephony services easily provided to most parts in the country. In 2008, WiMAX and Wireless Fidelity (WiFi) offerings became available, as well as 3G accesses in some towns and GPRS connections on the GSM
networks around the country (Baranga, 2011; Bogere, 2010; Kisakye, 2010; Mucheru, 2011; Mulira et al., 2010; UCC, 2013a; UIA, 2011).

Increased access to the Internet triggered a degree of competition in the fast-growing Internet market as new voice operators offered attractive bundled deals over optical fiber networks mainly to large corporations in Kampala (BMI, 2012a, 2012b, 2013; Lange, 2012; Ministry of ICT, 2012a; Mulira et al., 2010; UCC, 2013a, 2013c; UIA, 2011). Five major ISPs including, UTL, MTN, Airtel, Orange, and Warid telecom companies emerged as some of the most distinguished stakeholders in the new Internet market (Ministry of ICT, 2012a; Mulira et al., 2010; UCC, 2013a, 2013c; UIA, 2011).

From 2009, when the previously e-landlocked Uganda became connected via the national backbone infrastructure (NBI), to the three international submarine fiber optic cables that landed on the East African coast, the optical fiber network in Uganda expanded rapidly (Ministry of ICT, 2012a; UCC, 2013a, 2013c; UIA, 2011). The connection to three submarine cables, TEAMS, SEACOM, and the East African Sub-marine System (EASSy) became a major driver of the Internet service market (Ministry of ICT, 2012a; UCC, 2013a, 2013c; UIA, 2011). These technological improvements in the infrastructure resulted in increased service penetration and use as providers introduced and promoted unlimited calling and attractive pricing schemes leading to a growth in usage and call traffic (BMI, 2012a, 2012b, 2013; Lange, 2012; UCC, 2013a, 2013c).

These changes in data transmission technology received a further boost after the completion of the first and second phases of the NBI in 2011 when Uganda’s border towns were linked to neighboring Kenya to the east and Rwanda to the southwest (Baguma, 2011; Ministry of ICT, 2012a; National Information Technology Authority-Uganda {NITA-U}, 2013; The

The availability and access to the wireless Internet in addition to fixed line services resulted in reduction of Internet fees, increased subscriptions, and use of the Internet by Ugandans on social media to promote their businesses online, to solicit support during political campaigns, to participate in e-learning, and to collaborate with global communities to advance their professions and engage in research and innovations (Baranga, 2011; BMI, 2013a; Bogere, 2010; Kisakye, 2010; Lange, 2012; Mucheru, 2011). Internet subscriptions had risen from 300,000 in 2008 to an estimated 6 million users by the end of 2012 (BMI, 2013a; Ministry of ICT, 2012a; NITA-U, 2013; Tentena, 2012; UCC, 2013a).

In rural areas, however, deployment and use of Very Small Aperture Terminals especially by NGOs remains the technology for Internet access in addition to the availability of Internet points of presence provided by Uganda Communication Commission through the Rural Communication Development Program at district headquarters (UCC, 2009, 2013d). Despite UCC efforts through the RCDP, the quality of Internet services in rural areas continues to be poor as inadequate infrastructure continues to pose huge challenges (UCC, 2009, 2013d; UIA, 2011).

The favorable ICT environment resulted in an upsurge of new players in the Internet market offering various technology products, services, and solutions, including human resource
outsourcing, training, infrastructure, hardware, software offerings, enterprise solutions, and support and business management solutions (Nakayima & Bwambale, 2011; Ssempijja, 2011; UIA, 2011; Wafula, 2010c, 2010d). The College of Computing and Information Technology at Makerere University operates the National Software Incubation Center where students have developed various types of software tools used in the public and private sectors, including the translation of the Mozilla Firefox browser into a local language (Nakayima & Bwambale, 2011; Ssempijja, 2011; UIA, 2011; Wafula, 2010c, 2010d).

These developments in Internet services also attracted the attention of the international community including a visit in 2009 by Sir Berners Lee, the developer of the World Wide Web (WWW) to share his experiences with stakeholders in the IT sector, who included policy makers, government bureaucrats, professionals, academicians, students, and users from various parts of the country (Devapriyo, 2009). A number of top technology companies, including Google, IBM, and Nokia have initiated partnerships with the Makerere University College of Computing and Information Technology to develop a variety of software (Nakayima & Bwambale, 2011; Ssempijja, 2011; UIA, 2011; Wafula, 2010c, 2010d). These relationships have subsequently placed Internet developments in Uganda on the international scene.

The Ministry of ICT. The Ministry of ICT was created in 2006 to purposely bring all aspects of ICT under one governmental ministry to provide leadership with a vision of transforming Uganda into an information society. The ministry was mandated to provide strategic and technical leadership, coordination, support, and advocacy on all matters of policy, laws, regulations and strategy to ensure sustainable, efficient and effective development through harnessing and utilizing ICT in all spheres of life to enable the country to achieve its national development goals (Ministry of ICT, 2006).
The major goal of the ministry was to enhance and sustain national development and good governance through the development of ICT infrastructure and services to enable the population to use ICTs for economic and social transformation through poverty reduction and improvements in educational and health services (Ministry of ICT, 2006, 2009a, 2012a). Consistent with the National Development Plan 2010/2015, the ministry was mandated to strategically promote the convergence of ICTs to conduct research and development, human capacity building, awareness creation, and mass sensitization to enhance e-government, e-health, e-learning, and e-commerce, among others (Ministry of ICT, 2006, 2009a, 2012a).

The ministry spearheaded the process of enacting the National Information Technology Authority-Uganda (NITA-U) Act in 2009 that provided for the creation of the National Information Technology Authority-Uganda (NITA-U) with a main objective of harnessing the information technology sector to contribute to national development (Ministry of ICT, 2009b). The ministry retrospectively developed and adopted the national information technology (IT) policy in 2010 (Ministry of ICT, 2010). In 2011, the government passed three laws to supplement the NITA-U Act in the regulation of the IT sector.

These acts included: 1) The Electronic Transactions Act (2011) which provides for the use, security, facilitation and regulation of electronic communications and transactions, and encourages the use of e-government service; 2) The Electronic Signatures Act (2011) which provides for the use of electronic signatures and regulation, criminalizes unauthorized access and modification of electronic signatures, and determines minimum requirements for functional equivalence of electronic signatures; and 3) The Computer Misuse Act (2011) which provides for the safety and security of electronic transactions and information systems, prevents unlawful access, abuse or misuse of information systems, including computers, and provides for securing
The government also adopted the National Development Plan 2010-2015 with an emphasis on the use of ICTs in poverty eradication (Ministry of ICT, 2009c). Some of the strategies and programs implemented toward the realization of the plan included the business process outsourcing strategy in 2011, to guide the development and growth of the outsourcing services in Uganda for both on-shore and off-shore services (Ministry of ICT, 2011c).

Through the Ministry of ICT, the government launched the national electronic government framework (2010) with the main purpose of strategically using ICTs to modernize and promote an efficient and effective government, facilitate accessibility to services, allow greater public access to information, and make government more accountable to citizens, among other goals (Ministry of ICT, 2011b). The e-government program is currently running simultaneously with the implementation of the National data transmission backbone infrastructure and the e-government infrastructure (EGI) project for high speed communications by laying fiber optic cables, installing appropriate communication equipment, and providing training and service (Ministry of ICT, 2011b). The e-government infrastructure platform aims to increase the transparency of government activities, enable departments to share public data and enhance inter-departmental coordination, reduce government administration costs, and improve work efficiency (Ministry of ICT, 2011b).

To address poor management of information resources within the government, the government developed the information management services policy in 2011 (Ministry of ICT, 2012c). In 2012, the Ministry of ICT published a report to streamline the use of ICTs in government departments after recognizing the adhoc and haphazard manner in which ICTs were
introduced into most departments. The report recommended that the Ministry of ICT take the lead in ensuring the reorganization and re-structuring of ICT activities in all government institutions (Ministry of ICT, 2012b). The government also adopted the National Vision 2040 to guide all development programs with a forecast of ICTs contributing 40% to Uganda’s GDP by 2040 (Ministry of ICT, 2012a; National Planning Authority {NPA}, 2012).

Ten years after the 2003 ICT policy was implemented, the Ministry of ICT issued a draft review of the policy for consultations and approval with a major aim of integrating all Ministry of ICT policy pronouncements into one document and to capture other emerging areas that were not addressed in the 2003 National ICT Policy (Ministry of ICT, 2012a). The national ICT policy of 2003 embraced regulatory arrangements in which private sector investments supplemented by some targeted government initiatives resulted in significant expansion of the ICT sector (Ministry of ICT, 2012a). These ICT-related policies reflect the perception by the government which regards ICTs as necessary tools for economic development and social transformation with the ICT sector assuming a key position in the national priority areas for development.

Regulatory authorities in the ICT sector. Currently, the involvement of government in the ICT sector is to facilitate the development of enabling policy instruments to guide and regulate the private sector-driven ICT industry. For purposes of developing the requisite ICT laws, the Uganda Law Reform Commission (ULRC) drafts and sets the legal framework on behalf of the executive branch before relevant government structures, such as the Parliament and related stakeholders, participate in the process (Ministry of ICT, 2012a; Uganda Law Reform Commission {ULRC}, 2011). Laws or statutes (Acts of Parliament) are proposed by the government, debated, enacted by the Parliament of Uganda, and assented to by the President (Parliament of the Republic of Uganda, 2011; ULRC, 2011). Policies, however, are sets of
principles, strategies, and/or regulations developed by the executive branch of government through the relevant ministries in consultation with respective stakeholders, including the Parliament, and approved by the cabinet (Parliament of the Republic of Uganda, 2011; ULRC, 2011).

The Ministry of ICT and the NITA-U are the government agencies that primarily undertake the coordination and integration of the different IT activities in the public and private sectors as well as initiation and development of IT policies, laws, advice, and strategies (Ministry of ICT, 2012a; NITA-U, 2009).

The Ministry of ICT, Uganda Communication Commission (UCC), and the Media Council oversee the regulatory functions and promote development of communication, telecommunications, postal, and broadcasting services in the country (Ministry of ICT, 2012a; UCC, 2013f). The Uganda Investment Authority promotes and facilitates investment opportunities in the ICT sector as well as serving as the focal point for ICT export strategic intervention programs (Ministry of ICT, 2012a; UIA, 2011). The Uganda National Council of Science and Technology and the Public Tertiary Institutions undertake ICT training, research and champion innovations, as well as engage in research and development for ICT policies, laws, and strategies (Ministry of ICT, 2012a; UIA, 2011). The Ministry of ICT provides the political leadership and overall supervision of all activities in the ICT sector through the various agencies on behalf of the executive branch.

The exponential growth and dynamism of the ICT sector can be attributed to the government favorable legal and regulatory framework, a stable macroeconomic environment and economic reforms that liberalized the sector in the 1990s. The ICT environment in Uganda is strengthened by key drivers that include the country’s strategic geographic location that position
it as a central area from which other landlocked East and Central African countries derive their supplies (UIA, 2011). Also, Uganda’s time zone (8 hours ahead of the USA and Canada, 3 hours ahead of the UK, and 6 hours behind Japan) give it a strategic advantage to conduct business with the countries that are the major consumers of ICT related services in the world (Ministry of ICT, 2012a; UIA, 2011).

A huge local ICT market that is still under-served, in a well-regulated and liberalized environment with low-cost operation licenses and an expansive pool of skilled and youthful labor force, position Uganda’s population as a ready resource for both deployment and re-tooling to productively engage in the ICT sector (UIA, 2011). An educated, young, and vibrant population (fluent in English) with some specialized ICT training and a supportive ICT infrastructure, provides an attractive environment for future investments. Uganda Investment Authority (2011) reported that for the last twelve years, the ICT environment has enjoyed specific sector related incentives, including a waiver of taxes on computers and related equipment, to encourage its growth as well as other incentives including initial and deductible annual allowances to ICT companies.

Sector analysts forecast that with the private sector as the most e-ready entity in the country, steady investments will continue flowing into the ICT sector as a favorable business climate for expansion through automation and training is projected for many years ahead (UIA, 2011). The NGO community, international donor agencies, and financial institutions have also become major markets for ICT products and services as well as sources of employment for ICT workers in the country (BMI, 2013; Lange, 2012; UIA, 2011). With a rapidly improving ICT infrastructure, an educated workforce, and a well-regulated sector, progress towards transforming the Ugandan society to directly engage in the development of various technology
services for the local, regional and global market is on course (BMI, 2013; Lange, 2012; Ministry of ICT, 2012a; UIA, 2011).

In addition to the various technologies that have been introduced in Uganda, OSS has gradually emerged on the ICT scene as alternative software to proprietary software that requires formal recognition (Collins, 2010; Weddi, 2009). Documentary evidence dates the use of open source software in Uganda to 2003 when the International Institute for Communication and Development launched its activities in the country (EACOSS-Uganda, 2008; Reijswoud & Topi, 2003). The IICD in conjunction with Martyrs University at Nkozi and a private company Linux Solutions established a coalition to promote awareness, training, and the use of OSS in the country (Reijswoud & Topi, 2003). Anecdotal studies and reports by Baguma (2005), Bruggink (2003), CIPESA (2005), Collins (2010), EACOSS-Uganda (2008), Reijswoud and Topi (2003), and Weddi (2009) have also contributed to the awareness of OSS in the country.

These efforts and others added interest in, credibility about, and an impetus for the experimental use of OSS. The resultant emergence of the OSS policy initiative by the pioneers and early adopters of OSS in Uganda is consistent with existing policies on the use of ICTs in fostering an integrated and inclusive information policy in the attainment of Uganda’s national development goals. The implementation of the 1996 ICT policy framework and other related policies and statutes created a favorable ICT environment from which the proposed policy for the adoption of OSS is emerging. The conception and emergence of the OSS policy initiative by ICT stakeholders, therefore, fits well into these sets of policy frameworks and statutes dating back to the 1990s that helped the evolution of the current ICT environment in the country.
The National Information Technology Authority-Uganda (NITA-U Act (2009) and the Information Technology Policy (2010) are reviewed in this section. They are the most relevant key policy instruments related to the OSS policy initiative in Uganda. This examination highlights their visions, missions, mandates, goals and objectives to ascertain whether they were clear enough and had specific relevance toward the creation of a private sector-driven ICT environment that made a new OSS policy proposal possible.

The two policy instruments were selected on the basis that they directly address the regulation, guidance, and development of the information and technology (IT) sector. They offer a historical context; describe the current status, dynamics, and insights into future trends of the IT sector (i.e., software). The two instruments informed the decision of the researcher to select and assess their consistency with the evolving OSS policy initiative.

The National Information Technology Authority-Uganda (NITA-U) Act (2009). The NITA-U Act (2009) established the National Information Technology Authority (NITA-U), a government agency to develop and offer expertise to guide and implement the national IT policy, regulate the sector, coordinate, promote and monitor IT developments within the context of the overall national social and economic development goals (Ministry of ICT, 2009b; NITA-U, 2009). The act provided for the functions of the authority, the composition of its board of directors, management, finances, objectives, and addressed all IT-related matters in the country (NITA-U, 2009). The authority is guided by a vision of becoming a facilitator of a knowledge-based, globally competitive Uganda where social transformation and economic development are supported through IT-enabled services (NITA-U, 2009).
The mission of the authority aims to integrate IT into national programs by establishing coordinated and harmonized national IT systems (NITA-U, 2009). Through the guidance of the Ministry of ICT, the act mandated the authority to:

- Identify and develop required skilled manpower to coordinate and monitor IT programs and services in the public and private sectors;
- Formulate and implement national IT policies, strategies, and master plans and develop and implement public awareness campaigns to enhance the acceptability of national IT policies;
- Set and monitor IT standards in planning, acquisition, implementation, delivery, support, and maintenance of IT equipment and services to ensure uniformity in quality, adequacy, and reliability of IT usage throughout Uganda;
- Provide first-level technical support and manage the optimal utilization of government IT systems and infrastructure, such as centralized datacenters, the national backbone infrastructure, etc.;
- Promote e-governance, e-commerce, e-learning, and e-living; and
- Create a national IT systems network of stakeholders in line with the various national development programs (Ministry of ICT, 2009a; NITA-U, 2009).

The authority is expected to achieve the following goals and objectives:

- Harmonized and coordinated government use of IT to improve the quality and efficiency of public services;
- An optimal utilization of scarce technical skills and infrastructure by sharing them in government agencies through centralized datacenters to reduce government expenditure on excessive IT systems;
• Act as an authentication center to standardize the IT profession in liaison with relevant institutions to effectively promote and develop the IT sector, and

• A well-regulated electronic signature infrastructure and related matters in electronic transactions in the country (Ministry of ICT, 2009b; NITA-U, 2009).


The NITA-U Act of 2009 and the establishment of the authority in the same year signaled a clear and growing recognition of the catalytic role IT plays in enabling the implementation of other services and as an industry in its own right (Ministry of ICT, 2012a). Through the NITA-U Act, the IT subsector was transformed into a fully-fledged sector similar to the telecommunication and broadcasting sectors (Ministry of ICT, 2009b, 2012a).

The act offered a springboard for supplemental legislation to further guide and regulates the IT sector in Uganda and standardizes its operations through international digital conventions (Ministry of ICT, 2009b, 2012a; ULRC, 2011). Three IT laws were enacted in 2011 to supplement the NITA-U Act, namely: 1) The Electronic Signature Act, 2) The Electronic
Transactions Act, and 3) The Computer Misuse Act (Ministry of ICT, 2011d, 2011e, 2011f; ULRC, 2011). The NITA-U Act opened potential avenues for Ugandans to exploit and develop a research culture to engage in innovative software solutions and expand the country’s opportunities to become a beacon of IT solutions in the region.

These IT instruments advocated an overall openness of the Uganda ICT environment and its potential to accommodate new initiatives such as the evolving OSS policy. Similarly, the vision, mission, mandate, goals, and objectives of the authority outlined in the NITA-U Act (2009) were consistent with Uganda’s national development goal of attaining IT-led economic development through the universal access and use of ICTs.

To execute its mandate, the authority has moved to harmonize the uncoordinated IT activities in various government agencies and direct all government ministries and agencies to connect to the National Data Transmission Backbone Infrastructure and Electronic Government infrastructure to reduce expenditures on Internet-related services and promote operational efficiency (Mugabe, 2013a; NITA-U, 2013). The national data center is part of the e-government infrastructure intended to reduce expenditures associated with building multiple data centers and duplication of infrastructure (Baguma, 2011; Mugabe, 2012, 2013a; NITA-U, 2013).

The government-owned national data center hosts key applications including secure messaging and collaboration systems, provides high-speed Internet access and low-cost bandwidth throughout the country by connecting all districts to the Internet (NITA-U, 2013). The goal of the center is to decrease government expenditure on Internet use, provide teleconferencing equipment as an e-government component, increase efficiency in service delivery, and reduce misuse of public resources (Mugabe, 2013a; NITA-U, 2013). If the directive is implemented and participants comply, it may reduce government expenditure on

While the NITA-U Act (2009) mandated the authority to finance, conduct, and promote research and development of software, ambiguity still persists because of lack of specifics on the type of software to support. Besides committing to supporting software research to develop new solutions, no clear or direct legal commitments are stated in the NITA-U Act (2009) to support the development and use of OSS in Uganda. Yet, in developing countries such as Uganda, OSS research and development require strategic and direct government intervention to finance, recognize, formalize, diffuse, and use OSS. Without a specific and clear legal mandate to the authority to support OSS activities, the authority cannot commit its resources to such ventures, no matter how strategically critical they may be to the country.

Camara and Fonseca (2007) suggested that governments in developing countries should take a leading role in the formation of OSS policy initiatives and heavily invest in the development, diffusion, and use of OSS. Governments typically implement OSS development strategies for purposes of acquiring the technology and to facilitate sustainable processes of developing indigenous knowledge and expertise for future software development to benefit the country (Camara & Fonseca, 2007).

For the authority to progress toward the realization of the vision, mission, goals, and objectives set out in the NITA-U Act (2009), it will have to first overcome the numerous challenges posed by the IT sector. Regulating and guiding the evolving IT sector toward attainment of recommended IT standards in both the private and public sectors prove the most daunting task the newly established and inadequately funded authority may experience. Except for its omission of a clear provision stating the role of the authority in supporting OSS activities
in Uganda, the act is clear in all its provisions. That notwithstanding, a future amendment to this act to enable Uganda to embrace OSS is possible.

The National Information Technology (IT) Policy (2010). Having recognized the use of IT as an enabler that facilitates access to public services by the population through the use of e-government facilities, the government of Uganda adopted the national IT policy to provide guidance to all stakeholders in the IT sector (Ministry of ICT, 2010). The government also aimed to create a supportive environment to attract IT investments from all over the world and bring Uganda to the forefront of IT-related activities (Ministry of ICT, 2010). The national IT policy aims to encourage stakeholders in both public and private sectors to embrace and implement the policy to facilitate Uganda’s national goal of becoming an IT-led center for economic development and poverty eradication among its population (Ministry of ICT, 2010).

To encourage the attainment of Uganda’s development goal, the national IT policy is guided by a vision to realize a knowledge-based economy where national development and governance are effectively enhanced by harnessing and adopting IT-led economic transformations (Ministry of ICT, 2010). The mission of the IT policy is to promote the efficient utilization of ITs in developing Uganda’s economy. The key policy goal is to guide the optimal development and use of IT in the country guided by the principle of ensuring universal access to IT services in both rural and urban areas (Ministry of ICT, 2010). The major objectives of the national IT policy are to:

- Develop a standardized national IT infrastructure that provides equitable access to foreign and local markets;
• Provide leadership direction and vision to guide IT industry developments toward a critical mass of educated IT human resource at all levels to meet the local and export requirements;

• Stimulate and support research and development in IT and promote widespread use of IT applications in both public and private sectors to enhance efficiency and effectiveness in service delivery;

• Develop national and adopt international standards and guidelines to support growth of the IT industry in Uganda;

• Develop an enabling legal and regulatory framework and establish incentives for both local and foreign investors to foster the development of the IT sector (hardware, software and service industry); and

• Promote the use of IT systems in all government departments, local governments, and businesses to ensure efficiency and effectiveness in-service delivery through mobilizing and sensitizing communities on availability of IT services (Ministry of ICT, 2010).

As a major principle, the IT policy encourages the participation of citizens in IT-related programs and promotes public private partnerships (Ministry of ICT, 2010). The policy priorities include the development of a new legal framework enabling the population to use IT services to optimize e-commerce or e-business that offer new global opportunities for economic growth (Ministry of ICT, 2010). The policy also aims to curb growing IT-related cyber crimes by developing relevant laws to address emerging cyber crimes and review the curriculum for training legal professionals to improve the delivery of justice and enforce cyber laws (Ministry of ICT, 2010).
Cognizant of the high rate of IT illiteracy in both public and private sectors and the digital divide existing between urban and rural areas as well as between men and women, the IT policy is committed to “…specifically encourage the use of OSS and low-cost commercial versions of software for normal operations” (Ministry of ICT, 2010, p. 16). The policy is also committed to promoting a “Made in Uganda” brand of software and hardware, encouraging market-oriented software development for local markets and export, and promoting export of IT services and products (Ministry of ICT, 2010, p. 16).

In the two policy instruments reviewed, the government assumes the role of a facilitator to create an environment that enables the growth and development of private-sector-driven investments and businesses both locally and internationally. The government role is to establish the requisite infrastructure, enabling legislation, and a favorable economic environment to ensure that the private sector takes the lead in the IT sector for the benefit of the population. The instruments identified and described important roles for public private partnerships in promoting access, diffusion, and use of ITs and developing such partnerships in strategic sectors of the economy for the mutual benefit of investors and all Ugandans.

The National Information and Technology Authority-Uganda of 2009 and the National Information and Technology Policy of 2010 have provided independence, guidance, and a regulatory framework to the IT sector that was previously treated as a subsector in the more dominant telecommunication and broadcasting sector. The establishment of the IT sector through the two instruments, including some other intervening policies and laws, suggests a deliberate agenda to create an environment that supports the formation of new IT policies to develop and adopt new technologies such as OSS. The dominant policy goal of enhancing universal access and use of IT is relatively clear throughout the examined instruments and related laws. The two
policy instruments share a vision to create consistency between existing IT-related laws to ensure an integrated approach toward the attainment of national development goals.

With regard to the status of OSS in Uganda, the 2010 IT policy explicitly recognized and underscored the critical role OSS plays in enabling populations to participate in the burgeoning global economy as described earlier above. The specific recognition of the utility of OSS by the National IT Policy of 2010, which also outlined a strategy to promote its research and development, stands out as the only modest achievement gained by proponents of a change in existing laws to formalize the use of OSS to fairly compete with proprietary software. It is the only progress OSS policy proponents have made since 2008 when they proposed to government to change the existing laws to embrace OSS (Tentena, 2008a, 2008b).

However, lack of a law to operationalize policy recommendations hinders the implementation of such policy proposals. In Uganda, policy recommendations that are not supported by an Act of Parliament and assented to by the President, are not legally binding (Ministry of Public Service, 2000; The Parliament of Uganda, 2011). A detailed description of the differences between an Act of Parliament and a policy in the Ugandan context is provided in the next section that discusses key issues.

While the NITA-U Act (2009) generally supports the development of software, it is silent on specifics regarding OSS support and development. Besides, the act was enacted a year before the IT policy that recognized OSS was adopted in 2010. Until the government heeds the call of software stakeholders to amend the NITA-U Act, only OSS recognition will stand while its formalization, adoption, diffusion, and use of OSS will continue to lack the requisite support of the law to fairly compete alongside proprietary software.
Key Issues Identification

In this section, key issues derived from existing relevant documents about the history and current status of the ICT sector in Uganda as well as areas of contention for the emerging OSS policy initiative in the country are identified, described, and analyzed. While the literature review provided a thorough description of the evolution of the ICT sector in Uganda, most of the coverage was descriptive rather than analytical. The review supported the final descriptive assessment technique discussed here, the identification of key issues.

One key issue that requires clarification to better understand the ICT environment in Uganda is the difference between a policy and a law (statute or an act of Parliament). A policy refers to a principle or rule developed by the executive branch of government to guide decisions and achieve rational outcome(s). Policies may be political, managerial, financial, or administrative mechanisms designed to guide actions toward attaining specific goals or achieve desired outcomes through programs or projects (Parliament of the Republic of Uganda, 2011). Drafting a policy involves, such processes as research by a team of selected individuals, consultants, a government ministry or department, consultations with stakeholders including professionals, committees of Parliament, etc., before the draft policy is debated and approved by the cabinet, which is part of the executive branch (Parliament of the Republic of Uganda, 2011).

A policy, therefore, articulates a position taken by the government on a given sector, approved by the cabinet, and presented to Parliament for its information but not debate (The Parliament of the Republic of Uganda, 2011). Besides wide consultations that characterize the policy formation process, a policy does not carry any legal authority (The Parliament of the Republic of Uganda, 2011). Whereas, an act, a statute, or a law, is a legal document that has passed through the legislative process, signed or assented to by the President, and gazetted as a

However, this study takes the broader view assumed by the information policy discipline, which views policies as a set of principles and instruments that include laws, statutes, resolutions, and procedures adopted for the collection, production, dissemination, retrieval, use, retirement, and preservation of information (Berger, 1993; Hernon & McClure, 1987; Hernon, McClure & Relyea, 1996; Hernon & Relyea, 1968). Therefore, while a policy and a law (statute or act) carry different meanings in the Ugandan context, they are broadly referred to as policies within the context of this study as highlighted below.

Key Developments in the ICT Sector. The implementation of the 1996 National Telecommunications Policy Framework and the Uganda Communication Act (1997) laid the foundation to the evolution of a vibrant ICT sector with a favorable investment climate that resulted in the attainment of key milestones in the social and economic development of the country. The establishment of the Uganda Communication Commission (UCC) to regulate and guide the development of the then-nascent ICT sector facilitated the penetration of telecommunication infrastructure and services across the country, resulting in the attainment of a relative degree of universal access and use of ICTs, and progressively increased the contribution of the sector to the country’s Gross Domestic Product (BMI, 2012a, 2012b; Lange, 2012; Ministry of ICT, 2006, 2012a; Ministry of Works, Housing, and Communication, 2003; UCC, 2009, 2013a, 2013c, 2013d; UIA, 2011).

The initial ICT policies primarily focused on the development and regulation of the infant telecoms sector, were straightforward and enabled, policy makers, regulators, and service providers to pursue the stated visions, mandates, goals, and objectives (BMI, 2012a, 2012b;

The access and use of ICTs facilitated the improvement of literacy levels and built human resource capabilities by integrating ICT into mainstream educational curricula as well as other literacy programs in urban and rural areas (BMI, 2012a, 2012b; Lange, 2012; Mulira et al., 2010; UCC, 2005, 2009, 2013d; UIA, 2011). These policies also emphasized continuous training in the acquisition of new knowledge and skills to operate ICTs (UCC, 2013d; UIA, 2011).

The implementation of the National ICT Policy (2003) and the subsequent ICT Sector Review Report (2005) eliminated the exclusivity licensing arrangement thereby allowing new players to enter the sector to compete and expand the market. This expansion and competition led to improvements in the performance of the sector, introduction of new products, lowered costs, and benefited the consumers and investors (BMI, 2012a, 2012b; Lange, 2012; Ministry of ICT, 2006, 2012a; Mulira et al., 2010; UIA, 2011). During the first decade of the implementation of the 1996 National Telecommunication Policy Framework, the ICT sector grew at an annual rate of over 50% (BMI, 2012a, 2012b; Lange, 2012). The contribution of the ICT sector to the Gross Domestic Product increased from 0.09% in 1996 to 2.5% in 2005 and to 5% in 2010, diversifying the previously narrow tax base, and leading other sectors contributing tax revenues to the national economy (Tentena, 2011).

However, major challenges, such as lack of equipment, electricity, inadequate ICT infrastructure especially in rural areas and, in some cases, Internet access, continue to hinder
progress towards universal access and use of ICTs in Uganda (BMI, 2012a, 2012b; Lange, 2012). Also, the technology/software neutrality approach adopted by UCC in 2006 continues to favor proprietary software over OSS. As a government policy recommendation, the technology/software neutrality approach was also adopted in government procurement procedures implemented by the Public Procurement and Divestiture Authority (UCC, 2006). The technology/software neutrality arrangement grants investors in the ICT sector the freedom to select and use a technology of their choice as long as they provide the service for which they were licensed (Ministry of ICT, 2009; UCC, 2005).

Since this arrangement was adopted and implemented when only proprietary technologies/software was the only widely known and used ICTs in Uganda, it is assumed that OSS was not provided for. The general reference to technology/software neutrality did not indicate a specific technology/software for which such freedom was granted. Rather, it is assumed that it was granted only to proprietary products. Currently, with the availability of OSS on the ICT market, the approach considers and treats all technologies/software equally. But this policy position neither helps to support the adoption nor the development of OSS in the country. This is because the OSS development and diffusion model, especially in developing countries, such as Uganda, can neither progress nor succeed without direct government policy intervention and financial support. In 2010, software developers in the private sector in Uganda voiced concerns that the government had consistently neglected and rejected their appeals for support to improve their competitiveness in the region. Yet, their counterparts in neighboring countries were receiving regular funding and support to develop new OSS solutions for the local market and for export (Wafula, 2010d).
In 2006, a Ministry of ICT was established to provide policy guidance and political leadership to the increasingly critical sector to the country’s economy. However, erratic political leadership has contributed to the sluggish performance of the ministry with sector analysts questioning the competence of the ministry to guide and transform the country into an information society (BMI, 2012b, 2013a; Lange, 2012; World Bank, 2008). Since 2006, four substantive ministers and two ministers of state have served as political heads in the Ministry of ICT with varying and sometimes questionable levels of effectiveness. Only two of the six who served were ICT professionals while three had no expertise in the field. These political changes have negatively impacted the image and performance of the ministry over the past six years (BMI, 2012b, 2013a; Lange, 2012; World Bank, 2008).

Since 1996, all ICT-related policies have focused more on the telecommunications and broadcasting sectors with little attention given to the IT sector. With the enactment of the NITA-U Act and the establishment of an authority in 2009, a fully fledged IT sector was created to guide and regulate all IT activities in the country (Ministry of ICT, 2009a; NITA-U, 2009). While this was a positive recognition of the IT sector in the country, the authority mandated to guide the development of the IT sector lacks adequate funding to recruit and train qualified human resources to execute its wide-ranging mandate.

The working relationship between the Ministry of ICT, the Minister of ICT, and the authority also remains unclear as duplication of supervisory roles of IT systems and services within government agencies by the ministry and the authority persists. While the National Information and Technology Authority are accountable to Parliament, the influence of the Ministry of ICT and the Minister of ICT undermines the independent operations of the authority. The Minister of ICT approves the budget of the authority and the NITA-U Act (2009) gives the
minister powers to issue policy guidelines for implementation by the authority. While the act mandates the authority to advise the minister on policy, what remains unclear is what exactly constitutes the policy advice the authority gives to the minister. What also remains unclear is the extent to which the ministry and the minister are to get involved in the ordinary regulatory decisions of the authority. While the board of directors of the authority is appointed by the minister and approved by Parliament, the board is still answerable to the minister. This further gives the minister overarching powers to micro-manage the operations of the authority.

Last year, for example, the Ministry of ICT carried out a study to standardize IT functions in government ministries, agencies, and local governments, which is a function that clearly falls under the mandate of the authority. This execution of a NITA-U mandate by the Ministry of ICT suggests some duplication of work and a potential source of conflict within the IT sector. Currently, the authority lacks visibility and a record of performance in both the public and private sectors.

The NITA-U Act (2009) mandates the authority to promote and carry out research and development in IT-related activities and to support the development of software in Uganda for local and international markets. However, the act is silent on the status of OSS, its development, and use in the country. The NITA-U Act falls short of specific guidelines to support the formalization and use of OSS. Besides, the authority itself does not use OSS in its computing tasks. Yet, evidence of increased use of OSS in government ministries and departments, corporations, educational institutions, NGOs, the private sector, and by end-users is no longer in dispute (Collins, 2010; EACOSS- Uganda, 2008; Weddi, 2009).

A review of ICT-related documents suggests that OSS stakeholders include, but are not limited, to the executive branch, government agencies, policy makers, bureaucrats, educational
institutions, academicians, corporations, the donor community, NGOs, OSS communities, OSS developers both in the public and private sectors, and end-users (Collins, 2010; EACOSS-Uganda, 2008; Weddi, 2009). Of these OSS users, the government is the largest consumer of OSS products (Collins, 2010; Weddi, 2009). While the National Information and Technology Authority-Uganda is only four years old and is faced with overcoming a deeply entrenched government bureaucracy, the major issue emerging from this assessment is the explicit inconsistencies and ambiguities between the NITA-U Act (2009) and the National IT Policy (2010) with respect to OSS. While the latter recognizes the benefits of OSS and the need to support its development and use, the former is completely silent about OSS development and use. Yet, the growing number of OSS stakeholders is driven by the use of the Linux operating system on which server environments of most ministries and Internet service providers run, the high license fees for commercial software, the risks associated with rampant software piracy, the need to develop context-specific security systems, and the growing global trend of optimizing cloud computing as a smart business move (Collins, 2010).

The current use of OSS and new pursuits among the multiple OSS stakeholders suggest that OSS has gained a degree of significance in computing tasks and can effectively compete with proprietary software in a fair market environment. However, an OSS policy proposal has remained an idea in the minds of the proponents, who have preoccupied themselves with making uncoordinated and sporadic statements in the media about the need for Uganda to change the law and embrace OSS (Weddi, 2009). While promoters of the OSS policy and OSS adherents have organized landmark events in Uganda in collaboration with their colleagues from Africa and around the world, the proposed policy change has remained an idea and has never progressed beyond its conception. Nearly five years since the OSS policy proposal was made to government,
promoters of the policy have never drafted a document to present to the Ministry of ICT, NITA-U, nor to the Parliament to lobby for their support to change the existing IT laws to accept and endorse OSS.

Another setback that looms over the IT sector is the failure by the government to enact a law to mandate the implementation of the policy on public private partnerships (PPPs) to develop and establish the critical IT infrastructure recommended in the National IT Policy of 2010. Several IT-related projects have failed to manifest because no law to guide public private partnerships initiatives. Ogwang (2013) states that the absence of an enabling law for public private partnerships continues to hinder the implementation of many IT projects in the country. For example, government agencies cannot engage in procurement processes for IT projects unless a law that mandates PPPs arrangements is in place (Ogwang, 2013).

The application of the three information policy descriptive assessment techniques described above, the ICT-related policies and statutes that guided and regulated the evolution of the sector from the 1990s were identified, described, and analyzed. The multiple ICT stakeholders and others involved in the OSS policy initiative have been identified and described. The results from each of the three descriptive information policy assessment techniques contributed incremental pieces to an understanding of the general ICT environment and the nascent IT sector in Uganda. The ICT sector reflects a progressively flexible, vibrant, and dynamic environment capable of spawning, integrating, and managing new innovations with rational ICT policies. The economic, social, political, and transformative impacts of this sector upon the Ugandan society have been underlined. The assessment spotlighted how the Ugandan population is now linked to global digital networks to potentially collaborate and engage in productive and innovative activities. The assessment also highlighted the opportunities and
challenges in the ICT sector in general and the evolving OSS policy initiative as a logical outcome of a well-regulated environment for national development.

The three techniques: documenting the historical context, examining key policy instruments, and identifying key issues, provided a powerful context for developing and conducting empirical information policy research. While the use of the three techniques informed and enhanced the empirical study, issues that emerged from The assessment were not necessarily similar to those identified through the empirical analysis of the evolving OSS policy process. McClure, Moen, and Bertot (1999) suggested that one of the inadequacies of policy descriptive assessment techniques is that while they are useful tools for analysis, they are not substitutes for empirical research in information policy inquiry. The assessment results partly addressed the overarching research question, and specifically, research question four.

Results from the Stakeholder Analysis

This section presents results from an analysis of the data from three sources: documentary evidence, face-to-face interviews, and the focus group discussion. As an integral part of the iterative stakeholder analysis (SA) process, the researcher assessed and underlined how the data corresponded with stakeholder attributes highlighted from the research on stakeholder theory and stakeholder analysis in Chapters 2 and 3. The application of descriptive information policy assessment and SA techniques to the literature on the ICT sector in Uganda and the data collected directly from participants enabled the researcher to identify, describe, categorize, and analyze stakeholders involved in the evolving OSS policy initiative. These stakeholders are individuals or organizations that can affect or be affected by the initiation, implementation, and completion of an endeavor or project (Burgoyne, 1994; Donaldson et al., 1995; Freeman, 1984; Grimble et al., 1997; Mitchell et al., 1997).
From the comprehensive examination of the ICT-related documents, the researcher identified multiple governmental stakeholders associated with the OSS policy process, including the executive branch, government ministries, departments, commissions, authorities, and agencies, the Parliament of Uganda and Members of Parliament, as well as international donor agencies and/or development partners (Collins, 2010; Ministry of Works, Housing, and Communication, 2003; Mulira et al., 2010; Weddi, 2009).

Other stakeholders included telecommunications corporations, representatives of multinational corporations dealing in proprietary hardware and software, OSS-based local companies, universities, vocational institutions, lecturers, instructors and students, local and international nongovernmental organizations (NGOs), OSS communities, and individual OSS developers and end-users (Collins, 2010; Ministry of Works, Housing, and Communication, 2003; Mulira et al., 2010; Weddi, 2009).

Reinforced with an analysis of the data from the face-to-face interviews and the focus group discussion, the researcher categorized and analyzed stakeholders associated with the evolving OSS policy formation process. This process was enhanced by stakeholder attributes that were uncovered through the data and their relationships to the policy process. From the data, the researcher also uncovered contrasting viewpoints, concerns, respective stakeholders’ roles, perceived and anticipated challenges and conflicts, evaluations of the policy process, anticipated policy benefits, and recommendations on how the policy process should progress to its conclusion. These elements reflected the dynamics and complexities associated with an information policy formation process for the formal adoption of open source software.

While presenting the results, participants and their respective comments are distinguished by a label and a number. Participants who took part in the interviews are referred to as
Interviewees and assigned a number corresponding with the one assigned to them in Table 3. For those who took part in the focus group discussion, the researcher refers to them as Participants and assigned a number corresponding to them in Table 4. During the interviews and the discussion, when participants were asked to identify stakeholders involved in the OSS policy initiative, they were unequivocal in naming themselves as OSS stakeholders. They were, however, also realistic enough to identify those that they considered to have high interests in the policy process: those whose claims they considered most legitimate; those they thought wielded more influence, power, and resources; those they considered more important; those they thought posed greater risks to the initiative; and those they viewed as prime targets for recruitment to support and fund the policy effort based on their levels of interest and influence.

Bowie and Schnieder (2012) and Rabinowitz (2012) suggested that one of the most effective techniques used to identify, describe, and categorize stakeholders and to understand their interests in a given endeavor is to directly ask them what they consider important, what they regard as their primary concerns, and their recommendations to address their needs. Identified stakeholders also provide valuable information about concerns of other stakeholders who may otherwise prove difficult to find and engage (Bowie & Schnieder, 2012; Rabinowitz, 2012; World Bank Group, 2012).

Three Types of Stakeholders Identified

From the three data sources, the researcher identified three types of stakeholders based on their attributes and relationships to the evolving OSS policy. These included: 1) key stakeholders, 2) primary stakeholders, and 3) secondary stakeholders. Each of these stakeholder types held attributes that would potentially move the OSS policy forward, derail it, or have no meaningful impact upon it.
Key Stakeholders

While these are individuals or groups that may belong to either or neither of the individuals or entities supporting or opposing a policy initiative, they can have a positive or negative effect upon an effort (Rabinowitz, 2012; World Bank Group, 2012). Unless they are directly involved in formulating, promoting, funding, and implementing an effort, key stakeholders typically reserve their support of or opposition to an endeavor in its formative stages (Rabinowitz, 2012; World Bank Group, 2012). Bowie and Schnieder (2012), Rabinowitz (2012), and World Bank Group (2012) suggested that key stakeholders typically include elected or appointed government officials, donors, and community leaders who wield a significant amount of influence, power, and resources that they could use for the success or failure of an effort. Elected officials initiate, debate, and approve budgets and laws and oversee the use of funds and implementation of laws, policies, and regulations the execution of which may positively or negatively affect an emerging initiative (Bowie & Schnieder, 2012; Rabinowitz, 2012; World Bank Group, 2012). As key stakeholders, government bureaucrats, who work directly with promoters of an endeavor and administer budgets, can contribute greatly to the success or failure of an effort depending on how they exercise their power in enforcing regulations (Bowie & Schnieder, 2012; Rabinowitz, 2012; World Bank Group, 2012). These officials may be decisive allies or dangerous opponents to an endeavor while executing their duties.

Donors are also key stakeholders because without their funding an initiative may fail to start or succeed (Bowie & Schnieder, 2012). Collectively, if these key stakeholders do not believe in what the effort is all about or do not effectively support it, it may either fail to start or fail to realize its objectives (Bowie & Schnieder, 2012; Rabinowitz, 2012; World Bank Group,
Corresponding with the above attributes, an analysis of the three data sources indicated that the executive branch, government agencies involved in the supervision and development of the ICT sector, the Parliament, and international donor agencies are key stakeholders associated with the OSS policy formation process. The Constitution of the Republic of Uganda of 1995 mandates the executive branch to develop fair and just laws and policies that protect national interests, inalienable human rights, as well as participate in processes through which policies and laws are developed, adopted, implemented, and evaluated to ensure a better standard of living for the citizens (Ministry of Public Service, 2000).

The Ministry of Finance budgets funds for the formation, implementation, and evaluation of national policies and for the legislation processes for national laws (Ministry of Public Service, 2000). As an elected government, the executive branch through its various ministries and agencies develops relevant laws and policies to guide, regulate, and develop the private sector-driven ICT industry (IMF, 2008; Ministry of ICT, 2006, 2012; Ministry of Public Service, 2000; World Bank, 2008). An examination of the literature on the evolution of the ICT sector in Uganda suggested that the executive branch has strategically facilitated the sector through favorable and flexible ICT policies and laws (Business Monitoring International {BMI}, 2012b, 2013a; Lange, 2012; Mulira et al., 2010; Uganda Investment Authority, 2011).

The Ministry of ICT and the National Information and Technology Authority-Uganda (NITA-U) are mandated to guide, supervise, regulate, and develop the IT sector on behalf of the executive branch (Ministry of ICT, 2010, 2011; NITA-U, 2009). The Ministry of ICT and NITA-U are the most influential, most important, and most powerful government agencies in the country that command the highest leverage over national resources in the IT sector (Ministry of ICT, 2010, 2011; NITA-U, 2009). With an OSS policy still underway in Uganda, the data
indicated that most government ministries, agencies, and local governments widely use OSS in their day-to-day operations (Bruggink, 2003; Collins, 2010; EACOSS-Uganda, 2008; Reijswoud & Topi, 2003; Weddi, 2009). The progress or failure of the policy formation process for the formal recognition, adoption, diffusion, use, and development of OSS in Uganda, therefore, will depend on whether these two most influential and powerful stakeholders in the IT sector render their political and financial support or not.

The Parliament of Uganda is mandated by the constitution to consult, debate, and enact all laws including those that guide and regulate the ICT sector (Ministry of Public Service, 2000; The Parliament of Uganda, 2011). The Parliament is also mandated by the constitution to debate, amend, reject, or pass the national budget presented by the executive branch through the Ministry of Finance (The Parliament of the Republic of Uganda, 2011). The Parliament, therefore, also wields power that can influence both the legislative and budgetary processes in the country. The Parliament is the second most powerful, influential, and important ICT stakeholder in the OSS policy formation process (Weddi, 2009). It includes elected officials with a political mandate to develop policies and laws aimed to transform and improve the lives of all Ugandans. Parliament is also one of the largest users of OSS in the country (Collins, 2010; Weddi, 2009).

The high level of influence, importance, and power, in addition to the enormous resources the executive branch and Parliament wield were further underlined by Interviewee {10} who stated, “We need to persuade government, especially the Ministry of ICT, NITA-U, and Parliament to support changes in the law to adopt OSS. Without their influence and support, OSS cannot be adopted.” The statements by Interviewee {10} were reinforced by comments from Participant {1} who remarked, “We need to educate and gain the interest of key
government agencies in this low-cost, adaptable, and effective software. The government has the influence, power, and resources to change the law to ensure OSS adoption and use.”

Some international donor agencies operating in Uganda, including UNDP, United States Agency for International Development, Danish International Development Agency, Swedish International Development Agency, German Society for International Cooperation, International Development Agency, European Union, International Institute for Communication and Development, Free Open Source Software Foundation for Africa, and others, are key stakeholders in the evolving OSS policy in Uganda (Collins, 2010; Weddi, 2009). Most of these agencies are state-owned development organizations that support, small and medium IT enterprises and training programs aimed to encourage the growth of African ICT industries and policy initiatives among other activities (Sowe, 2011).

Some of these international donor agencies are key stakeholders that have previously funded and supported community-based programs aimed at the diffusion of ICTs for social transformation, including sponsoring OSS training events in Uganda (Collins, 2010; Weddi, 2009). While international donor agencies may not get directly involved in the implementation of an effort, they may care enough about it that they could bring to bear their clout as key stakeholders to influence a policy outcome through their networks, knowledge, and finances (Bowie & Schnieder, 2012; Rabinowitz, 2012; World Bank Group, 2012).

To emphasize the influence, importance, power, and resources some of the international donor agencies could bring to bear and move the OSS policy forward, Interviewee {15} stated, “If government supports and endorses the OSS policy, some donors will fund the implementation of the law. UNDP, DANIDA, EU, IICD, and FOSSFA have previously supported OSS activities and can do so again.”
The data helped to characterize and categorize the executive branch, Parliament, Members of Parliament, the Ministry of ICT, NITA-U, and some international donor agencies as key stakeholders. These key stakeholders are described as wielding high influence, power, importance, and resources to facilitate a change in the law to pave the way for the adoption of OSS. Given their high levels of influence and power, these key stakeholders can be crucial allies or dangerous opponents that may make or break the OSS policy by how they choose to support, fund, or reject it.

Primary Stakeholders

These are individuals or groups are the most vital stakeholders to an endeavor or organization with a strong claim or stake in the endeavor. They render their time, energy, and support to promote and implement the effort, and have something to gain or lose in an endeavor (Burgoyne, 1994; Donaldson et al., 1995; Freeman, 1984; Freeman et al., 2004; Grimble et al., 1995; Mitchell et al., 1997; Robert et al., 2003). Typically, primary stakeholders have the highest levels of interest in an endeavor. They are the most influential members in an initiative, coalition, or organization whose failure to attain a goal would translate into losses for them (Burgoyne, 1994; Donaldson et al., 1995; Freeman, 1984; Freeman et al., 2004; Grimble et al., 1995; Mitchell et al., 1997; Robert et al., 2003). Corresponding to characteristics of primary stakeholders, individuals who proposed to change Uganda’s existing ICT laws in 2008 and embrace OSS through an Act of Parliament would stand to gain if the proposed OSS policy is approved (Tentena, 2008a, 2008b). However, these individuals would stand to lose if the policy for the adoption of OSS fails to progress. These individuals and entities are the primary stakeholders involved in promoting the OSS policy.
They include telecommunications companies that use OSS in their operations, proprietors of OSS-based companies, OSS communities, members of OSS communities, and individual developers of OSS solutions in the public and private sectors (Collins, 2010; Ministry of ICT, 2009a; Tentena, 2008a, 2008b; Wafula, 2011; Weddi, 2009). Local agents of multinational corporations that market proprietary software and hardware are also primary stakeholders because they would suffer losses if an OSS policy is approved to break their monopoly on the market and face competition from OSS (Collins, 2010; Ministry of ICT, 2009a; Tentena, 2008a, 2008b; Wafula, 2011; Weddi, 2009). But, they would stand to gain in great measure if the policy is rejected. This characterization of primary stakeholders in Uganda’s evolving OSS policy is further reinforced with comments by Interviewee {10} who stated, “I am a passionate OSS stakeholder, an OSS Pastor…making money from OSS, training people to develop and use OSS, promoting the OSS policy, and with associate pastors, fishing and converting men to believe in OSS utility and viability.” These high stakes in the OSS policy were complemented with remarks from Interviewee {20} who stated, “I develop, use, and make money from OSS. I am a strong and enthusiastic promoter and supporter of an OSS law that is long overdue.”

But Participant {5} expressed concern about the perceived hostility to the OSS policy from local agents of multinational corporations dealing in proprietary software, who can use their influence, power, and resources to block the process. “I am actively involved in promoting an OSS policy, but its progress is threatened by agents of proprietary software. They are strongly opposed to competition from OSS. They can do anything to frustrate the policy.”

The data revealed the primary stakeholders in the OSS policy process, the strong stakes they have in the endeavor, and the respective pivotal roles they are playing in promoting the policy to benefit them. The data also uncovered contradictory and competing interests in the OSS
policy among the primary stakeholders. These opposing interests are reflected in possible threats from local agents of commercial software whose dominance of the software market could be undermined by competition from OSS. Besides describing and characterizing stakeholders, the SA process enables promoters of an effort to identify possible sources of threats that could impede the progress of an endeavor (Bowie & Schnieder, 2012; Rabinowitz, 2012; World Bank Group, 2012). The availability of such information enables promoters and defenders of an initiative to mobilize resources to strategically deal with potential threats to the effort (Bowie & Schnieder, 2012; Rabinowitz, 2012; World Bank Group, 2012).

Secondary Stakeholders

These are individuals or groups who are not directly involved in an endeavor but their environments may either affect or be affected positively or negatively by an effort (Burgoyne, 1994; Donaldson et al., 1995; Freeman, 1984; Grimble et al., 1997; Mitchell et al., 1997; Robert et al., 2003). Whether secondary stakeholders participate or fail to take part in the activities of a policy process, its progress may not be affected (Burgoyne, 1994; Donaldson et al., 1995; Freeman, 1984; Grimble et al., 1997; Mitchell et al., 1997; Robert et al., 2003).

An examination of the documentary evidence on the ICT sector indicated that secondary stakeholders in the emerging OSS policy include various international and local nongovernmental organizations (NGOs), universities and vocational institutions, lecturers, instructors, students, and other organizations that use OSS but are not directly involved in the process (Collins, 2010; Ministry of ICT, 2009a; Tentena, 2008a, 2008b; Wafula, 2011; Weddi, 2009). Some of these organizations that are using OSS but are not directly involved in the policy process include UNICEF, Oxfam, Action Aid, ACCORD, Plan International, Connect for Change, Women of Uganda Network, Action for Development, and Uganda NGO Forum,
Uganda Joint Christian Council, among others (Weddi, 2009). Some of these secondary stakeholders, such as NGOs operating in rural areas, students, some government departments, and individual users may not even be aware that an OSS policy process is underway in the country. If the policy is adopted, for example, it may result in the reduction of software prices and enable universities to buy more OSS instructional tools, reduce the number of proprietary licenses they purchase, and enroll more students in their programs. This might require recruiting more lecturers, instructors, and staff, and also expand existing infrastructure to accommodate the increased population of students. All of these groups: lecturers, instructors, staff, students, contractors, etc., would be examples of secondary stakeholders.

To further identify and describe some of the secondary stakeholders in the OSS policy process, Interviewee {14} stated, “Some organizations that might benefit from an OSS policy may include Connect for Change, ACCORD, Oxfam, UNICEF, NGOs operating in rural areas, and WOUGNET. Many of these use OSS in their social service delivery.”

Emphasizing the potential benefits of OSS if a law for the formal adoption of OSS is adopted, Interviewee {1} stated, “Integrating OSS in teaching computer studies will benefit universities, tertiary institutions, schools, lecturers, teachers, and students. OSS will enable them to teach research, learn, and accomplish other tasks.”

Stakeholders’ Attributes in the OSS Policy Process

The description of the three stakeholder types in the previous section suggests that all types of stakeholders have diverse characteristics or attributes that they bring to bear on an effort. These stakeholder attributes include interests, influence, power, importance, legitimacy, resources, etc. Regardless of the nature of an endeavor, all stakeholder types have varying levels of interests in a given effort. Bowie and Schneder (2012), Rabinowitz (2012), and World Bank
Group (2012) stated that while an interest in an effort might be motivated by intellectual, academic, economic, political, environmental, social, or medical reasons, the attention and interest stakeholders have in an endeavor or organization are based on whether they can affect or be affected by such an effort. To conduct a meaningful SA process, therefore, the initial step is to understand the perceived level of interest, such as the degree of investment, including emotions, finances, and/or time, an individual or entity has in an endeavor, and how an endeavor will impact them, or how much input they will have in an endeavor (Rabinowitz, 2012; World Bank Group, 2012).

Stakeholder interests. This refers to the degree to which individuals or groups are vested into an endeavor. While potential beneficiaries of the OSS policy supported the process as an opportunity to gain economic benefits, other stakeholders expressed skepticism toward the initiative. An examination of data indicated that stakeholders who proposed the development of a new policy to embrace OSS have the highest levels of interests in the policy. Collins (2010), Wafula (2011), and Weddi (2009) suggested that telecommunications corporations operating as Internet service providers (ISPs), OSS entrepreneurs running private OSS-based businesses, individual OSS developers in the public and private sectors, and various OSS communities with diverse memberships had the highest levels of interest in the OSS policy.

These OSS stakeholders stand to benefit financially if the policy is adopted or stand to lose if the policy fails to facilitate the formal adoption of OSS to compete with proprietary software. While their deep involvement in the policy process reflects their high interests, their stakes in the process are also at the highest risk (Collins, 2010; Wafula, 2011; Weddi, 2009). These high levels of stakeholder interests were underlined by statements from Interviewee {18} who stated, “I am involved in promoting an OSS policy for economic, academic, and social
interests. I develop, sell, and use OSS to teach and train others. We trained local and international journalists to use OSS before elections in Southern Sudan.”

The high levels of interest held by OSS policy promoters were reiterated by Participant {3} in the following remarks. “Besides operating profitable OSS businesses, we develop affordable alternatives to expensive proprietary products that some Ugandans and NGOs cannot afford. OSS is not all about money but also social responsibility.” These statements reflect interests that are far more than just gaining financial advantage. Promoters of the OSS policy also develop solutions to advance educational, philanthropic, and social change causes.

However, the data uncovered some stakeholders with low levels of interest in the OSS process. Some of these stakeholders openly voiced their ambivalence to OSS and others were described as resentful toward the policy. These included representatives of government agencies mandated to regulate and develop the IT sector and agents of multinationals dealing in proprietary software. The stakeholder group dealing in proprietary software was viewed with apprehension by the OSS policy promoters.

The low levels of interest in the OSS policy were reflected through ambivalent statements by Interviewee {7} who stated, “Presently, the Ministry of ICT doesn’t plan to change existing laws to embrace OSS. What is there in OSS that deserves changing laws? OSS should compete in the market to change customer loyalties. That change won’t come through laws.” To emphasize the low levels of interest in the OSS policy initiative by the executive branch, Interviewee {16} stated, “While NITA-U recognizes increased use of OSS, changing existing laws to enhance its development and diffusion is not required. If OSS does what proprietary software cannot do for Uganda, a law formalizing OSS will be passed.”
These statements by Interviewees \{7\} and \{16\}, who are representatives of the most powerful government agencies in the IT sector, suggest that while OSS has been used productively in various computing activities in Uganda, high levels of apathy by government officials toward OSS are pervasive and favor the perpetuation of the current status quo. Their statements also reinforce the low levels of interest government bureaucrats have in furthering the OSS policy. Thus, the underlying reasons behind the government’s wariness to recognize its investment role in facilitating the adoption of an OSS policy are revealed as is its unwillingness to build an indigenous pool of OSS experts and innovators to reduce expenditures on proprietary software.

While these statements dismiss the need to develop a new law to formalize the use of OSS in the country, they indicate the subtle support and favorable position proprietary software vendors enjoy from the key government agencies in charge of the IT sector. These statements also provide hints on the nature of opposition the promoters of OSS policy initiative have to confront. But the OSS policy promoters could not conceal their frustration with the ambivalence with which the executive branch views the OSS policy. Interviewee \{15\} echoed the concerns of most of the OSS promoters, “I am concerned about lack of interest in this low cost, adaptable, and effective software by the government. Yet, it continues to support and implement policies favoring proprietary software.” Participant \{1\} added, “Top government officials are the biggest obstacles to changing the law to adopt OSS. If we can overcome their opposition and raise their interest in OSS, the policy will move forward faster.”

Besides expressing their concerns with representatives of government agencies in the IT sector, OSS promoters also voiced their anxiety toward local agents of multinational corporations based on the perceived threats they posed to the policy. Interviewee \{3\} stated, “As
we push for a change in the law to adopt OSS, agents of proprietary software products are busy sabotaging our efforts to maintain their monopoly on the software market to consolidate their financial interests.” This view is further reiterated by Participant {4} who stated, “Vendors of proprietary software mint lots of money, undermine OSS to maintain market dominance, are major obstacles, fiercely oppose OSS, and take advantage of ignorance, fear, and interests of government officials to frustrate OSS policy.”

These ominous sentiments sounded by OSS proponents with respect to the risks local agents of commercial software posed to the OSS policy initiative, suggest deeply rooted suspicions they hold toward vendors of proprietary software and a potential source of conflict in the policy process. Bowie and Schnieder (2012), Friedman and Miles (2006), Johnson and Sholes (2001), Martin and Henderson (2001), Pickstock (2007), Rabinowitz (2012), and World Bank Group (2012) stated that stakeholder interests in an endeavor often vary because some interests may be best served by carrying the effort forward and others by derailing the effort. Some stakeholders are deeply vested in implementing the effort while others are equally intent on either preventing its progress or its total failure. Therefore, finding and understanding stakeholder interests should not be speculative but a systematic process of inquiry or directly soliciting stakeholders’ views about an evolving initiative to ensure its success (Bowie & Schnieder, 2012; Rabinowitz, 2012).

Stakeholder influence. This refers to how powerful a stakeholder or group of stakeholders can positively or negatively affect the current or future direction of an endeavor (Bowie & Schnieder, 2012; Rabinowitz, 2012; World Bank Group, 2012). Stakeholders with high levels of influence may exercise their influence through their expansive networks, the knowledge and
skills they possess, and economic resources they command to make or break the progress of an effort (Bowie & Schnieder, 2012; Rabinowitz, 2012; World Bank Group, 2012).

An examination of the literature on the evolution of the ICT sector in Uganda indicated that the executive branch along with all government agencies involved in guiding and supervising the ICT sector, the Parliament and Members of Parliament, and some international donor agencies wield high levels of influence that they can exert to affect the progress or failure of the OSS policy process (Collins, 2010; Ministry of ICT, 2012a; NITA-U, 2009; Tentena, 2008a, 2008b; Wafula, 2011; Weddi, 2009). Government agencies mandated to guide and supervise the IT sector, for example the Ministry of ICT and the National Information and Technology Authority-Uganda, may exercise official power in some way to influence, positively or negatively, the OSS policy process. These two agencies wield high levels of influence that they may bear on OSS promoters to ensure compliance to any regulations in the course of the policy process.

Closely associated with influence are three stakeholder attributes: importance, the priority given to satisfying the problems, needs, and interests of each stakeholder; power, the level of coercion a stakeholder may wield to ensure compliance in a policy process; and resources, the level of tangible and intangible assets stakeholders possess and are able to bring to bear in the policy process (Rabinowitz, 2012). Bowie and Schnieder (2012), Rabinowitz (2012), and World Bank Group (2012) suggested that typically, stakeholders with high levels of influence also wield high degrees of importance, power, and resources that they may exert to shape an agenda of a policy process and even influence its outcomes. Highlighting the high levels of influence, importance, power, and resources that some international donors wield and might exert to influence the progress or failure of the policy, Participant {3} stated, “Some donors can
influence the government to change its ICT policies to embrace OSS. If we persuade them to believe in what we are proposing, they can use their clout to pressurize government to accept changing the law.” In addition to the influence by some donors, participants also underlined the high influence of the executive branch in the OSS policy process.

Interviewee {4} commented, “More than anybody else, government has the highest influence, power, and resources to change the law to embrace OSS. As the biggest consumer of OSS, it should exert its influence to prioritize and champion OSS use and development.” These high levels of influence wielded by the government are further emphasized by Participant {4} who stated, “The executive branch and Parliament should champion and support the law to adopt OSS. Without exerting their influence, power, and resources, OSS cannot be formally adopted.”

But representatives of government agencies mandated to oversee the IT sector expressed contrary viewpoints that further highlighted the extent to which their high influence, importance, power, and enormous resources shape and determine the ICT environment in Uganda. Interviewee {7} stated the policy position of the executive branch to the OSS policy, “The Ministry of ICT considers OSS and proprietary software complementary. We cannot change laws to prioritize just one software. That would contradict liberalized ICT policies pursued since 1996. Uganda has a free, competitive, and vibrant ICT market.” The ensuing remarks by Interviewee {16} crystallized the stance taken by the executive branch to not change the existing IT policies and laws, or embrace OSS, at least for now. “At NITA-U, we know OSS is free and affordable but we think it isn’t time to develop an OSS policy. I am an IT professional affiliated with Microsoft and think OSS must prove itself before formal recognition.”

The thinking of the two government officials reflects the value-oriented approach, a key concept of frame theory, which “accounts for and explains the influence of political-economy
forces in policy formation processes” (Rowlands et al., 2002, p. 32). Similarly, a counter value system appears to shape and account for the thinking of the proponents of the OSS policy, whose sentiments reflect a pursuit of the humanist or user-oriented goals in this evolving policy process. The data also correspond with the ideological approach from the new institutionalism theory that informs, explains, and develops an understanding of the typical neo-liberal thinking that emphasizes the free market economy that, in turn, appears to influence the approach of government officials to the OSS policy process. The ideological approach also helps to develop an understanding of the viewpoint of government officials, indicating that information policy questions and issues are indeed highly influenced by ideological preferences of a dominant group. These coordinated ideological positions are used as channels to translate ideas into policies that consolidate and perpetuate economic and political interests of dominant social groups and institutions (Galperin, 2004).

To further underscore their power over the OSS policy process and the IT sector in general, Interviewee 7 stated, “The Ministry of ICT provides policy guidelines to the IT sector and may strategically intervene to enhance national development goals. Currently, no evidence exists to justify changing IT laws to specifically adopt OSS.” Similar sentiments were expressed by Interviewee 16 who stated, “NITA-U, mandated to regulate and guide the IT sector, engages in OSS research but we don’t use OSS. We implement a technology/software neutrality approach where no software is privileged. A law to formalize OSS would counteract existing government IT policy.”

Technology/software neutrality refers to a licensing arrangement that allowed ICT operators the freedom to select and use technologies of their choice (IMF, 2008; Lange, 2010, 2012; Ministry of ICT, 2009; Mulira et al., 2010; UCC, 2009; World Bank, 2008). Since 2006,
this licensing arrangement has been viewed as a catalyst to innovation compared to previous licensing approaches that limited competition and innovation. However, this technology/software licensing approach created new supervisory challenges (UCC, 2009, 2013a). The technology neutrality approach created loopholes in the use of ICTs as operators dumped some inferior technologies on the Ugandan market due to laxity in enforcement of quality control guidelines (IMF, 2008; Lange, 2010, 2012; World Bank, 2008). Besides, when the licensing arrangement was adopted, the use of OSS was not as widespread as the case is today. Also, while the arrangement broadly defines and includes all technologies, it never included provisions for all types of software, such as OSS, to fairly compete with proprietary software.

While statements from Interviewees {7} and {16} reflect the highest levels of influence, power, importance, and resources that government agencies wield in the OSS process, they also create perceptions that agents of multinational corporations may connive with government officials to block the OSS policy. Indeed, the perceived opposition to the OSS process by agents of multinational corporations is expressed by Participant {1} who stated, “Agents of commercial software wield a lot of influence over government officials. They are strongly opposed to the OSS policy. Overcoming their opposition is the biggest challenge to encounter.” These sentiments are reiterated by Interviewee {15} who remarked “It is frustrating to imagine that the government cannot use its influence to adopt this affordable, adaptable, and effective software. But, it continues buying expensive licenses for proprietary software.”

However, influence, importance, power, and resources may not only come from outside to bear upon an emerging endeavor. Bowie and Schneder (2012), Rabinowitz (2012) and World Bank Group (2012) stated that a holistic understanding of levels of influence, importance, power, and resources should also identify, examine, and characterize levels of internal sources of
influence. This process should ensure effective understanding of stakeholder roles and management of other stakeholders involved in an endeavor. In the evolving OSS policy, for example, some of the primary stakeholders wield high levels of influence that are limited within their sphere of control, the OSS communities involved in promoting the OSS policy.

This level of influence is described by Participant {3} who observed, “We have knowledgeable, skilled, and experienced OSS adherents in our communities who have been promoting OSS since 2003. We can entrust them to unite and lead us in this endeavor. The earlier we do it the better.” These observations were reinforced by comments from Interviewee {9} who stated, “Many OSS pioneers have contributed to the widespread use of OSS. But they have been sole voices in promoting OSS. They are well-known and respectable people to spearhead our campaign.” These statements indicate that even within the OSS communities in Uganda, there are clearly identifiable leaders who are promoting the policy and use of the software. Based on their levels of interest, influence, and legitimacy, they have assumed the role of promoting, protecting, and sustaining the interests of OSS stakeholders.

While low levels of interest in the OSS policy by government agents pose a challenge to the process, their high levels of influence, importance, power, and resources make them prime targets for the OSS policy promoters to recruit and convert into potential supporters of the endeavor. Influence and interest in the policy process are critical stakeholder attributes that require a thorough understanding for purposes of managing stakeholder relationships to an effort. Both interest and influence are stakeholder attributes that can be either positive or negative, depending on the perspectives of the identified stakeholders (Bowie & Schnieder, 2012).

Wilson and Pollard (2009) suggested that for any policy initiative to win support of key stakeholders, its promoters must recognize, include, and infuse the influence, power, and other
attributes of key stakeholders, such as their tacit knowledge into the policy process, as well as communicate and co-coordinate between them and other stakeholders. Rabinowitz (2012) suggested that if stakeholder attributes, especially of key stakeholders, that reflect their needs, aspirations, and problems are not assessed effectively, understood, and strategically addressed, then an endeavor may fail to realize its objective.

Understanding the levels of influence and interest each stakeholder has on an effort, therefore, helps to harness support, recruit and involve those who could be helpful, and convert or at least defuse those who are ambivalent or resentful to the process (Bowie & Schnieder, 2012). For the purposes of enhancing this SA process, the two stakeholder attributes of interest and influence are used to map the identified stakeholder groups and facilitate the development of a strategy to manage their relationship to the policy process. Figure 1 and Figure 2 graphically illustrate the two most critical stakeholders’ attributes in the OSS policy process, interest and influence.

Stakeholder legitimacy. This refers to the degree to which stakeholders’ claims are seen as credible and appropriate by other stakeholders (Rabinowitz, 2012; World Bank Group, 2012). The data from the emerging OSS policy process suggest that perceptions and views expressed by proponents of OSS hold a high degree of legitimacy. These policy promoters are also primary stakeholders, who are heavily vested in the process, highly knowledgeable about OSS, affiliated with many local and international OSS communities, and strongly aspire to move the process forward. Evidence of stakeholder legitimacy in the OSS policy process is reflected in statements by Interviewee {3} who stated, “I have developed OSS solutions for over ten years, pioneered training and consulting services locally, and affiliated with OSS communities in Uganda and abroad. Together with other colleagues, we are promoting the OSS policy to transform Uganda.”
To further underline the legitimacy of the OSS stakeholders, Participant {5} remarked, “We often remind government that it is the largest consumer of OSS but hesitates to openly support an OSS policy. I think government is hostage to proprietary software. With time, it will change and find authenticity in our position.”

Remarks from Participant {3} also underscored the credibility some OSS stakeholders have developed in the IT sector. “We are developing, using, and marketing affordable and robust OSS solutions locally and abroad, a fact the government cannot dispute. More OSS businesses are emerging to build Web sites, databases, and to provide maintenance and migration services in Uganda.” These claims are corroborated by comments from Participant {5} who explained, “If government realizes that everybody is using OSS, it will ask: why not us? Finally, it will fall in line and approve the OSS law.”

These statements disclosed a reasonable degree to which claims of OSS adherents in the policy formation process are both credible and corroborated. Additionally, the literature on the ICT sector in Uganda reaffirmed claims by the OSS stakeholders. Collins (2010), Ministry of ICT (2012b), and Weddi (2009) suggested that many government departments, most Internet cafes, and several servers in the private sector use the Linux operating system in their computing tasks. Rabinowitz (2012) and World Bank Group (2012) stated that credibility and corroboration of stakeholder claims are critical elements used to discern and ascertain stakeholder legitimacy and interests.

Stakeholder salience. This refers to the priority and attention that managers or implementers of an endeavor accord to resolving the claims and concerns of some stakeholders in a reform effort. Mitchell et al. (1997) defined stakeholder salience as “the degree to which promoters of an endeavor give priority to competing stakeholder claims or interests” (p. 854).
Where some stakeholders wield more interest, influence, and power than others and more attention is given to managing or negotiating their claims or interests in an endeavor, then, they have more salience than others (Chung et al., 2009; Downing et al., 2010; Fraas, 2010; Garcia et al., 2004; Milewa, 2008; Mitchell et al., 1997; ODA, 1995; Ramírez, 1999). To meaningfully and strategically manage stakeholders in any endeavor, a clear understanding of their attributes and relationships to an endeavor is critical to making informed decisions that prioritize how their claims are addressed.

Statements by Interviewee {4} underscored the levels of salience upon which stakeholders’ claims and concerns in the OSS policy will be prioritized to move the process forward. “We need government agencies in charge of the IT sector to ensure that a law embracing OSS is enacted. But we must organize ourselves as a top priority before we seek their support. Our interests are most paramount.” These statements were supported by Participant {4} who stated, “Government and Parliament are influential, powerful, and control resources to change laws to adopt OSS tomorrow. The only way to have them do so is to first organize OSS supporters to speak with one voice. Its that or never.”

These statements indicate that while government agencies mandated to oversee the ICT sector and the Parliament are critical stakeholders, they will only gain interest and participate in the OSS policy process after OSS promoters present a more coordinated and united front. This suggests that at this stage in the policy formation process, claims and concerns of OSS promoters will receive priority attention (salience) before claims and concerns of other stakeholders are addressed by the policy promoters. Table 5 shows levels of stakeholder attributes, either high or low, that formed the basis for assigning the interest categories into which the various stakeholder groups fell.
Stakeholder affiliations are associations, organizations, coalitions, and/or relationships to which stakeholders belong or those with whom they can be reasonably associated (Freeman et al., 1987; Grimble et al., 1996). Burgoyne (1994) stated that identifying and describing stakeholder affiliations enhance an understanding of stakeholder roles, perceptions, interests, legitimacy, and the values they attach to a given endeavor. Stakeholders in the evolving OSS policy, who participated in this study, revealed that they were affiliated with national, continental, and international OSS communities. For example, Interviewee {10} stated, “I am affiliated with OSS communities in Uganda, Africa, and internationally. These communities have helped us to promote OSS use and development through training. Some have funded OSS events and other programs here.”

Interviewee {20} added, “I enthusiastically participate in OSS activities in Uganda. I am affiliated with OSS organizations in Africa and Europe. These communities have improved my knowledge and skills that I share with others here.” Participant {5} stated, “I am affiliated with OSS communities here and abroad. My interests in OSS are financial, educational, and social. I develop and sell OSS, donate some, and use it to teach and train others.”

Besides identifying and describing stakeholder affiliations, these statements provide insights into their interests and further emphasize their legitimacy in the OSS policy process. Their statements also lend credence to observations by Chung et al. (2009), Dalbello (2005a, 2005b), and Freeman et al. (2004), who stated that understanding stakeholder affiliations helps to create a better awareness of their interests and context-specific values that they could potentially exert to shape the direction of a policy process.

Recognizing the high levels of influence, importance, power, and resources wielded by government officials, donor agencies, and agents of proprietary software, OSS proponents with
legitimacy in the policy process recommended ways to raise the interest of government officials and donor agencies in the policy process. However, pioneers and early adopters of OSS expressed regrets that they have not much to educate policy makers and bureaucrats about the potential benefits of OSS to transform Uganda into an information society thereby, attaining its national development goals. The OSS pioneers acknowledged their failure to educate Ugandans about OSS. The data suggest that lack of knowledge and ignorance about OSS is widespread within the executive branch, Parliament, bureaucratic bodies, the private sector, and the general public.

Statements by Interviewee {15} underscored this lack of awareness. “Ignorance about OSS is widespread. Ministers, MPs, and bureaucrats lack knowledge about OSS. Lack of information about OSS, unfounded fears, uncertainties, and risks attributed to OSS compound this problem.” These statements were corroborated by Participant {12} who stated, “Young bureaucrats and MPs understand OSS, its potential benefits, and support its formal adoption. But senior leaders know little about OSS. A top politician visiting Makerere University said he wasn’t interested in software that he couldn’t even touch!” The data suggest that this failure by supporters of the OSS policy initiative to make a persuasive case to policy makers to support the formal adoption of OSS became a subject of contention. The data indicate that participants closely examined their roles in the OSS policy process and subjected their priorities to severe self-criticism.

Statements by Participant {3} captured the sentiments of most OSS proponents. “I think we are lazy and more concerned with making money from OSS. We are focused more on individual survival than OSS advocacy, than engaging movers and shakers of national policies to support the policy.” These statements were reinforced with remarks from Interviewee {17} who
stated, “We lack a strategy to recruit influential and powerful individuals, agencies, and the public to support changes in ICT laws to adopt OSS. We are only interested in OSS utility and bottom line.” Participant {1} echoed similar views. “We have let ourselves down. We may accuse agents of proprietary software of sabotaging OSS but we have done little to engage the executive branch and Parliament to support the policy.” Interviewee {3} summed up the lethargy among OSS proponents in Uganda. “I have developed OSS for ten years but I have never explained OSS to policy makers to understand and win their support for the policy. Unless we do more to make OSS a national priority, blame games will continue.”

These statements suggest that proponents of the OSS policy process emphasize more the functionality and bottom-line aspects of OSS than education and advocacy activities. Research on OSS education campaigns and their associated rhetoric tend to not only extol the robustness of OSS but also, sometimes, exaggerate its universal functionalities (Iacono & Kling, 1996; Simon, 2008).

The Uganda OSS policy formation process is, evidently, devoid of the typical high-sounding rhetoric and visions of technological utopianism predominantly featured in many OSS movements around the world. Visions of technological utopianism refer to highly positive language and well-developed but sometimes unrealistic universal functionality and versatility associated with OSS disseminated by adherents of OSS (Iacono & Kling, 1996; Simon, 2008).

But, lack of high-sounding rhetoric in the policy formation process does not absolve promoters of the initiative from the failure to execute their educational roles. The data suggest that proponents of an OSS policy for Uganda have primarily focused on the pragmatic aspects of OSS, its utility, what it can do to solve problems and its economics, and/or the financial benefits it can bring developers, rather than as a philosophy or an ideology to be pursued against
proprietary software as prevalent in other contexts. The data also indicate that OSS promoters have not made concerted efforts to win the support of policy makers and the general public to appreciate the benefits of OSS and its advantages over proprietary software. Rather, they have mainly developed OSS solutions to solve problems and satisfy their financial interests.

As pioneer users, early adopters, and promoters of the OSS policy, their failure to clearly articulate relevant features about OSS may hinder the adoption and diffusion of this innovation. This failure goes contrary to the two concepts from the diffusion of innovation theory: innovations pioneers and champions (Backer & Rogers, 1998; Rogers, 1995; Rogers & Kincaid, 1981). Innovation pioneers articulate the relevance, simplicity, flexibility, and usefulness of an innovation to persuade other people to adopt the innovation based on its benefits, until a critical mass is reached (Rogers, 1995; Rogers & Kincaid, 1981). The inability by these OSS policy advocates to identify and recruit an innovation champion or opinion leader to support and elevate the cause and profile of OSS does not bode well for this policy. An innovation champion would by now have elevated the OSS policy initiative to national prominence and eloquently articulated its politics to gain public understanding, resources, support, and acceptance. Failure by the OSS policy proponents to execute these communication tasks is inconsistent with these two theoretical concepts from the diffusion of innovations theory.

Failure by OSS developers and supporters of the OSS policy to educate and recruit support for the policy is also consistent with research in stakeholder theory and stakeholder analysis. The research explicitly acknowledges the role of individual or group priorities or interests in policy formation processes as key factors in shaping stakeholder decisions (Chung et al., 2009; Dalbello, 2005a, 2005b; Freeman et al., 2004). Personal values, interests, gains, and practical benefits inspire and influence stakeholder decisions and actions (Chung et al., 2009;
As the data suggest, OSS pioneers prioritized economic interests and the utility of OSS to solve practical problems instead of ideological aspects of OSS.

Four Stakeholder Categories

Rabinowitz (2012) suggested that the most effective way to characterize stakeholders is by their relationship to the effort, including their levels of interests, influence, power, importance, resources, legitimacy, and impact. Bowie and Schneder (2012), Rabinowitz (2012), and World Bank Group (2012) suggested that to strategically manage stakeholders, they should be sorted into categories, which can be many and varied, depending on an endeavor. Guided by the assessed stakeholder attributes in the previous sections, the researcher assigned the respective stakeholders to four interest categories.

For example, the economic interest category might involve programs or efforts to benefit or improve the economic prospects of individuals or groups. The social interest category would commonly be comprised of several social change efforts designed to improve the welfare of individuals or communities. And, the health interest category would broadly include efforts to offer free or improved health or medical services or facilities to benefit individuals, families, or communities (Bowie & Schneder, 2012; Rabinowitz, 2012; World Bank Group, 2012). The academic interest category is commonly associated with individuals involved in academic pursuits, such as teaching, research, or providing educational facilities or services. The political interest category includes either elected individuals or those aspiring for election into public office to serve as representatives of their political interests. And environmental interest category would be comprised of stakeholders involved in the protection of open spaces, conservation of
natural resources, attention to climate change, and other environmental efforts to improve peoples’ lives (Bowie & Schneder, 2012; Rabinowitz, 2012; World Bank Group, 2012).

The cited researchers stated that since stakeholder analysis is a subjective process guided by the available data, the researcher derives stakeholder categories and designates identified stakeholders into categories that most appropriately fit their interests, which differ from one endeavor to another. Even among stakeholders in the same interest category, there may be conflicting interests and concerns (Bowie & Schneder, 2012; Rabinowitz, 2012; World Bank Group, 2012). From the data, four stakeholder categories emerged based upon the participants’ declared or conceivable interests and roles in the increasingly dynamic and complex OSS policy formation process. Drawing from Bowie and Schneder (2012), Rabinowitz (2012), and World Bank Group (2012), the researcher identified four interest categories into which the multiple stakeholders fell: 1) Political interest category, 2) Economic (financial) interest category, 3) Social interest category, and 4) Academic (educational) interest category.

The political interest category. This category includes the executive branch with government agencies involved in the development, implementation, and evaluation of ICT-related policies in the country as a political mandate to serve the Ugandan population (Ministry of Public Service, 2002). Others within this category include the Parliament of Uganda and elected Members of Parliament mandated by the constitution to debate and pass laws, debate and pass the budget, and hold the implementing government agencies accountable for the public funds allocated to them on behalf of the population (The Parliament of the Republic of Uganda, 2011). To underline their political mandate, Interviewee {7} stated, “Our role in the Ministry of ICT is to provide political leadership to facilitate and develop the IT sector on behalf of the executive branch. We ensure that government interests through policies, laws, and regulations
are implemented.” Interviewee {16} reaffirmed the political role played by government agencies in the IT sector into which the OSS policy initiative fall. : “At NITA-U, we implement a law developed by the executive branch and passed by Parliament. The mission, vision, goals, and objectives that guide our mandate reflect government interests in the IT sector.”

However, even in this political interest category, contradictory viewpoints are evident as reflected in statements from the following Members of Parliament. Interviewee {11}, for example, stated, “I am an MP, IT professional, a strong proponent, developer, and long-time user of OSS. Adopting OSS will liberate Uganda from digital colonization. OSS is freely available, flexible to customize, use, and maintain compared with expensive proprietary software.” Statements by Interviewee {11} were corroborated by Interviewee {2} who remarked, “MPs use devices run by OSS. But majority unaware and need urgent education to support laws embracing OSS to save national scarce resources. Internet operates on OSS, cell phones, and many devices either run or are built on OSS.”

The previous statements suggest that while these two Members of Parliament fall in the political interest category, their views are directly opposite those held and implemented by government agencies that supervise the IT sector on behalf of the executive branch. And, while the Parliament falls into this political interest category, its collective position as a separate branch of the government is unclear regarding the OSS policy.

The economic interest category. This category is comprised of the majority of primary stakeholders in the OSS policy process, including telecommunication companies and Internet service providers, operators of OSS-based businesses, individual developers, and members of the various OSS communities. These stakeholders were assigned to this category on the basis that they would stand to gain economic benefits if the OSS policy is adopted. Even now, they are
involved in OSS development activities that benefit them economically. They are highly interested in the policy process for primarily economic reasons. An examination of the ICT-related documents uncovered international and local telecommunication corporations, including UTL, MTN, Airtel, Warid Telecom, Orange Telecom, and Smile Communications Uganda, that operate as Internet service providers and ICT stakeholders with strong economic interests in the OSS policy process (Ministry of ICT, 2012a; Ministry of Works, Housing, and Communications, 2003; UCC, 2005; UIA, 2011; Weddi, 2009).

These corporations use OSS alongside proprietary software to operate as ISPs and are highly interested in the evolving OSS policy because if it is adopted, more OSS solutions would be developed locally enabling them to drastically reduce their software costs, expand their operations, and maximize profits (Collins, 2010; Weddi, 2009). If the policy fails to progress, these corporations would not make any financial gains but would continue spending heavily to use proprietary software alongside OSS. The analysis also indicated that local companies offering OSS support services, developing OSS solutions, and/or using OSS for their business operations, such as the Civil Aviation Authority, Uganda Carbon Bureau, Mountbatten Hosting, Digital Solutions, and Cured, Ltd., among others, are OSS stakeholders fall into the economic interest category (Collins, 2010; Weddi, 2009). Executives and some employees of these local companies are highly interested and at the forefront of promoting and defending the OSS policy (Collins, 2010; Weddi, 2009).

The analysis showed that local agents dealing in proprietary hardware and software were stakeholders in the ICT sector, falling into the economic interest category (Wafula, 2011). These local agents of multinational corporations had opposing (low) economic interest in the proposed OSS policy. Some of the multinational corporations whose interests are represented in the ICT
sector in Uganda and fall into the economic interest category include Microsoft, Oracle, Apple, Samsung, Dell, and Hewlett Packard, among others (Wafula, 2011). As dealers in proprietary hardware and software products, they would stand to gain directly if the OSS policy is rejected, because they would be able to maintain their monopoly in the market. The adoption of the policy would introduce formal competition from OSS and, thereby, reduce their profit margins.

The interviewees reiterated the high economic interests of the telecommunication corporations that operate as Internet service providers. Statements by Interviewee 8 emphasized the economic interests of telecommunication corporations that translate into their support for the policy. “As the biggest ISPs in Uganda, we strongly support OSS adoption. I supervise Internet service operations using OSS with proprietary software. Formal use of OSS will facilitate development of solutions and reduce our huge expenditure on commercial software.” These statements were echoed by Interviewee 19 who stated, “I worked in a telecom company, an ISP, which operated on OSS technology and it made lots of money. OSS formalization would drastically reduce their expenditure on proprietary software and give them windfalls!”

Reinforcing statements by Interviewees 8 and 19, other IT professionals who have set up OSS-based companies, indicated that a law to formalize the use of OSS would not only benefit those with OSS businesses and expertise but also create employment for thousands of educated but jobless youths to contribute to the economic development of Uganda. Interviewee 9 stated, “I developed an OSS solution, licensed it as proprietary, and profitably market it globally. A law to formalize OSS may help create jobs for 20,000 annual IT graduates to contribute to Uganda’s economic development.” Stakeholders with financial interests that would benefit from the OSS policy fell into this economic interest category.
The social interest category. This category includes stakeholders involved in providing social services to facilitate social change in the country. These include some key, primary, and secondary stakeholders, such as international donor agencies, NGOs, hospitals, civil society organizations, and some of the OSS communities. The literature on the ICT sector indicated that several international donor agencies as well as international and local nongovernmental organizations operating in Uganda have funded and continue to support community-based programs aimed at the diffusion of ICTs for the social transformation of populations (Weddi, 2009). Some of the donor agencies that fall into this social category include UNDP, United States Agency for International Development, Danish International Development Agency, Swedish International Development Agency, European Union, and International Institute for Communication and Development, among others (Weddi, 2009). Some of the local and international nongovernmental organizations that fall into this social interest category include UNICEF, Oxfam, ACCORD, Plan International, Action Aid Uganda, Action for Development, and Women of Uganda Network, among others (Collins, 2010; Weddi, 2009).

Regardless of their memberships, the majority of OSS communities pursue missions and goals that aim to provide services to improve the social welfare of Ugandans. These OSS communities, including Linux User Group, Center for Open Source Software, ICT Association of Uganda, I-Network, Mobile Monday, HiveColab, Outbox, Applab, and Google Developer Group, primarily fall into the social interest category. However, some of these organizations and communities may fall into more than one interest category. Typically, while conducting SA, it is not unusual for some stakeholders or groups to overlap with some falling into more than one category (Bowie & Schnieder, 2012; Freeman, 1984; Rabinowitz, 2012; World Bank Group, 2012).
Evidence of OSS stakeholders falling into the social interest category was reflected through comments by Interviewee 3 who stated, “Most NGOs providing social services to rural populations to access clean water, to protect the environment, promote gender equity, curb domestic violence and child abuse, and monitor prices for agricultural products use OSS to reduce costs and expand services.” These views were reinforced by remarks from Interviewee 4 who said, “I know that UNICEF, Action Aid, and some local NGOs in health care services use OSS in their devices to monitor conditions of expectant mothers and to send them reminders about their children’s immunization dates.”

The academic interest category. This category is comprised of universities and vocational institutions, lecturers (academicians), instructors, teachers, and students. Their involvement and support for the OSS policy is primarily driven by academic or educational purposes. Although they also provide a social service and could have fallen into the social interest category, their focus is more specifically oriented towards education. From the review and analysis of the ICT literature, OSS stakeholders falling into this academic category include universities, vocational institutions, lecturers, instructors, students, Free Software and Open Source Foundation for Africa-Uganda, ict@innovation, East Africa Centre for Open Source Software-Uganda, S7 Vocational Institute, Linux Chapter at Makerere University, and Mbarara University Linux Chapter (Weddi, 2009).

Participant 2 stated, “Here at the Virtual University of Uganda, we only use OSS for all our academic programs online. We share similar visions and interests with Nkozi University and International University of Health Science to integrate OSS in e-learning.” These remarks were supported by Interviewee 12 who said, “Several of the 31 universities in the country now use OSS applications in libraries, in teaching, and administration. At the S7 Vocational Institute, all
our computer training programs run on OSS applications.” The OSS stakeholders described in this section fall in the academic (education) interest category.

The data presented in this section were consistent with the two concepts from stakeholder theory: stakeholder attributes and stakeholder affiliations. Viewed from these two theoretical concepts, a clear understanding of the various stakeholders’ characteristics and relationships to the OSS policy initiative emerged. Chung et al. (2009), Downing et al. (2010), Fraas (2010), Garcia et al. (2004), and Milewa (2008) stated that if stakeholder attributes and affiliations are effectively applied to an evolving policy initiative, they lend themselves as pragmatic tools in facilitating a better understanding of stakeholders’ relationships to a policy reform and how best to manage their claims. This systematic process, therefore, helped to uncover stakeholder perceptions, levels of interest, influence, importance, power, resources, and potential risks to the evolving OSS policy.
### Table 5

*Stakeholders’ Categories and Attributes Emerging from the Data.*

<table>
<thead>
<tr>
<th>Stakeholder categories</th>
<th>Influence</th>
<th>Interest</th>
<th>Importance</th>
<th>Power</th>
<th>Resources</th>
<th>Legitimacy</th>
<th>Salience</th>
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<tr>
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<tr>
<td>OSS Communities</td>
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Stakeholder Mapping

Stakeholder mapping, also referred to as stakeholder management involves the graphic display of stakeholders based upon their interest categories to facilitate an effective management of their claims or concerns for positive reform outcomes (Rabinowitz, 2012; World Bank Group, 2012). The SA process is only useful if it is applied to map and manage stakeholders to gain their support for the effort. The main purpose of stakeholder mapping or management is to determine who among the stakeholders can have the most positive or negative influence on an effort, who is likely to be most affected by the effort, and how to deal with stakeholders with different levels of interest and influence (Rabinowitz, 2012; World Bank Group, 2012). Additionally, stakeholder mapping or management aims to facilitate the recruitment of stakeholders with interest, influence, and power through communication, education, negotiation, persuasion, and other methods that acknowledge their concerns (Rabinowitz, 2012; World Bank Group, 2012).

Rabinowitz (2012) and World Bank Group (2012) suggested that because stakeholder mapping graphically displays stakeholder positions, they offer some initial understanding of their respective levels of salience. Typically, elected leaders and donors would receive priority attention to address their concerns as a way of recruiting them to support a reform process (Rabinowitz, 2012; World Bank Group, 2012). With Uganda’s evolving OSS policy, however, the first priority attention would be focused on mobilizing all the policy promoters to unite and develop a common strategy. Thereafter, shifting attention to recruit the most influential, powerful, and important entities, as well as those with resources to positively impact the effort, the elected government officials, bureaucrats, and donors. This proposed strategy, essentially, is specifically informed by stakeholder attributes uncovered from the data.
It is, therefore, not a one-size-fits-all approach to stakeholder management. Rather, it addresses stakeholder relationships to the evolving OSS policy. Statements by Participant 1, indeed, point to the type of stakeholders that will receive first priority and attention from OSS policy promoters to restore momentum into the process. “Foremost, we need to re-organize ourselves into one unified body, develop a communication strategy, and agree on how to implement it by targeting the most effective support to overcome opposition and get the OSS policy approved.”

The proposed stakeholder management strategy presented in Chapter 5, therefore, outlines communication and education components aimed to first organize OSS promoters and then persuade and recruit key stakeholders and others to support and participate in the process to change the existing ICT laws to embrace OSS.
Figure 1. A reflection of the different stakeholder groups presented in a two-by-two matrix using the attributes of interest and influence (adapted from DFID, 2003. See Appendix I for the copyright permission.

Quadrant A is comprised of stakeholders with high interest and high influence in the policy formation process. These include promoters of the OSS policy whose interest and participation in the process is to ensure the adoption of the policy to satisfy, protect, and sustain their interests. However, their assumed high influence is limited to their sphere of control within OSS communities that support the policy process. Stakeholders in quadrant A include OSS developers, telecom corporations, local Internet service providers, OSS-based companies, and some members of OSS communities falling mainly into the economic or financial interest category.

In conventional policy reform processes, governments or their agencies, as stakeholders with high interest and high influence that wield high levels of power and enormous resources, assume the role of promoters to spearhead a policy reform and would occupy quadrant A (Bowie & Schneder, 2012; DFID, 2003; Rabinowitz, 2012; World Bank Group, 2012). However,
because the OSS policy initiative in Uganda is private sector-driven, quadrant A and its
categorization differ from conventional policy reform processes. Where the policy is initiated by
the private sector, the promoters, however highly interested in the policy initiative, can neither
directly elevate it to the legislative agenda nor gain budgetary support for it without the support
of a high profile individual from the executive branch or the Parliament that wields high
influence, importance, power, and resources to champion the cause of the policy.

The OSS policy promoters only wield limited influence within OSS communities and
have to solicit support of an individual that commands high influence in broader social spheres.
Such an individual would articulate the politics of the policy, place it on the legislative agenda,
and mobilize resources for it (Rabinowitz, 2012; World Bank Group, 2012). Referred to as
promoters, stakeholders in quadrant A typically treat, with high priority, all matters pertaining to
a policy initiative, and their actions can have a significant impact on a policy formation process
(Dialogue by Design, 2011; Expert Program Management {EPM}, 2011; Rabinowitz, 2012;
World Bank Group, 2012). As a group, they need to develop a cohesive strategy, common
positions on the policy process, and fully engage in the implementation of strategies to gain and
maintain commitment and ownership of the process (Dialogue by Design, 2011; Rabinowitz,

Quadrant B includes stakeholders with high interest and low influence in the policy
initiative but can significantly shape its direction and outcome. Stakeholders in this quadrant
includes OSS communities, enthusiastic OSS users, and some employees of OSS companies,
some government bureaucrats developing and using OSS, some media practitioners, universities,
vocational institutions, schools, and some academicians, including university lecturers,
instructors in tertiary institutions, and teachers. Although this group has low influence, it is
highly interested and requires regular communication with feedback to motivate them and integrate their recommendations to move the policy process forward.

Typically, this group includes individuals ready to commit their time and energy to work toward the attainment of positive policy outcomes (DFID, 2003; Dialogue by Design, 2011; EPM, 2011; Rabinowitz, 2012; World Bank Group, 2012). Referred to as defenders, this group attaches a high priority to an endeavor but needs leadership, education, and motivation to actively engage in the process (Dialogue by Design, 2011; EPM, 2011; Rabinowitz, 2012; World Bank Group, 2012). This group needs constant education about an endeavor to improve its knowledge and skills to ensure that its involvement enhances the success of an endeavor (EPM, 2011; Rabinowitz, 2012; World Bank Group, 2012). Without education and mobilization, actions of this group may not have a meaningful impact on policy outcomes. OSS policy promoters should develop good working relationships with these stakeholders.

Quadrant C shows stakeholders with low influence and low interest who need minimum engagement and monitoring because they are least likely to sabotage an endeavor. Most of the stakeholders in this group fall into the social and academic interest categories. These include some NGOs and their employees, hospitals and their employees, some educational institutions and their employees, OSS users, students, and members of the general public that use OSS. They only need information about the progress of a policy process because they are the least interested in the policy process. Given their low interest and influence, they are referred to as apathetics, whose actions are not likely to affect a policy process in any way (Rabinowitz, 2012; World Bank Group, 2012).

Quadrant D shows stakeholders with high influence and low interest. These key stakeholders should receive maximum attention from policy promoters by developing good
working relationships with them to reduce risk for the initiative. These stakeholders are referred to as latents, whose actions can positively or negatively affect a policy process because they either have low interests in the policy or are completely opposed to it (DFID, 2003; Dialogue by Design, 2011; Rabinowitz, 2012; World Bank Group, 2012). The majority of these stakeholders fall into the political interest category, including the executive branch and its agencies: Ministries of ICT, Finance, the Parliament and Members of Parliament, government officials working in the Ministry of ICT, the National Information and Technology Authority-Uganda, Uganda Communication Commission, Uganda Investment Authority, the Uganda Law Reform Commission, local governments, and their employees. These key stakeholders, who also include some donor agencies, have high influence, power, resources, and importance, attributes they could exert on the process to support or derail it.

These stakeholders, with low interest in the endeavor, are capable of using their high influence, importance, power, and resources to block, undermine, derail, or skew a policy process (Dialogue by Design, 2011; EPM, 2011; Rabinowitz, 2012; World Bank Group, 2012). Rabinowitz (2012) suggested that these are priority stakeholders, who need constant communication about the policy initiative with more time dedicated to updating them about emerging issues, to gaining and sustaining their confidence, treating them with respect, and working toward winning their support for the endeavor. Quadrant D includes some primary stakeholders whose interests are directly opposed to those of the promoters of the OSS policy initiative. Although they fall into the economic (financial) interest category, they include local agents dealing in proprietary hardware and software whose interests are opposed to those of the OSS policy promoters. These are entities or people who could exert a large amount of negative influence over the OSS policy because its success would subject them to competition and result
in financial losses. Their interest in the policy is for negative reasons, to ensure that it fails. Given their negative or resentful attitude towards the OSS policy, they fit more into the group of latents than in any other group.

This map provided a means to group stakeholders together and helped to consider managing them as groups rather than as individuals. A stakeholder map is particularly helpful because it provides a visual image of stakeholder categories and positions and minimizes the huge task of adopting a management style for each stakeholder, as developing a national policy involves thousands of individuals interested in a given process (Rabinowitz, 2012; World Bank Group, 2012).
Figure 2. An illustration of the dynamic relationships the stakeholders have toward the policy process and with each other.
The mapping tool used to construct Figure 2 was Excel 2010. The coordinates were marked according to a two-dimensional scale with the X-axis representing interest and the Y-axis representing influence/importance. The scales for both X and Y axes were scaled from negative 10 to positive 10. For the interest or X-axis, negative 10 represents low interest and positive 10 represents high interest. For the influence/importance or Y-axis, negative 10 represents low influence/importance and positive 10 represents high influence/importance. After entering the numerical values for each OSS stakeholder, the Excel 2010 chart builder was used to draw the figure.

Figure 2 highlights relationships of the different stakeholder groups to the OSS policy initiative. The manner in which they would interact with and influence each other, such as how the OSS policy promoters would interact with the executive branch, government agencies and officials, Parliament, and donors to persuade them to move to their side and support the initiative. The stakeholders were mapped using the interest and influence attributes, their absolute distance from the center or the OSS policy process, as well as their relative distance from each other. Some stakeholders identified their positions themselves and their statements formed the basis for uncovering their attributes in relation to the policy initiative and other stakeholders. These attributes helped to inform the respective stakeholder positions on the map. On the upper right hand side of the map, primary stakeholders with high interest and high influence with respect to the OSS policy initiative are displayed. These include OSS developers, telecom companies, ISPs, OSS-based companies, and some IT professionals working in various institutions. These primary stakeholders are heavily vested in the OSS policy initiative and would be directly impacted either positively or negatively by the policy outcomes. Among them are the self-identified policy promoters of the policy.
On the opposite side in the upper left hand side of the matrix, are some primary stakeholders with high influence but low interest in the policy initiative. These stakeholders with contrasting and negative interests in the process are in the opposite axis on the map farther away from the policy promoters. These are the local representatives of multinational corporations dealing in proprietary hardware and software. Potentially, they pose the highest risk to the policy initiative because they would stand to lose their monopoly in the ICT market if the OSS policy initiative is adopted to introduce competition.

The key stakeholders, including the executive branch, government agencies, the Parliament and Members of Parliament, and donor agencies, appear close to the axes suggesting that they neither support nor oppose the policy. Rather, their positions on the map indicate their low interest and indecision to support or oppose the policy process. Their position offer policy promoters an opportunity to direct their attention to these key stakeholders through communication to gain their interest, support, and participation in the process.

Other primary stakeholders include OSS communities and their members, some employees of OSS-based companies, universities, academicians, and enthusiastic OSS users that symbolically congregate in the lower right cell of the matrix. These are OSS policy defenders ready to volunteer their time and energy to work for the success of the initiative. Although their influence with respect to the policy is low, they are highly interested in the policy because they would be most impacted, positively or negatively, by the policy outcome.

Some secondary stakeholders, including NGOs, civil societies, students, and ordinary users of OSS, those with low interest and low influence, cluster in the lower left side of the axes. These individuals and organizations would be indirectly impacted by the OSS policy. Some of these stakeholders may not even be aware that an OSS policy initiative is underway.
With respect to perceptions about OSS as key to the support or opposition to the policy process, Figure 2 uncovered some potential risks to the initiative. To underpin this potential threat to the policy, Interviewee 4 commented, “Obvious hostility exists against OSS from agents of proprietary software. They may influence decisions by policy makers through donations of ICTs to frustrate the process. We should forestall these schemes by educating policy makers to understand and embrace OSS.”

The map (Figure 2) also illuminated a potential emergence of some conflict among opposing groups as the dispersion of stakeholders, particularly in the two dimensions in both Figures 1 and 2, signaled likelihood for conflict. Conflict, however benign it may appear, drains resources and energy and diverts attention from a policy process (Rabinowitz, 2012; World Bank Group, 2012).

The data suggest that the OSS policy promoters are devoting most of their time to explaining the potential dangers of proprietary software to their effort. Instead of forming a united and strong national OSS association and committing their time and energy to developing a cohesive strategy to communicate and educate policy makers and the general public about OSS, its transformative elements, and potential benefits for Uganda, policy promoters are paying more attention to a likely conflict with agents of proprietary software that may not even manifest.

This scenario in the OSS policy process is eloquently stated by Participant 14, who remarked “We are our own saboteurs. We are fragmented and need to put our house in order, develop a common platform, speak with one voice, and then go out to recruit support for the policy.” These sentiments were underpinned by statements by Interviewee 13 who stated, “We need to develop strong commitment to the OSS policy. This is our baby to nurse, nurture, and protect from our fiercest opponents. But how can we overcome resistance from agents of’
proprietary software if we are divided?” These statements clearly indicate the degree to which perceptions, real or unfounded, in any social context, may contribute to the complexity associated with a social phenomenon.

The two stakeholder maps facilitated scenario-building to initiate discussions that would help promoters of the OSS policy initiative determine appropriate responsive strategies, which stakeholders to target for negotiations and trade-offs, and/or which to buttress with resources and information. A stakeholder map, therefore, makes it easier to define the types of communication needed during the policy formation process, and helps to develop strategies of how to manage the relationships of various stakeholders early in the process (EPM, 2011).

Statements by Interviewee 5, indeed, correspond with the development of an early responsive strategy to overcome the lackluster pace at which the policy has been moving and infuse some momentum into the process. “As OSS pioneers and promoters, we need to unite and communicate with the executive branch, Parliament, and other stakeholders through one voice. Without that, we will remain a fragmented group. Nobody will take us seriously.” From the maps, a framework emerged that graphically showed the different types of stakeholders and the likely communication strategy that would be needed to prioritize and manage their relationships.

Stakeholder Management

An analysis of positions of stakeholder groups on the maps and their perceptions formed the basis for developing recommendations to the OSS policy promoters on how to communicate and manage the diverse stakeholders. Since the objective of this SA process was to identify, describe, categorize, analyze, and develop strategies to manage stakeholder relationships and enhance the OSS policy formation process, a brief but context-specific communication strategy
to recruit support from the most influential, important, and powerful stakeholders with appropriate resources to move the OSS policy forward is proposed in Chapter 5.

Drawing from the results presented in this section, the proposed stakeholder management strategy will primarily focus on how policy promoters will communicate with each other, other categories of stakeholders based upon their salience, and how they will sustain, review, and improve the evolutionary communication strategy. This iterative aspect of the communication strategy to advance the OSS process is captured in statements by Interviewee 10 who stated, “We must continuously communicate, educate, and convert everybody who matters, women and men, to understand and believe in OSS utility and viability. We urgently need every support for this policy to diversify availability of transformative IT tools.” This proposed communication strategy will parallel efforts to bridge social capital, which relates to interacting with multiple community stakeholders to solicit their views, resources, and support for an evolving endeavor in a given social context (Rabinowitz, 2012). The data presented in this section will contribute to addressing the overarching question, and more specifically, research questions 1, 2, and 3.

Results of the Frame Analysis

The application of frame analysis to the data helped the researcher identify, describe, interpret, and understand the frames of reference ICT stakeholders associated with the evolving open source software policy in Uganda. This technique systematically uncovered a web of dynamic, competing, and complex OSS stakeholders’ perspectives. Participants’ value systems offered insights into their thinking and experiences with OSS as well as how they perceived and identified with nuances in the policy process. The resulting data provided an opportunity to compare and contrast the unique perceptions of stakeholders in this formative stage of an
information policy process. Their narratives reflected two major, divergent viewpoints concerning the policy.

One view, the supportive position, considered the proposal to change the existing ICT laws and policies in Uganda to facilitate adoption of OSS as an appropriate strategy to reduce expenditures on proprietary software, create more avenues for technology acquisition and innovations, potentially bridge the digital divide, and transform Uganda into an information society. The contrary standpoint, however, rejected a change to the existing ICT laws as an unnecessary disruption of market forces that have over the years guided the evolution of a thriving ICT sector that is positively transforming Uganda.

This frame analysis technique also provided a better understanding of whether the proposed OSS policy aimed to promote the interests of OSS users as active participants transforming Uganda or as mere consumers of the software. The technique also uncovered competing market forces and human-oriented interests underlying the proposed OSS policy. To better understand the frames of reference of the OSS stakeholders, a comparative analysis of their frames, their experiences with OSS and the policy formation process was sketched around six dimensions: 1) Facilitation or intervention, 2) Skepticism and confidence, 3) Ignorance and corruption, 4) Stability and novelty, 5) Emancipation and hegemony, and 6) Digital divide and the information society.

Facilitation and Intervention

The terms facilitation and intervention are used in the ICT sector to differentiate the roles the government of Uganda has assumed since 1989 when it adopted an economic liberalization and privatization policy (Ministry of Works, Housing, and Telecommunication, 1996, 1997). Facilitation involved the development of policies and laws to guide, develop, and regulate the
private sector-driven ICT industry, whereas non-intervention ensured that the government allowed market forces to determine the cost of ICT services and products (Ministry of Works, Housing, and Telecommunication, 1996, 1997). The government role of facilitation was limited to strategic interventions to enable private investors to develop and increase telecommunication infrastructure and services (Ministry of Works, Housing, and Telecommunication, 1996, 1997).

However, contrasting viewpoints emerged among the OSS stakeholders regarding which role the government should play in the evolving OSS policy process, facilitation or intervention. This dimension highlighted contrasting perspectives espoused by the government. While representatives of the government framed, defined, understood, and presented the historical role of facilitation within the ICT sector as productive, promoters of the OSS policy espoused a new role of direct intervention by the government in the ICT sector to champion the interests of the citizens to access a tool that is affordable, adoptable, and usable to enable them maximize opportunities in the digital-based global economy.

The thinking of the government officials is captured through statements by Interviewee 7, who referenced the numerous ICT policies pursued since 1996 that emphasized government facilitation rather than intervention, a policy role that resulted in positive outcomes. “Government policy is to facilitate an enabling environment to guide and develop the ICT sector. Intervention can only be considered for strategic purposes to ensure realization of national development goals. Facilitation, not intervention, has succeeded.”

However, promoters of the OSS policy initiative voiced a contrary viewpoint requiring the direct intervention of the government to support a new law to enable the formal recognition and adoption of OSS. Statements by Interviewee 10 echoed sentiments expressed by other OSS policy promoters. “Government should intervene to support and champion OSS adoption in the
country. Failure to intervene and merely facilitate the ICT sector would sacrifice citizens to interests of predatory commercial software.”

The views espoused by Interviewee 7, a government official, are grounded in the liberalization and privatization policies adopted and pursued since 1989 and outlined in the National ICT Policy Framework of 1996, which described the role of government as a facilitator of the private sector to develop and increase telecommunication infrastructure and services rather than through direct intervention (Ministry of Works, Housing, and Telecommunications, 1996, 1997). However, the views espoused by OSS policy promoters are shaped by an OSS development model that emphasizes direct intervention in ICT sectors by governments in developing countries to develop policies and laws that support and promote investment in projects to enable the use, development, and diffusion of OSS (Camara & Fonseca, 2007).

While perceptions espoused by government officials are influenced by a non-interventionist ICT policy based on a liberal economic philosophy (Ministry of Works, Housing, and Telecommunication, 1996), views expressed by the OSS promoters are based upon the OSS philosophy on which the OSS model is built (Camara & Fonseca, 2007). These divergent frames of reference shaped by two different philosophical and value orientations underline the schism in the OSS policy formation process between the Uganda government and OSS policy promoters.

This dichotomy in the framing of the role of government in the ICT sector by the protagonists is further reflected in the understanding, definition, and presentation of OSS. While supporters of government ICT policies view OSS and proprietary software as complementary technologies existing side by side in a free market environment, promoters of the OSS policy regard the software as a different and an unequal competitor in an unfair market place. Currently,
the government pursues a technology or software neutrality approach that does not privilege any
technology or software over the other.

Defending the technology/software neutrality approach to ICT policies, Interviewee 16 stated, “Technology neutrality is in line with government policy of economic liberalization. No software is favored. Proprietary software and OSS are treated alike.” This liberal economic policy of technology/software neutrality is further supported by Interviewee 7 who stated, “Under our liberal economic policies, technologies must compete equally in the ICT market. We are mandated to enforce that liberal policy to develop the ICT sector without favor. OSS must prove itself as an alternative to proprietary products.”

But Participant 4 specifically framed government pursuit of the technology/software neutrality approach as primarily favorable to proprietary software and unfavorable to OSS. “Technology or software neutrality favors proprietary software, disadvantages OSS, and stunts innovations. OSS developers are marginalized by this approach because it does not encourage fair competition.”

This viewpoint is further supported by Interviewee 1 who highlighted how OSS policy promoters understood OSS and the policy. “OSS is new, needs a specific law not technology neutrality approach, and government support to enable citizens access, use, and transform their lives. Proprietary software is historically favored and widely advertised to influence markets. OSS developers cannot afford adverts.”

These conflicting frames illuminate a complex OSS policy formation process in which stakeholders subjectively assign different meanings to OSS and espouse divergent perspectives of the role of government in the ICT sector. These viewpoints are influenced by their understanding and unique experiences with OSS. This dimension also reflects how ideologies of
ICT stakeholders involved in the OSS policy are interacting and contesting each other in this agenda-setting stage of the process. Viewed from an ideological approach from the new institutionalism theory (Galperin, 2004), the data in this dimension underlined how divergent ideological orientations consistently contradict with the most powerful group, the government supporters of the current liberal ICT policy regime, perpetuating its dominance over the minority, supporters of the OSS policy.

Statements by Interviewees 7 and 16 correspond with the notion that information policies are translations of ideas that serve to consolidate and perpetuate the political ideology of dominant social groups and institutions (Galperin, 2004). Galperin (2004) observed that viewing information policies through the ideological approach, when conflicting ideologies of diverse social groups interact, the ideology of the dominant group always prevail over the interests of minority groups. Apparently, the ideological orientation based on a free market liberal economic approach pursued for the ICT sector by the government, the most dominant and powerful group appears to prevail.

Burger (1993) and Hernon, McClure, and Relyea (1996) observed that the formative stage of an information policy process is fraught with contradictory viewpoints and agendas represented by multiple stakeholders based upon their competing interests and value orientations. Erumban and de Jong (2006) suggested that development of information policies for the adoption and use of ICTs involves contradictory viewpoints influenced by social, economic, political, and cultural preferences of diverse stakeholders involved in a policy process.

These frames of reference espoused by the respective stakeholders reflect their specific standpoints or ideologies, which are consistent with suggestions that developing an information policy is a political process that deals with problems and outcomes associated with subjective
value systems that lack objectivity (Moore, 1996; Overman & Cahill, 1990; Rowlands et al., 2002). Viewed from the political economy, ideological, and value perspectives, the framing of OSS and the policy process by stakeholders representing two opposing standpoints, parallel two competing humanist and neo-liberal models in which national information policies are categorized and described (Moore, 1996).

Information policies based upon a humanist model strongly emphasize a holistic strategy championed by governments to adopt and use ICTs to stimulate economic development for all citizens, ensure social change, stability, and cohesion (Moore, 1996). In contrast, ICT-inspired information policies modeled along the neo-liberal economic philosophy emphasize market-led solutions and exploit private capital to maximize profit with governments assuming the role of a facilitator (Castells, 1998; Moore, 1996; Shapiro & Varian, 1997). To resolve these contesting ideological positions, McClure, Hernon, and Railye (1989) suggested that policy makers involved in the formation of information policies for the adoption of ICTs need to balance competing interests, perspectives, and values held by individuals or groups to advance the public good.

Skepticism and Confidence

More contrasting frames of reference coalesced around skepticism and confidence toward OSS. In this context, skepticism refers to levels of uncertainties associated with OSS whereas confidence refers to a degree of certainty associated with a technology. Representatives of the government underlined the skepticism with which they viewed OSS. Their positions are influenced by perceptions that because OSS is a new software in the Ugandan context, it is still shrouded in unresolved uncertainties. They frame and describe OSS as potentially risky and lacking features to inspire enough confidence in government officials to invest public funds for
its development. Yet, government representatives associate proprietary software with certainty and value for money. Their viewpoint is informed by their historical use and association with proprietary software to which they have developed a degree of confidence and loyalty.

Contrasting proprietary software with OSS, government officials consider lack of a warranty in the procurement of OSS to guarantee replacement, repair, and maintenance to users as risky and a sign of uncertainty. In Uganda, the provision of a warranty is a legal requirement in procurement processes and procedures to win government contracts under the Public and Procurement and Divesture of Assets Act of 2003 (Public Procurement and Divesture of Assets Authority, 2013). OSS cannot, therefore, fairly compete with proprietary software that provides a warranty to replace, repair, and maintain its products.

But even without the legal requirement for a warranty, proprietary software is privileged given its historical use and the loyalty it has developed among officials in the public sector who are involved in procurement processes for government contracts. This government perception is expressed through statements by Interviewee 7 who stated, “Uncertainty still surrounds OSS; little information about it is available. Proprietary software offers warranty and training. Relying on international experts to offer OSS services are indefensible. Expenditure of public funds requires strict accountability based on established competitive procurement procedures.”

This skepticism is also reinforced by government’s view that Ugandan OSS adherents may not be well prepared to comply with the complicated OSS licensing regimes as exemplified in statements by Participant 16 who stated, “OSS licenses are complicated and confusing. If Ugandans cannot comply with the more rigid commercial licenses, some engage in software piracy, how sure are we that they will conform to OSS licenses?”
The skepticism expressed by representatives of the government about OSS is not without precedent. It parallels research by Blansit (2009), Colford (2008), and Valimaki and Oksanen (2005) who stated that previously ignored and underestimated OSS costs often unpredictably turn out to be higher over the lifespan of any OSS solutions, such as expenditure on training and support services, which contribute to rampant skepticism. Colford (2008) also stated that while OSS is free to download and use, its model, including its licensing structures and redistribution, especially by OSS skeptics, is shrouded with misinformation and confusion.

Bruggink (2003), Heeks (2004), and Reijswoud and Topi (2003) suggested that governments in Africa and other developing countries are wary of supporting OSS-related initiatives because they view and associate OSS with technical uncertainties and high operational risks. Equally, limited availability of OSS products, shortage of OSS vendors and specialized technical support, and poor and costly Internet connections to engender real-time collaboration with global OSS communities systematically undermined the confidence in the adoption and use of OSS (Bruggink, 2003; Heeks, 2004; Reijswoud & Topi, 2003).

Camara and Fonseca (2007) stated that while robust OSS solutions have been collectively developed and become pervasive, only a small group of developers have access to information and understand the source code of a given product to effectively contribute and sustain its development. Elliot and Kramer (2008) and Simon (2008) also suggested that ubiquitous use of OSS notwithstanding, interoperability problems between versions of OSS solutions still exist as a running concern among OSS communities.

But the global OSS landscape has since changed. Fontana (2008) stated that OSS has become an integral part of ubiquitous computing where access to information using OSS has become cheaper, faster, and devoid of uncertainties of the past. Even in Africa in general and
Uganda in particular, previous skepticism toward OSS is gradually shifting toward confidence in the use of the software. African countries including Uganda are now widely using OSS in capacity building, development and usage, educational and business applications, advocacy campaigns, policy implementation, research and development, among others (Collins, 2010; Free Software and Open Source Foundation for Africa {FOSSFA}, 2013; Karume & Mbugua, 2012; Sowe, 2011; Weddi, 2009).

While contradicting the skepticism, proponents of OSS and promoters of the policy view proprietary software as a drain on the country’s meager resources, perpetuates dependence on the whims of multinational economic interests, and suffocates development and innovation of software by indigenous developers. Exuding the confidence in OSS, supporters of the OSS policy initiative framed OSS as a technology that enhances innovation and strategic national development.

This endorsement of OSS and confidence in its features were underscored through comments by Interviewee 3 who stated, “Adoption and use of OSS would ensure development and acquisition of affordable, robust, flexible, and secure technology. OSS is less prone to viruses, could save the country money, and could be developed locally for sustainable national development.” Statements by Participant 1 resonated with those made by the majority of interviewees and participants supportive of OSS. “Skepticism about OSS in government has no basis. It is unfounded. If government funded and promoted the development and use of OSS, Uganda would attain a more balanced and rapid development than buying expensive commercial software with strings attached.”

Raymond (1998, 1999) suggested that a major advantage of OSS is that amateur and knowledgeable OSS users and developers work together to inspire each others’ confidence to
develop versions of software code that is freely released to the public for modification and use. Because the OSS development model “follows the Linus's Law, it produces superior software products, and, given enough eyeballs, all bugs are shallow” (Raymond, 1999, p. 2). Brandl (2004) suggested that because the OSS model is a more inclusive and participatory process, it produces a technology with superior qualities, cost-effectiveness, and versatility. Iivari (2010) stated that in OSS development environments, OSS is perceived as texts written by the writer-developers, and read by the reader-users, a development model analogous to a repudiation of technological determinism that highlights the interpretive flexibility of technological artifacts (Bijker & Law, 1992; Pinch & Bijker, 1994).

Further contrasting attributions of skepticism and confidence toward OSS were expressed by Interviewees 6 and 16. Highlighting the confidence in OSS, Interviewee 6 stated, “Skepticism toward OSS is behind us. OSS is affordable, easy to use, enables novices to develop lifelong skills, knowledge, inspires confidence, and membership to communities of experts to sustain innovations. Government should support OSS to diversify economic activities.” But Interviewee 16 contradicted that description and interpretation of OSS by stating, “Only few elite can afford using OSS easily. Not all elite can engage in OSS development as a sustainable economic activity. Let the private sector lead OSS development, inspire confidence, and government will facilitate.” These contrasting interpretations assigned to OSS reflect how the description, understanding, and meanings individuals attribute to a new technology is a dynamic and complex process that involves multiple forces that continuously interact and conflict in a given social context.

These divergent viewpoints are consistent with the social construction of technology (SCOT) theory, which suggests that the description, understanding, adoption, diffusion, and use
of a new technological artifact do not occur automatically but through “interplay between the social, the economic, the technical, the scientific, and the political forces in a given social context” (Bijker, 1995, p. 13). Bijker (1995) further stated that SCOT breaks down arbitrary distinctions between the social and the technical, and views the understanding and adoption of new artifacts as integral elements of societal goals. Additionally, the views expressed by the interviewees about OSS parallel the interpretive flexibility concept, which considers decisive outcomes on the descriptions, meanings, understanding, adoption, diffusion, and use of a technological artifact as products or outcomes of protracted and fluid intergroup negotiations based on their perceptions about a given artifact but not based on deterministic narratives (Bijker, 1995; Pinch & Bijker, 1986). The conflicting standpoints that clustered around skepticism and confidence also correspond with frame theory, which underlines the critical role value systems play in how individuals and groups describe, interpret, and understand the same information policy issues differently (Rowlands, 1998; Rowlands et al., 2004).

Stability and Novelty

This dimension was comprised of conflicting perceptions that oscillated around stability and novelty, concepts participants used differently to describe and assign meanings to OSS. While government officials viewed proprietary software as stable, reliable, and tested enough to yield positive and expected results, they framed and perceived OSS as not only novel but also experimental and unreliable. Government officials framed OSS as lacking functionality guarantees, maintenance, and local expertise to guide and assure users of its unique functionalities. Statements underscoring perceptions held by government officials toward OSS were articulated by Interviewee 16 who stated, “Government buys and uses stable technologies
with minimum uncertainties. If OSS attains a critical mass of users, government will create a law for its adoption. OSS must overcome novelty and gain stable functionality features.”

However, government views and apprehension about the stability of OSS are contradicted by OSS advocates and promoters of the policy initiative. Interviewee 13 stated, “Government expenditure on proprietary software is unsustainable. Uganda is poor and should reduce costs on expensive software as developed countries. Investment in OSS projects will save money, produce affordable, suitable, secure, and locally developed solutions for export.” Comments by Interviewee 18 reinforced the thinking of the other OSS adherents. “Users can customize OSS code to ensure security and interoperability at a low cost. These features would be very expensive to harness with proprietary software. I wish government would appreciate these OSS technological advantages and formalize its use.”

But Interviewee 16 disputed the claims by stating, “Security and interoperability aren’t necessarily guaranteed OSS features. As an IT professional, I know the hard work and costs required to attain those so-called OSS advantages. While OSS code is free, modification, repair, security, and interoperability aren’t cheap.” But Participant 5 echoed narratives by fellow participants whose endorsement of OSS supplemented sentiments expressed by the majority of interviewees. “OSS stability and novelty are attracting increased use, government in particular. The Ministry of ICT and NITA-U are aware. Use of commercial software should be drastically reduced to promote OSS to cut costs.”

These statements by the interviewees and participant are consistent with the interpretive flexibility concept from SCOT, which considers decisive outcomes on the meanings, adoption, diffusion, and use of a technological artifact as products or outcomes of protracted and fluid
intergroup negotiations based on their perceptions about a given artifact but not based on deterministic narratives (Bijker, 1995; Pinch & Bijker, 1986).

While contradicting government views and apprehension about the stability of OSS, promoters of the policy framed proprietary software as too expensive for Ugandans to afford, not flexible to change and suit local conditions, and not as secure as its developers and vendors claim. In support of OSS, adherents of OSS frame OSS as new and flexible enough to offer seamless opportunities to experiment, customize, adopt, and modify to innovate and develop new solutions for specific local needs. They also describe OSS as embedding novel and unique attributes that can be optimized to potentially earn the country foreign exchange by exporting Ugandan made solutions. They regard the adoption and use of OSS as consistent with national development goals.

Indeed, claims that lack of stability features in OSS are responsible for government reluctance to support initiatives to develop an information policy for the adoption and use of OSS are, however, not supported by evidence. Collins (2010), EACOSS-Uganda (2008), and Weddi (2009) have documented and reported that a majority of government ministries and agencies, universities and schools, non-profit organizations, corporations, and ordinary Ugandans have adopted the use of OSS in their routine and major computing operations. Camara and Fonseca (2007), Karume and Mbugua (2012), and Sowe (2011) stated that despite various benefits of OSS compared with proprietary software, it still faces technical, social, political, economic, and philosophical challenges in developing countries. A major obstacle to the development and use of OSS is the reluctance by bureaucrats to shift their conservative approach to technology and embrace OSS both as a technology and a model for skill development and acquisition (Karume & Mbugua, 2012; Sowe, 2011). “OSS development requires direct
intervention by governments to formulate OSS-specific information policies to avoid its growth at the fringes of public and private companies and their core applications” (Camara & Fonseca, 2007, p. 123).

Iivari (2010), and von Hippel and von Krogh (2003) stated that the technical stability and functionality of OSS derives from its new and participatory model, which allows networked communities including programmers and users to co-create, frequently integrate code changes on software versions, and develop an affordable final version with more stable features. OSS solutions are products of a co-development process involving users and skilled technical co-designers who collectively negotiate innovations, improvements, and endorsements to software that is freely available to download, customize, and use (Iivari, 2010).

Weerawarana and Weeratunga (2004) and Wheeler (2007) suggested that most governments in developed countries were inspired to adopt and use OSS for economic, political, and technological reasons. Their goals were to reduce licensing costs on commercial software, to promote indigenous technological developments, and to acquire reliable and secure solutions. The widespread adoption and use of OSS around the world are derived from the rapidly increasing number of knowledgeable computer users and software developers who understand the flexibility and stability of OSS (Blansit, 2009; Colford, 2008; Hars & Ou, 2002).

Additionally, some of the data that constituted this dimension in support of the novelty and stability of OSS correspond with studies indicating that ubiquitous use of OSS was influenced by the growing number of organizations and governments wishing to customize their technology based on the novelty, robustness, and superiority of the software, but not necessarily because it was free (Blansit, 2009; Colford, 2008; Hars & Ou, 2002; Krishnamurthy, 2003; Murphy, 2004; von Hippel & von Krogh, 2003). Evidently, results presented in this dimension
are consistent with research suggesting that social experiences with technologies shape perceptions, attitudes, and behaviors of individuals and social groups, which in turn, strongly influence the extent to which such individuals and groups interpret, understand, use, and commit themselves to new technologies (Fulk, 1993).

Ignorance and Corruption

A fourth dimension highlighting the framing of OSS and an associated policy revolves around issues of ignorance and corruption. OSS advocates framed and associate lack of political will by the government to change the existing ICT policy as a reflection of ignorance, incompetence, and corruption. OSS adherents referenced knowledge gaps and ignorance about OSS as responsible for government lack of enthusiasm to support the OSS policy initiative. Their viewpoint is that most users, including the highly educated, lack knowledge about applications that run some of the devices they use and carry, such as cell phones, laptops, iPods, and computers, among others, some of which were built using OSS. Comments by Participant 18 largely represent the thinking of OSS advocates in Uganda who attribute the indifference and tendency by government officials and the majority of the elite to shun OSS use due to lack of technical knowledge, ignorance, and unfounded fears about OSS. “Government officials are either ignorant about OSS benefits, are corrupt, or both. Other elite in Parliament and private sector using OSS are ignorant about OSS and influenced by baseless viewpoints.”

Perceptions among the OSS community that government officials are corrupt are reinforced by perceived underhanded methods used by vendors of proprietary software, who make donations of hardware equipment and software to government ministries and departments disguised as support for government programs. Such donations are perceived as marketing stunts that directly influence procurement decisions by government officials in favor of proprietary
software. OSS adherents also attribute indifferent attitudes towards the OSS policy initiative by
government officials to ignorance about OSS and its potential benefits for Uganda.

Statements by Interviewee 4 voiced the frustrations of the majority of OSS supporters in
the country by decrying the negative attitudes towards OSS in government circles. “Government
openly receives free equipment and software from vendors of commercial hardware and
software. These donations are used to promote proprietary products, influence decisions by
government officials, reinforce their negativity toward OSS, and undermine OSS development
and use.” These statements suggest that perceived corruption is responsible for the apathy toward
the OSS policy by government officials. The underlying viewpoint by the OSS policy promoters
suggests that because the current system is so lucrative, the alternative offers no incentives to
influence a change in the status quo.

But supporters and implementers of existing government ICT policies frame and present
their viewpoints as consistent with and protective of national interests that focus on the public
good rather than on monolithic interests advanced by segments of society. They dismiss
attributions of ignorance, incompetence, and corruption to the execution of government ICT
policy mandates and goals as unjust, unrealistic, and oblivious of the process through which
diverse interests in a national policy agenda are considered and harmonized. Interviewee 7
summed up the thinking of government by stating, “Neither ignorance nor corruption influence
government ICT policies nor decisions to allow market forces determine software used by
government or citizens. ICT policies are outcomes of consultations, negotiations, and consensus
building processes to account for conflicting interests.” These statements were also reinforced
by Interviewee 16 who stated, “Donations of equipment cannot influence government policy.
Following the law to realize national interests and goals don’t reflect incompetence. We don’t
use commercial software to sabotage OSS. Government supports OSS but doesn’t extend preferential treatment to any technology.”

These statements by Interviewees 7 and 16, which reflect the thinking of the government in developing the various ICT-related information policies, emphasize the competing interests from multiple groups that policy makers have to harmonize to correspond with national development goals. Responding to claims of corruption and ignorance leveled against government officials by OSS adherents, a government minister who declined to tape-record an interview with the researcher dismissed the widespread perceptions of corruption and ignorance as nothing new. “The choice of software depends on its functionality, warranty, and maintenance services but not on corruption and ignorance. No one should be blamed for procuring time-tested, reliable, and secure software. Where OSS has proved effective, it has been used in such sectors as education, health, and others.”

However, perceptions that government officials are corrupt do not exist in a vacuum. In 2009, for example, Transparency International reported that corruption in the public sector was considered by Ugandans to be more rampant than it had ever been in the recent past. In its Corruption Perception Index, the international watchdog on corruption ranked Uganda as number 130 out of 180 nations. The ranking was based on perceived levels of corruption in the public sector. The position occupied by Uganda suggested an increase in corruption in the public sector as perceived by Ugandans since 2004 (Namubiru, 2009).

Bruggink (2003), Heeks (2004), and Mtsweni and Biermann (2008) suggested that while most governments in Sub-Saharan Africa widely use OSS to reduce costs on commercial software, the reluctance to develop OSS-specific policies points to the desire to maintain the status quo because it greatly benefits policy makers and bureaucrats. This tendency towards
corruption and reluctance to change from proprietary software to adopt new policies to promote new, affordable, and superior technologies are major bottlenecks to the adoption, development, and use of OSS in developing countries (Camara & Foncica, 2007).

This framing of the information policy formation process by representatives of the government was, evidently, guided by the desire to attain national development goals through the use of ICTs. These frames of reference are consistent with research on ICT-inspired government policies that aim to attain three major goals: 1) The realization of universal access and use of ICTs to facilitate education, life-long learning, and equitable distribution of economic benefits for social transformation; 2) Promote commercial and industrial competitiveness and productivity, and invest in e-government programs; and 3) Develop a national information infrastructure to enable universal access and use of digital networks for communication, collaboration, and innovation, bridge the digital divide, and evolve into information societies (Castells, 1998, 2000; Cogburn, 2003; Daniel, 2000; Moore, 1996; Shapiro & Varian, 1997).

While the government officials recognized that policies and laws are outcomes of a balancing act between multiple interests, their statements regarding this specific OSS policy formation process appear to negate that recognition, and ignore/integrate interests of the OSS policy promoters. Klein and Hirschheim (2001) suggested that harmonizing contradictory value systems should guide and drive political forces in an information policy development process. Hernon and McClure (1997) recognized that one of the unresolved challenges in an information policy formation process concerns the balancing of complex and conflicting interests and attitudes by disparate groups.

The data illuminated in this dimension correspond with suggestions by Overman and Cahill (1990), who noted that contradictory public and private views, interests and values,
inherent features in information policy formation processes, present the most intricate yet inevitable obstructions that policy makers must confront and reconcile. Recognizing, as well, that while policy makers continue to grapple with unresolved information policy issues, rapid developments of ICTs, which dwarf their abilities to understand their impacts on society, have further complicated the already complex information policy formation processes (Hernon & McClure, 1997).

Emancipation and Hegemony

This dimension highlights statements that clustered around contrasting frames used to describe, analyze, and assign meanings to the OSS and proprietary models. In this context, the concept of emancipatory education is conceived as an enabler to recipients to gain knowledge and skills to free themselves from the domination of any given idea or technology (Weber, 2004). Hegemony, on the other hand, is used to refer to a form of authority or control imposed on individuals or groups who submit willingly or unwillingly to the domination of an idea or technology (Weber, 2004). Research on software development refers to the OSS model as emancipatory, inherently inclusive and participatory, facilitating acquisition of technology, knowledge, and skills, and promoting innovations and sustainability of production and development of technologies (Camara & Fonseca, 2007; Weber, 2004; Weerawarana & Weeratunga, 2004). The proprietary model, on the other hand, is described as closed and inherently hegemonic as it limits participation, holds users hostage, and facilitates dominance and loyalty of users to its products (Camara & Fonseca, 2007; Weber, 2004; Weerawarana & Weeratunga, 2004).

Comparing the OSS model with the proprietary development model, OSS adherents presented the OSS model as superior over the former because it offers technology, knowledge,
and sustainable skills that can free individuals from the lock-in effects of proprietary software. They recommended the OSS model for Uganda because it would enable development of indigenous expertise while at the same time acquiring affordable and context-specific software. Views expressed by Interviewee 17 nearly captured the sum total of perceptions and attitudes held by other OSS supporters regarding differences between OSS and proprietary software. “Unlike the closed proprietary model, OSS model is inclusive, offers developers and users skills to develop solutions to benefit themselves and others, freedom from proprietary software, provide functional and emancipatory knowledge, and helps create employment.” These comments were complemented by Participant 2 who stated, “The proprietary model restricts knowledge to few people and perpetuates a culture of technological hegemony. The OSS model promotes innovation, self-reliance, and enhances global collaboration.”

However, government officials expressed the view that the adoption of OSS is not a panacea to the problem of unemployment, underdevelopment, social transformation, and an end to the dominance of proprietary software. Interviewee 7 cautioned, “We must be careful not to overplay the importance of OSS in creating jobs, acquiring skills and freeing Uganda from commercial software. Each technology should be considered on its merit to rationally decide what is best for Uganda.”

This cautious framing of OSS and the policy initiative by the government was further supported through statements by Interviewee 16 who stated that government supports OSS use as part of a general ICT strategy which, for the moment, doesn’t deserve priority legislation. “Government supports the adoption of any useful technology to create jobs and contribute to national development. OSS does not require special legislation unless overwhelming evidence proves otherwise. Technological superiority of OSS is still contested.”
The views espoused by supporters of the OSS model correspond with suggestions by Torvalds and Diamond (2001), who stated that while OSS may neither be free nor cheap, its real advantage is that it facilitates individuals, organizations, and/or countries to develop their own knowledge and skill bases contrary to proprietary software. Altenhöner (2005) described the OSS model as one where all those involved in OSS projects around the world “attested to the creativity and quality awareness of a well-motivated community of software developers” (p. 1). Torvalds and Diamond (2001) further suggested that commercial software not only requires continuous expenditure but also inhibits knowledge and skill development by users who, ironically, also end up none the wiser. Camara and Fonseca (2007) and Iivari (2010) stated that OSS is both a process of gaining software development knowledge and skills and is an instrument for self-determination, emancipation, and social change.

Furthermore, OSS policy advocates in Uganda framed and present the adoption of OSS and the proposed policy initiative as a catalyst for job creation for thousands of youths graduating from universities annually. This view is articulated by Interviewee 9 who remarked, “Adoption of OSS will not only benefit us to make money but will solve the huge unemployment problem in the country. Youth unemployment is a real security risk, a ticking demographic time bomb waiting to explode.”

The unemployment problem among the youth in Uganda has gained traction even among international donor agencies. In 2008, a World Bank report stated, for example, that Uganda had the highest youth unemployment rate and the youngest population in the world, while the African Development Indicators 2008/2009 report indicated that 83% of Ugandan youth are jobless (Karugaba, 2013). An estimated 37,000 youth in Uganda who graduate from the 31 universities annually fail to gain employment (Karugaba, 2013). A UNDP report from 2013
stated that Uganda remained among the worst ranked performing countries in human development for the last three years, 161 out of 182 countries in human development, (Karugaba, 2013). The UNDP suggested that the adoption of pro-poor policies and significant investments in people’s capabilities, such as education, employment, equality, and democracy, can expand access to decent work and provide for sustainable progress (Karugaba, 2013). 

The comments by the interviewees who support the OSS policy parallel the research suggesting that the adoption of OSS should be understood as a catalyst to play a significant role in supporting goals of developing countries to master the technology of software development, harness local skills to create both new products and jobs (Braa, Monteiro, & Sahay, 2004). Underpinning these views, Breeding (2009), Colford (2008), Dalbello (2005a, 2005b), Elichirigoity and Malone (2003), Evans (2005), Grant (2008), and Kilker and Gay (1998) stated that the adoption of OSS, especially in information and learning centers, such as public and academic libraries, increases access and use of information, improves education facilities, enhances user knowledge, reduces costs, optimizes resources, and facilitates employment opportunities, e-learning, and e-education.

But, contrasting statements by government officials correspond with research by Fitzgerald (2004), who disputed claims of total adherence to collective development of OSS solutions involving novice users and skilled programmers as misleading and exaggerated. Dismissing assumptions underlying the ‘Linus Law’ as more idealistic than realistic, Fitzgerald (2004) stated that the development of most OSS products involves mainly top programmers contributing the bulk of the work as the case was with the development of the Apache Web server. Complementing that standpoint, Mockus, Fielding, and Herbsleb (2002) suggested that during the development of the Apache Web server, one of the landmark OSS project, 88% of
improvements were contributed by the leading fifteen programmers. The traditional model preserves the architectural integrity of a system design and the fewer the software architects the more likely the specifications would be followed to ensure consistence and faster development of stable and high quality software (Brooks, 1995). The divergent viewpoints presented in this dimension expressed by government officials and those espoused by OSS adherents parallel research by Erumban and de Jong (2006), who stated that the development of information policies for the adoption and use of any ICT involves conflicting perspectives representing various interest groups in a country.

Digital Divide and the Information Society

The possibility that Uganda may bridge the digital divide and transform into an information society as a result of the adoption of OSS also illuminated divergences between stakeholders supportive of existing government ICT policies and those promoting the OSS policy. Conflicting viewpoints emerged surrounding the potential use of OSS as a strategic tool. While participants subscribing to the possibility of OSS to narrow the digital divide expressed confidence in its transformative characteristics, cautious government officials took a more nuanced view. Government officials framed the digital divide as a complex and multi-faceted phenomenon and held an unwavering position that the mere adoption of OSS could neither bridge the digital divide nor eliminate it. Remarks by Interviewee 7 conveyed the official government position. “Adoption of OSS alone will not bridge the digital divide and usher Uganda into the information society. A combination of factors will contribute to those outcomes. Uganda’s focus is to attain a middle income status in 30 years.”

This wary view expressed by the government officials toward associating the adoption of OSS as a pathway to bridging the digital divide corresponded with existing research on the
multi-faceted digital divide concept. The National Telecommunications and Information Administration (1995, 1997) conceptualized the digital divide concept as a division between those who had access to the new communication technologies (the Internet) and those who did not. The Organization for Economic Cooperation and Development (2000, 2001) referred to the digital divide as a gap that related to sociodemographic differences in the access and use of ICTs by individuals, households, companies, and/or regions. However, “the phrase {digital divide} is no longer exclusively used to refer to Internet access and usage but is widely used to include all other ICTs, such as traditional and new technologies and multiple technologies that have contributed to the complexity of the digital divide problem” (Vehovar et al., 2006, p. 281). Cullen (2001) broadly framed the concept as a disparity that manifests through “historical, socioeconomic, geographical, educational, behavioral, generational, or physical incapability or disability conditions of individuals” (p. 311).

But adherents to OSS contended that if OSS is adopted, strategically supported and promoted throughout the country, it could tremendously contribute to the reduction of the digital divide and transformation of Uganda in the next thirty years. Interviewee 12 reflected this supportive view that contradicted that of the government officials. “If OSS adoption is supported by an act of Parliament, Ugandans have the expertise to develop and use OSS solutions, optimize its advantages to bridge the digital divide and transform Uganda into an information society.” Statements by Participant 2 reinforced the perspective of most interviewees involved in the promotion of the OSS policy. “Adoption of OSS, its diffusion, and use in schools will enable students to acquire technical skills, educate others, develop new solutions, and lead the transformation of Uganda into the information society.” Statements by supporters of OSS and its potential to reduce the digital divide in Uganda are consistent with research by Reed (2000), who
suggested that if fully optimized; OSS may contribute to transforming societies by overcoming social inequities that oftentimes, exacerbate the digital divide. “While the adoption of OSS by developing countries is not a silver bullet for longstanding development issues, its transformative potential of computing creates new opportunities to make progress on development problems that have been intransigent for a long time” (p. 254).

Elliot and Kramer (2008), Fontana (2008), and Simon (2008) suggested that the inherent freedoms, passionate promotion by its adherents, and subsequent developments in the global information infrastructure have helped to accelerate the use and diffusion of OSS in ubiquitous computing to bridge the digital divide around the world. Comino et al. (2010), James (2001), and Wheeler (2007) suggested that OSS has contributed to bridging the digital divide by enabling governments to interoperate it with other technologies to provide social services to their citizens and to engage them in e-government programs. Fontana (2008) stated that the potential of OSS to bridge the digital divide is no longer in question, it is not a “trendy conversation but a clear evolution of a community that has grown up and produced intelligent, cutting-edge technologies with an eye on making computing faster, smarter and cheaper for all users” (p. 1). “In the government sector internationally, OSS is seen as a viable technology for lowering software costs, growing local software development industry, and bridging the digital divide” (James, 2001, p. 9). Lessons from assumed homogenizing effects of technologies are pertinent to whether Uganda can transform into an information society as a result of the adoption of OSS.

Blancit (2009), Elliot and Kramer (2008), Simon (2008), and Weber (2004) suggested that in developed economies, OSS has substantially contributed to the evolution of information societies where the use of ICTs to engage in information-related activities has become a
dominant feature in the cultural, economic, and political lives of communities. The availability of
OSS, which ensured access to the OSS code, avoidance of recurrent payment for proprietary
licenses, advancing knowledge more quickly, and helping the evolution of information societies
has attracted governments around the world to adopt and use OSS (Ghosh et al., 2002; Weber,
2004; Weerawarana & Weeratunga, 2004). However, the adoption of OSS, just like any other
technology, has fallen short of some expectations. Research suggested that while accessibility
and usability of ICTs may contribute to the evolution of an information society, cultural, social,
political, and geographical factors may inhibit such a transformation (Ebo, 2002; Norris, 2001;
Parayil, 2005; Warschauer, 2003). The adoption and use of OSS in itself may not provide a
solution to the digital divide and a sure pathway to the information society and result in
maximizing opportunities in the ICT-driven global economy (Ebo, 2002; Norris, 2001; Parayil,
2005; Warschauer, 2003). Rather, the possibility that the adoption and use of OSS alongside
proprietary software may accentuate the digital divide across a wide spectrum of social
dimensions could manifest (Ebo, 2002; Norris, 2001; Parayil, 2005; Warschauer, 2003).

Results of the Thematic Analysis

Drawing from the pragmatist approach to data analysis (Aronson, 1994), a thematic
analysis technique was applied to enhance a systematic examination of the data. This technique
focused on “identifying themes in the data from patterns of experiences, perceptions, knowledge,
behaviors, and attitudes shared and expressed by participants about a process under
investigation” (Aronson, 1994, p. 1). This technique, consistent with the pragmatist perspective,
reinforced a triangulation strategy to analyze and better understand the totality of the OSS policy
formation process rather than viewing it from a single technique.
Thematic analysis facilitated the materialization of five primary themes that are presented and discussed as follows:

1) OSS is free and affordable with superior interoperability and security features;
2) The OSS model enhances self-reliance and sustainability;
3) Corruption and incompetence are derailing the OSS policy;
4) Consensus exists on policy formation structures and processes; and,
5) Intergroup contradictions, tensions, and conflicts highlight the process.

OSS is Free and Affordable with Superior Interoperability and Security Features

The first major theme that emerged revolved around participants’ knowledge and perceptions about OSS. This theme was constructed from participants’ views that expressed their knowledge and perspectives about OSS and the proposed information policy. Prompted to describe in detail their personal understanding and knowledge about OSS, the majority of participants were unequivocal in underlining the free availability of OSS, its affordability, flexibility, interoperability, and superior security features. Additionally, the majority of the stakeholders were supportive of developing a policy for the adoption of OSS. This theme was divided into two categories: 1) The free availability of OSS and its affordability and 2) Superior interoperability and security features.

OSS is free and affordable. This first category highlighted participants’ knowledge and perspectives about OSS, its current status, and the huge potential it holds for Uganda if it is formally adopted and strategically harnessed. Participants that identified themselves as OSS developers and users were perceptive in articulating the vast features of OSS, its potential for Uganda, and the extent to which it has facilitated the evolution of developed countries into information societies.
When asked to share their knowledge and perspectives about OSS and the OSS policy initiative, most of the participants were striking in their knowledge about the software and the evolving policy for the formal recognition and adoption of OSS. Their understanding of OSS included its evolution, its free availability, the rhetoric associated with its ideology, the competition it faces from proprietary software, its contribution to information societies, and its unique model, unlimited potential to harness business, and improve peoples’ lives. While their perspectives about the software and its potential for Uganda were incisive, they disclosed divergent views concerning why and how an OSS policy should be developed to facilitate its formal. While counter views from participants that were not supportive of an OSS policy were also expressed, their knowledge about OSS was similar to those of the policy promoters. Noteworthy, was their recognition of the potential contribution of OSS to the country and its development. However, they held contrasting views with respect to the timing and viability of an OSS policy under the current circumstances.

Most stakeholders were unanimous in their statements that they had heard of the free availability of OSS and had used it to accomplish various computing tasks; some had even set up businesses upon which their livelihoods depended. Statements by Interviewee 10 captured sentiments expressed by the majority of OSS stakeholders. “I have downloaded freely available OSS code, customized and used it, sold, and donated some. I built a business and employ 12 people to offer OSS services, develop and sell affordable and alternative solutions to proprietary software.” The economic benefits of OSS were further elaborated in statements by Interviewee 12 who commented, “Adopting OSS use makes economic sense to individuals, companies, and governments worldwide. The free availability of OSS, affordability, flexibility, and potential to reduce costs are attractive features favoring migration to OSS.”
These statements by the interviewees suggested that experienced OSS developers have optimized OSS to establish and operate businesses that have created employment opportunities in the IT sector to develop and market solutions, and to offer OSS services, including maintenance and migration. Statements by Interviewee 6 reinforced sentiments expressed by the previously cited interviewees. “OSS development is inclusive, enhances skill development, and OSS is increasingly being adopted in several IT systems. Uganda government should have changed ICT laws years ago to adopt and promote its use and development.”

These statements were supported by observations from Participant 3 who echoed the sentiments of the other discussants. “Because of its affordability, the OSS market in Uganda and neighboring countries is growing fast. Continued expenditure on some expensive proprietary software products in Uganda is no longer justifiable.” These comments by the interviewees and participant reflected the increasing use and growing confidence in OSS solutions. Accordingly, confidence in OSS derives largely from its free availability, affordability, and potential to transform society, and therefore, merits a new policy for its formal adoption. As the statements suggested, the adoption of OSS not only results in the acquisition of software but also skills and knowledge to ensure continuous development and innovation of new solutions. In addition, economic benefits of OSS for both Ugandan developers and the government are highlighted in the steadily growing market for various OSS solutions in neighboring African countries.

Although the stakeholders described OSS as free, they expressed awareness of costs associated with its modification and use. The costs notwithstanding, however, they defended the adoption and use of OSS as a less expensive alternative compared to proprietary software. Statements which reflect this recognition were echoed by most interviewees and participants supporting the formal adoption of the OSS model. Statements by Participant 4 highlighted such
perspective. “I know, and most OSS developers do, that OSS is not entirely free. To use OSS, one incurs some costs. But such costs are too negligible compared with buying licenses for commercial software.” These remarks were reinforced by Interviewee 8 who stated, “Of course OSS is not as free as the word suggests. Nothing is free. Optimizing OSS potential needs investment of time, energy, or money to customize it to one’s preference. But that choice is not available with proprietary software.”

Participant 3 echoed perspectives about OSS as advanced by the previous interviewees. “OSS is freely available but is not free enough to use without community, social, and professional responsibilities. OSS developers contribute their modifications to communities, donate free solutions to society, but also earn money from OSS.” These statements suggested that OSS adherents have a clear understanding of the characteristics of the OSS model; while it is freely available; it is not free of cost. Their knowledge about OSS indicated that they are not oblivious to the costs associated with the adoption and use of OSS.

Campbell-Kelly and Garcia-Swartz (2009), Krishnamurthy (2003), von Hippel and von Krogh (2003), and Valimaki and Oksanen (2005) suggested that the overriding advantage of OSS is that it is freely available for download, customization, and use with applications resilient enough to effectively compete and break the monopoly of proprietary software. Weber (2004) and Weerawarana and Weeratunga (2004) stated that economic and political reasons are ongoing justifications influencing individuals, corporations and governments to migrate from proprietary software and adopt OSS. The widespread adoption and use of OSS by governments is viewed as a means of reducing licensing costs and of promoting indigenous technological development (Weber, 2004; Weerawarana & Weeratunga, 2004).
For example, several governments around the world have developed policies for the adoption of OSS, while others have made recommendations to government departments to use OSS and reduce costs on licenses for proprietary software. Brazil, Russia, India, China, and South Africa have recommended the installation of Linux in all new computers operated by government institutions (Camara & Fonsica, 2007; Government Information Technology Officers’ Council, 2003). Following a promotion campaign for the adoption of OSS by governments in Pakistan, Singapore, Thailand, Malaysia, and Indonesia, OSS is now widely used in the civil service, commerce, and telecommunications sectors (Open Source Resource Center, 2007; Pakistan Software Export Board, 2008; Tan, 2005).

Comino et al. (2010) and Lewis (2008) suggested that governments worldwide have recognized opportunities that open source software can offer as a way of cutting costs on proprietary software and stimulating an independent domestic ICT sector with local expertise. Ghosh et al. (2002) and Weber (2004) stated that governments are continuously recognizing and promoting the adoption and use of freely available and low cost OSS as an enabler for individual and social transformation.

Superior interoperability and security features. The thematic category labeled “superior interoperability and security features” presents data that clustered around participants’ statements used to describe and present the OSS development model as an open platform that encourages the creation of flexible solutions that enhance compatibility with other applications. This inherent interoperability feature, OSS stakeholders stated, continues to influence and inspire individuals and corporations to adopt OSS and for governments to develop policies for the adoption, development, diffusion, and use of the software.
Statements that captured sentiments extolling the flexibility of OSS that enable users to customize the code to their specific personal, organizational, or governmental needs are echoed by Interviewee 8. “Because of its flexibility, OSS can be modified to communicate with other software to enhance interoperability with other applications. The OSS development model inherently promotes interoperability, collectivity, and networking between humans, software, and social environments.” Moen and Bertot (2000) described interoperability as “the effective technical ability of different types of computers, networks, operating systems, and applications working together, without prior communication, to exchange information in a useful and meaningful manner” (p. 130). Ahmed (2005), Hoepman and Jacobs (2007), and Wheeler (2007) also suggested that interoperability features embedded in OSS enable it to interface with other applications.

The description, understanding, and presentation of the OSS development model and the interoperability features highlighted by the OSS stakeholders also correspond with research by Landsbergen and Wolken (1998) who stated:

Since interoperability is a multi-faceted concept referring to the facilitation of effective access to information within networked environments, it should be viewed not only from an information technical standards perspective but as a sum total of policy, managerial, financial, bureaucratic, and user-based elements, working together to ensure efficient information access and use. (p.2).

To further underline the compatibility features of OSS and the dynamic process through which it is developed, used, diffused, and sustained, statements by Interviewee 13 echoed those of other stakeholders. “Major benefits of OSS include reliability, compatibility, sustainability, inclusiveness, and security of the product. The active involvement of users, programmers, and policy makers in its development process ensure interoperability, legitimacy, and security of the final solution.”
Wheeler (2007) observed that from a technical standpoint, the presence of an active and enthusiastic community of users and skilled programmers, who work jointly to customize the source code, constantly improve the product, and fix possible bugs, contributes to the reliability, security, compatibility, and technical superiority of OSS over proprietary products. To further highlight the superior security features of OSS, Interviewee 3, a software engineer, stated that the free availability and affordability of OSS aside, its greatest value lies in its flexibility to embed airtight security features that proprietary software may not allow. “If for nothing else, OSS should be adopted because of its superior security features. OSS is flexible enough to customize secure hardware and software, ensure integrity and independence of users from hackers, with security features incomparable to proprietary software.”

Supporting this view on the security features inherent in OSS that lend themselves favorably to context-specific and personalized modification to suit users’ needs, Interviewee 18 stated, “With OSS, a user has the capability to modify and personalize security features to completely lock out any potential attacks. This flexibility to engineer OSS features to enhance security of digital environments is unlikely with proprietary software.” Maldonado (2007) stated that the major advantages of OSS are its potential to offer users the opportunity and capability to customize the technology to detect and filter out possible dangers to digital environments and the information they hold. Most countries adopt the use of OSS not only to reduce expenditure on proprietary licenses but also as a security mechanism to protect their national treasures and interests. Venezuela, for example, adopted the use of OSS in most of its agencies not only to reduce expenditure on proprietary software but to primarily enhance the security of its digital environments and, ultimately, its national security and autonomy (Maldonado, 2007).
The security features offered through the flexibility of OSS illuminated by the study participants are consistent with suggestions by Heeks (2004) who stated that since 2003, ministries of defense, police departments, and intelligence agencies in France, Germany, United Kingdom, Finland, and other European countries adopted the use of GNU/Linux in their operations to primarily bolster the security of their installations from infections and cyber attacks. In China, the government has long promoted the use of OSS in all its agencies based on its local version of the GNU/Linux to cut costs and ensure tight security of its ICT facilities (Hoepman & Jacobs, 2007).

OSS Model Enhances Self-reliance and Sustainability

The second primary theme, “the OSS model enhances self-reliance and sustainability,” highlights participants’ statements that clustered around phrases echoed by nearly all participants to describe OSS. Participants constantly referenced these phrases to describe the model upon which OSS is developed and why it merits changes to existing ICT laws through an act of Parliament for its formal recognition and adoption.

Asked to respond to a question about what is so special about OSS that proprietary software cannot accomplish to merit the formation of a new policy for its formal adoption, supporters of the new policy were unanimous in stating that OSS can advance benefits of self-reliance and sustainability in ways that proprietary software may not offer. The majority of participants referenced the OSS development model as a collaborative platform for users and programmers to develop and refine software, to acquire knowledge and skills to engage in innovations, and to enhance self-reliance capabilities and technological sustainability. Statements from the majority of participants emphasized the potential benefits of OSS as a strategic tool in the provision and improvement of education and training services, job creation, enhancement of
social transformation and self-determination, and promotion of independence from proprietary software.

Interviewee 15 captured those sentiments in these statements, “Using OSS as instructional tools in schools to educate and train youngsters will develop a pool of technical experts to collaborate, engage in technological innovations, and help Uganda become self-reliant and independent of proprietary software.” Besides reinforcing those views, Interviewee 12 expressed concern over widespread unemployment in Uganda, which could be mitigated by the adoption of the OSS policy for the diffusion, development, and use of OSS. “Thousands of youths graduate from universities with ICT theory but cannot find jobs. Proprietary tools are too expensive for training purposes. Strategic adoption of OSS will enable students to acquire skills, develop technologies and enhance self-reliance and sustainability.”

These Interviewees’ statements indicated the extent to which OSS may offer opportunities to engender new skills, self-reliance, and technological sustainability for the country. To further emphasize this view, Interviewee 6 stated, “OSS facilitates the acquisition of life-long skills, knowledge, and affiliation with communities of highly experienced developers to assist novices to engage in innovative projects. Government can gain politically by engaging unemployed IT graduates in OSS projects for rewarding careers.” These statements by Interviewee 6 are consistent with the Social Construction of Technology (SCOT) theory, which suggests that the adoption, diffusion, and use of a new technology occurs as a result of harmonizing social, economic, technical, scientific, and political factors in a given social context (Bijker, 1995).

While supporting the proposed OSS policy, Interviewee 11 sounded more pragmatic and enthusiastic than other interviewees in framing OSS as a tool that embeds sustainable features
and potential political, economic, and technological benefits for Uganda. As a politician with an eye on what the formal adoption of OSS would mean to the government and the country, Interviewee 11 stated, “Government can score politically by establishing OSS centers to equip youths with technical and business skills, help them start businesses, and tax them. Government would have created employment, improved lives, earned taxes, grown the economy, and gained political support.” These statements reflect the confidence OSS supporters have in the technology and how they relate benefits of its adoption to economic, social, cultural, political, technological, and cognitive aspirations of developers, users, society, and the government. These statements by Interviewee 11 were also consistent with a technological frame concept from SCOT that considers a fusion and an illumination of cognitive, social, and individual or group interests, goals, problems, practices, design methods, and the technical artifacts themselves (Bijker, 1995). A technological frame also includes all elements that influence the interactions within relevant social groups and facilitates “the attribution of meanings to technical artifacts that constitute a technology” (Bijker, 1995, p. 123).

The data presented in this theme also parallel observations by Ghosh et al. (2002) and Weber (2004) who suggested that the OSS model offers the possibility of accessing software source code, avoiding being held hostage to proprietary software, and advancing knowledge more quickly, which are amenable features that continue to attract governments to develop policies for the adoption of OSS. Braa et al. (2004) stated that the OSS model allows a thorough understanding of the knowledge embedded in OSS to enhance sustainability, the practical skills to develop, repair, and maintain the software in addition to ensuring that expertise to migrate and interoperate OSS with other applications is harnessed. The self-reliance and sustainability concepts elaborated in this theme also correspond with research by Iivari (2010) who stated that
the adoption of the OSS model offers both a process of gaining software development knowledge and skills and as an instrument for self-determination, social change, and sustainability. Camara and Fonseca (2007) stated:

> Information policies for the adoption of OSS should be viewed not only as a choice of software, but also as a means of acquiring knowledge; OSS has to be used as a way to gain knowledge about the technology itself and as a way of creating technology products that fit and sustain specific needs of a society. (p. 126).

Wang and Swanson (2008) stated that the OSS development model strategically enables developing countries to plan the adoption of OSS based upon their domestic social capital to ensure optimization and sustainability of the software. Developing countries can “strategically address organizational factors, the adoption by governmental departments, economic factors, the response of the private sector to OSS, and innovative factors of the policies themselves” (Wang & Swanson, 2008, p. 324).

Corruption and Incompetence are Derailing the OSS Policy

The third primary theme, “corruption and incompetence are derailing the OSS policy,” was constructed from recurring descriptors used by OSS policy promoters to explain possible causes that influenced behaviors and attitudes of government officials. Their remarks suggested that more than anything else, corruption was motivating government officials to view OSS and the proposed policy with indifference. In addition, incompetence was advanced as being responsible for derailing the policy process. Statements associating government officials with corruption and incompetence characterized interactions with most participants when asked to explain why the OSS policy had derailed.

Statements by Interviewee 18 echoed the majority of views expressed by OSS policy supporters. “Corruption and incompetence are responsible for delaying the OSS policy. Because we, the promoters of OSS policy, have no money to bribe officials, initiatives to change ICT
laws to formalize OSS adoption and use have stalled.” Interviewee 6 underpinned the corruption and incompetence claims by stating, “Kenya and Rwanda have adopted the use of OSS but Uganda government officials continue to protect interests of proprietary software. While corruption exists in Kenya, their officials are competent and nationalistic enough to pursue ICT policies to develop their country.”

Participant 5 was even more blunt in highlighting claims of corruption and incompetence against the government officials: “With zero tolerance to corruption and incompetence, the IT sector in Rwanda is growing rapidly. For Uganda, self interests of officials come first. If that is not corruption, ignorance, or incompetence, then it is something worse.” These statements by the OSS stakeholders suggested that government officials are comfortable in perpetuating the status quo to harness their own interests through corruption and incompetence.

Kenya, for example, adopted an OSS policy and also launched a 10-billion dollar African Silicon Savannah in 2012 that promises to become the biggest ICT hub in the region (The East African, 2013; Smith, 2012). For Uganda, continued lack of a clear political will to support and change the existing IT policy to adopt OSS is more associated with either corruption or incompetence or both. While Uganda is neither Kenya nor Rwanda, the governments of Kenya and Rwanda are moving faster than Uganda in supporting the use, development, and diffusion of OSS in their countries (Smith, 2012). For Uganda, the data suggested that at least for now, proprietary hardware and software will continue to hold sway over OSS.

But attributions of corruption to government officials by promoters of the OSS policy are not without support. Since 2009, the World Bank has estimated that over US$500 million is lost each year in Uganda through corruption in the public sector (Human Rights Watch, 2013; Kabuchu, 2013; Mwesigwa, 2013; Naggaga, 2013). As a result of corruption during the
2012/2013 fiscal year, the World Bank, the largest multilateral lender extending over 30% of budgetary aid to Uganda announced the suspension of its aid to Uganda, which is the third largest economy in East Africa (Human Rights Watch, 2013; Kabuchu, 2013; Mugabe, 2013; Mwesigwa, 2013; Naggaga, 2013). In addition, following a series of corruption scandals, highlighted in the Auditors’ Report of 2012, Austria, Belgium, Germany, Ireland, Switzerland, Sweden, the United Kingdom, and the European Union withdrew about US$300 million in aid to Uganda (Human Rights Watch, 2013; Kabuchu, 2013; Mugabe, 2013; Mwesigwa, 2013; Naggaga, 2013). The Norwegian Minister for Development recently reported that Uganda has returned over 20 million euros of embezzled donor funds to the five countries (The New Vision Newspaper, 2013).

Responding to claims that corruption and incompetence within government agencies mandated to supervise the IT sector are responsible for frustrating progress of the OSS policy, Interviewee 16 described the claims as unfortunate. “It’s unfortunate to accuse professionals enforcing clear and effective policies as corrupt and incompetent. While corruption exists, groups should not use it as a weapon to tarnish others’ integrity. Laws are not changed to promote interests of one group.” Interviewee 7 also echoed disappointments toward the claims that corruption and incompetence are responsible for derailing the OSS policy. “Claims of corruption and incompetence are irrational. Current ICT laws are in our national interest. Uganda has its priorities just as Kenya and Rwanda. We cannot derail an OSS policy if it will benefit all Ugandans.”

Claims and counter claims of corruption and incompetence parallel research by Howard et al. (2009) who stated that ICT policy promoters, innovation pioneers and early adopters, and investors in a new technology should always “identify roadblocks that may arise through the
political culture of the country; the bureaucratic state can either enable or constrain technology adoption because in some countries, corruption sets up roadblocks (with tolls)” (p. 214).

Equally, understanding perceptions and attitudes toward the adoption, diffusion, and use of any new ICT in a specific country is a helpful first step in reflecting upon social factors that make a country unique relative to its neighbors (Howard et al., 2009).

Consensus Exists on Policy Formation Structures and Processes

The fourth theme of the five primary themes is labeled “consensus exists on policy formation structures and processes.” The data suggested that most participants were not only comfortable with the existing policy formation structures and processes but were also less receptive to changing them. However, there were a few individuals who expressed some disquiet over politically inspired obstacles to the implementation of existing regulations that are practically impossible to overcome by minority parties in the opposition. For example, a private member’s bill proposed by a Member of Parliament in the opposition may fail to gain consideration in Parliament as a result of biased and unfair implementation of existing rules of procedure by government officials. These concerns notwithstanding, an overwhelming number of stakeholders supported the existing law making and policy formation structures and processes.

Asked why it takes a very long time for proposed policies and bills to become adopted as policies or enacted as statutes (Acts of Parliament) respectively, the response by Interviewee 10 underscored the support of the current policy structures and process. “Enough time is required to develop policies and laws acceptable to majority of Ugandans to ensure legitimacy and positive change in society. Existing structures and processes provide for wide consultations with the population to develop consensus and consistency with existing statutes.” This endorsement was echoed by Interviewee 2 who stated, “We cannot simply rush to enact laws or adopt policies
simply because we want to appear efficient. There are so many interests and views to consider before a law or policy is approved. These procedures are inevitable.”

Statements by Participant 4 were as supportive as they were perceptive. “If laws and policies have to gain legitimacy from the population, they must go through complicated bureaucratic processes and structures that consume a lot of time. That is the high price we pay for democracy, checks and balances.” Byrnes (1990), Ibingira (1973), Ingham (1983), and Karugire (1980) stated that Uganda has followed West Minister (British) structures and processes to make laws. Uganda inherited these British structures and processes in 1962 following its political independence from Britain and has maintained them with appropriate modifications (Byrnes, 1990; The Parliament of the Republic of Uganda, 2011).

Parliaments in Commonwealth member states, formerly under British colonial rule, including the Parliament of Uganda, follow intricate structures and processes in making laws as a way of gaining legitimacy (Byrnes, 1990; Ibingira, 1973; Karugire, 1980). While processes and structures to make policies are also elaborate, they take various directions depending upon their political priority, availability of funds, complexity, and availability of experts to collect information and compile a draft policy proposal for debate by relevant stakeholders (The Parliament of the Republic of Uganda, 2011). For proposed laws, in addition to preliminary procedures followed while conceptualizing and drafting them, the parliamentary process begins with introducing a proposed law; the bill’s first reading stage (Uganda Law Reform Commission, 2011; The Parliament of the Republic of Uganda, 2011).

A proposed law is referred to as a bill and is introduced at the bill’s first reading in Parliament by either a government minister for a government-sponsored bill or any Member of Parliament for a private members’ bill (Ministry of Public Service, 2000; The Parliament of the
Republic of Uganda, 2011). At this stage, no debate is held on the bill in Parliament; however, the speaker refers the bill to an appropriate Committee of Parliament (The Parliament of the Republic of Uganda, 2011). The committee examines the bill, interacts with its sponsor, receives memoranda from stakeholders, may interview experts, and, compiles then submits a report to Parliament within 45 days (The Parliament of the Republic of Uganda, 2011).

If no petitions challenging the bill are submitted to the speaker, it moves to another stage, the second reading in Parliament. At this time, a debate is held on the merits and principles of the bill and the report from the committee is followed by a motion on the bill (The Parliament of the Republic of Uganda, 2011). The bill is then committed to the committee of the whole House, which is referred to as a bill’s committee stage, wherein a detailed debate, scrutiny of each clause, discussion of amendments, and decisions on each clause are made by the House (The Parliament of the Republic of Uganda, 2011). During each of the previous two stages, however, a bill can be subjected to numerous challenges by its opponents, compelling the speaker to recommit it to a select committee of Parliament for further examination, procedures that oftentimes add to the complexity and delays that characterize law making structures and processes (Byrnes, 1990; Ibingira, 1973; Karugire, 1980). During the third reading of the bill, no debate is held but a final vote is taken by the entire House to approve or reject it. If approved, the bill is said to have been passed by Parliament (The Parliament of the Republic of Uganda, 2011).

After the bill is passed, the Clerk of Parliament sends a copy of the bill for presidential assent, a constitutional requirement for the president to append his or her signature to the bill within 30 days to signify his or her approval (The Parliament of the Republic of Uganda, 2011). Following Presidential Assent to the bill, it is published in the Gazette, becomes an act of Parliament, and the legal effect of its provisions commences on a date set by a legal instrument.
signed by a government minister and published in the Gazette (The Parliament of the Republic of Uganda, 2011). However, if the president declines to assent to the bill and notifies the speaker of his or her decision, more intricate constitutional procedures are pursued that may either result in the bill becoming an act of Parliament or not (The Parliament of the Republic of Uganda, 2011).

While structures and processes through which laws are developed are contentious and protracted, the processes through which the formation of national policies, elaborate frameworks from which laws derive guidance, are even more extensive and sometimes uncoordinated (Byrnes, 1990; Ingham, 1983). Policies are political roadmaps that are devoid of any legal force. They define contexts, guiding principles, visions, missions, goals, and objectives from which laws are derived. The formation structures and processes for policies endure bureaucratic procedures, financial, and consultative challenges that contribute to delays (Byrnes, 1990; The Parliament of the Republic of Uganda, 2011).

The majority of participants never questioned the prolonged procedures associated with law and policy making structures and processes. However, a member of an opposition political party in Parliament, who declined to tape-record his interview and two study participants, took issue with the implementation of existing parliamentary legal rules of procedures. They described the manner in which government implements rules of procedures for private members’ bills introduced by Members of Parliament belonging to opposition parties as unfair, biased, and marginalizing to them.

Interviewee 8 expressed these sentiments by observing, “Currently, the likelihood that a private members’ bill sponsored by a minority opposition party in Parliament can go through all policy structures and processes and become a law is unthinkable.” Procedures for introducing a government and/or private members’ bill in Parliament require sponsors to obtain a certificate of
financial implications from the Ministry of Finance as proof that the government has the resources to implement the law before a bill is introduced in Parliament, in accordance with rule 102 of the parliamentary rules of procedure (The Parliament of the Republic of Uganda, 2011).

Additionally, sponsors are required to set out specific outcomes of the bill, and how it will fit within the government's overall policies and programs (The Parliament of the Republic of Uganda, 2011). Semakula and Masaba (2013) suggested that under existing political circumstances where Members of Parliament belonging to opposition political parties do not even number one-third of Parliament, it would be practically impossible for a private members’ bill to obtain a certificate of financial implications for consideration in Parliament. Besides, because rule 106 of the parliamentary rules of procedure also requires that before a private members’ bill is debated, sponsors have to introduce a motion in Parliament supported by a majority of members, which is an unfeasible hurdle for a party in opposition to overcome in Uganda today (Kakaire, 2011).

Participant 5 expressed concern that the notion of viewing politics as a zero sum game in which interests and opinions of minority political parties are marginalized is undemocratic and should be reversed. “Rules on policy and law making structures in Uganda should be reversed or enforced by a neutral body and not a sitting government with a super majority in Parliament. That is the only way fairness can be realized.” The data presented in this primary theme indicated that consensus exists among the majority of participants to uphold the existing elaborate legal policy and law making structures and processes.

Intergroup Contradictions, Tensions, and Conflicts Highlight the Process

The fifth primary theme, “intergroup contradictions, tensions, and conflicts,” highlights the simmering tensions, contradictions, and conflicts among stakeholder groups. These tensions
were a reflection of power dynamics across and within stakeholder groups, differences in cultural value orientations, roles and responsibilities, gaps in knowledge about OSS, generational differences, and differences in ideological preferences. The data comprising this theme clustered around patterns of divergent perceptions, attitudes, knowledge, and interests that were either solely or collectively held or expressed by participants regarding OSS and the policy initiative.

The five categories comprising this theme are presented below and labeled as follows:

Tensions among the executive branch, Parliament, and the bureaucracy: antagonism among government bureaucrats: cultural value conflicts: inadequate education and lack of an OSS champion; and, contradictions between evangelism and utilitarianism.

Tensions among the executive branch, Parliament, and the bureaucracy. This category presents statements that uncovered the extent to which political power is characterizing the OSS policy process. Data from interviewees and participants suggested that whoever is wielding more political power is influencing the pace at which the policy process is progressing and its consideration by the executive branch and Parliament for action to gain approval. To underline tensions existing between the executive branch and the Parliament as a result of who wielded more power than the other, Interviewee 1 observed, “When you hear members of the executive dismissing OSS capabilities and shunning its use, it’s out of ignorance and unfounded fears based on lack of knowledge. Because they have more power, they don’t even listen.”

Interviewee 11 reinforced the previous observation by suggesting that, “Indifference by the executive toward the use of OSS is primarily caused by lack of appropriate information and clear understanding of this affordable and potentially transformative technology. I think declining to adopt OSS is also abuse of power.” But a member of the executive branch who declined tape-recording his interview rebutted with the following remarks: “We are not ignorant
about OSS. We don’t shun it. It cannot solve all our technological problems. Those who present OSS as our technological redeemer live on a different planet and should be ignored.” The statements by the two Members of Parliament and a member of the executive branch reflect the tensions between the two branches of government over OSS. They also indicate the power dynamics that characterize information policy processes.

Edwards (1995) observed that since “technological change is a social process, technologies can and do have social impacts, they are simultaneously social products embodying power relationships and social goals and structures” (p. 260). The observations by the interviewees that because the executive branch lacks knowledge about OSS and shuns it or is ambivalent toward it, parallel suggestions by Broman (2004), who stated that in addition to conflicts that characterize information policy formation processes, a new and ongoing dilemma involves “a lack of clear understanding of the rapid and unpredictable changes and impacts of ICTs which are difficult to regulate and police; they can only be mapped on an ad hoc basis” (p. 16).

Tensions between Members of Parliament were reflected through statements that questioned their knowledge about OSS even though they are elected and mandated to enact ICT laws, such as the OSS policy, to contribute toward the development of Uganda. Members of Parliament on the ICT Committee were particularly singled out as lacking the relevant information and knowledge to competently appreciate the potential of OSS. Interviewee 2 stated, “Most parliamentarians, including the highly educated, have little knowledge and understanding of OSS. They even have no idea that devices they carry and use may be running on OSS.” Interviewee 11 echoed similar sentiments of frustration with the lack of knowledge about OSS exhibited by Members of Parliament. “For lack of knowledge, attitudes of some MPs
on the ICT Committee towards OSS were very negative. They sounded ignorant, disinterested, and suspicious of OSS. With education, they are beginning to change positively and become receptive.”

Gil-Garcia (2004) and the U.S. Senate (1986) underlined complications associated with developing information policies for the adoption of rapidly changing ICTs whose features and social impacts are least understood by policy makers. Laws and policies to guide the adoption, use, and regulation of rapidly changing ICTs can only be developed through constant education and piecemeal efforts (Gil-Garcia, 2004; U.S. Senate, 1986). Equally, the data reflected an apparent disconnect between members of the executive branch (political leaders in ministries) and bureaucrats with respect to the utility and affordability of OSS. Statements by government bureaucrats distinctly reflected a sense of disquiet among them and their political leaders in ministries. This level of dissonance, underlining a degree of frustration within the bureaucracy toward the political leadership, was captured by Interviewee 7 who stated, “We know that OSS is affordable and would practically benefit Uganda. But we can only advise. If our advice is not taken and implemented, we have no choice but follow the official line.”

Interviewee 16 echoed similar sentiments of uneasiness by observing, “We advise our political leaders on cost benefits and technical advantages of OSS. But if our advice is snubbed, we cannot be blamed for lack of action.” Shin (2006, 2007, and 2008) noted that oftentimes, elitist, economic, and political preferences and interests of powerful groups tend to dwarf or replace views and participation of the least powerful groups in the conceptualization, development, ownership, and evaluation of ICT projects. The data also correspond with research by Minishi-Majanja and Kiplang'at (2005) that suggested that arenas in which the development of policies for the adoption, diffusion, and use of ICTs are volatile and subject to control by
political forces that overlap with several institutional regimes with different interests. “Power
dynamics associated with ICT adoption and diffusion arenas can deeply shape the direction and
pace of ICT adoption and diffusion processes” (Minishi-Majanja & Kiplang’at, 2005, p. 223).

Antagonism among government bureaucrats. Data for this category coalesced around
statements that uncovered degrees of antagonism and conflicts among government bureaucrats.
These antagonistic tendencies originated from divergent perceptions and attitudes towards OSS,
the power respective participants wielded based upon their roles in the formulation of ICT
policies, and positions they held in the government civil service hierarchy. These antagonistic
tendencies primarily existed among bureaucrats working in various government ministries,
departments, and authorities.

Out of the twenty-two participants who took part in this study, bureaucrats were the most
elusive to recruit. Out of the five who were eventually recruited to participate, two were working
with government departments mandated to directly develop and guide IT policy formation,
implementation, and evaluation activities. Three of the five were IT professionals working as
civil servants in IT departments in other government departments. On almost all elements
associated with the OSS policy, statements by bureaucrats working in government agencies
directly responsible for IT policy formation and implementation contradicted those working in IT
departments within other ministries and government departments with no direct bearing on IT
policy processes. For example, when asked to share knowledge and perceptions about OSS and
its potential for Uganda, Interviewee 16 re-affirmed a view advanced by other bureaucrats in
government departments mandated to guide and develop the IT sector. Their views downplayed
the utility of OSS as a catalytic IT tool for development and transformation as advanced by their
counterparts in other government departments. “OSS alone may not play such a critical role in
developing and transforming Uganda. The hype about OSS interoperability and superiority security features over proprietary software is not definitive. Those disseminating such rhetoric are misinforming the public.”

This view sharply contradicted observations by Interviewee {5}, an IT professional working in an IT department of another government department. The support for OSS expressed by Interviewee {5} resonated with sentiments expressed by other civil servants not directly involved in overseeing the IT sector. “I routinely develop and use OSS. It is affordable, flexible, superior to commercial software, and has potential to transform Uganda into an information society. Corruption contributes to negativity towards OSS.” Haddon and Silverstone (1996) stated that because processes and outcomes associated with the adoption of ICTs are:

Rhetorical (symbolic) as well as social, political, technical, and economic, users or consumers views cannot be overlooked as they assume active and not passive roles. As co-creators of technologies and meanings, ignoring their views distorts not only the adoption process but also how a new technology should be understood and used. (Haddon & Silverstone, 1996, p. 59).

Haddon and Silverstone (1996) further suggested that because, “these users or consumers participate in the creation of meanings and value for these ICTs or texts” (p. 59), neglecting their views can derail the adoption process.

These contradictory and antagonistic tendencies were also highlighted among civil servants in IT departments based on differences in official hierarchy or their seniority in rank and age. While young IT professionals were more supportive of the adoption of OSS, senior officials were less enthusiastic about OSS. Interviewee 20 stated, “Our seniors (bosses) are very fearful of integrating OSS in our operations. These are highly educated IT professionals whose loyalty to proprietary software is religious but their skepticism toward OSS is frustrating.”
This supportive view of OSS was corroborated by another IT specialist working in a government department who suggested that because their seniors were negatively adamant about the use of OSS, junior IT professionals were developing solutions and using them without informing their seniors. Interviewee 15 observed, “We develop OSS solutions to save millions of dollars government would spend on software licenses. Our seniors and government are unaware of how much we are saving. If we told our seniors, they would not even understand.”

Most young IT professionals in Uganda are cyber-literate, pragmatic, confident, highly adaptive to change, and enthusiastic about experimenting with new technologies, behaviors that contrast with those of their seniors. Their behaviors with new technologies nearly parallel those of young people in developed countries, such as the United States where the Millennials (born between 1980-1990) who were raised using computers do not perceive the Internet as an amazing new technology, but rather as just another device like the phone or television (Jones, 2008; Lancaster, 2003).

But Interviewee 7 working in a government department with a mandate to execute IT laws and policies, dismissed claims that seniors are fearful and less supportive of OSS as overblown. “Some junior IT professionals are simply excited about OSS. We don’t fear it. It is just not the answer to all our computing needs.” Wainwright and Waring (2006) stated that the adoption, understanding, diffusion, and use of any ICT is “politically constrained, perceived, and motivated within organizational environments that influence a degree of resilience” (p. 6). The data presented in these first two categories parallel research by Mansello and Silverstone (1996), who observed that the process of understanding, adopting, and implementing any ICT policy in all contexts is inherently turbulent, prone to conflict, and inequities. “Just as in any set of proximate relationships where people do not meet on equal terms, relevant social groups or
entities do not meet on equal terms when they engage in framing, describing, and using
electronic artifacts” (Mansello and Silverstone, 1996, p. 110).

Cultural value conflicts. The third category developed from the data highlighted views
that revolved around statements by participants that expressed conflicting cultural values in the
OSS policy formation process. Disparaging statements as discussed in previous categories were
by no means limited to one single OSS stakeholder group. These tensions were evident even
among stakeholders falling into the same interest category. The more pronounced conflict
emerged from apparent differences in cultural backgrounds and values systems. These tensions
further compounded and reinforced the complexities associated with information policy
formation processes. The most prominent cultural value conflict revolved around the concept of
volunteerism as understood and expressed by Interviewee 13, a non-Ugandan, who stated,
“Perhaps due to lack of a volunteerism culture in Uganda compared with what prevails in
Europe, United States, and Canada, our Ugandan colleagues hardly volunteer to organize OSS
activities. They leave everything to us foreigners. This is unfair.”

These statements implied that the task to educate the public about OSS has been left to a
handful of foreign OSS developers and international organizations whose knowledge of the local
cultural idiosyncrasies is somewhat limited. Inevitably, volunteerism fatigue among the non-
Ugandan OSS proponents has become pervasive as indigenous involvement in organizing OSS
community-related activities has consistently failed to materialize.

These cultural conflicts, based on value systems among categories of OSS proponents,
especially on the issue of volunteerism, are further underlined in statements expressed by
Interviewee 18 who observed, “We have done as much as we could. Our Ugandan colleagues
only show up to attend events organized by Bazungus (Whites). They don’t want to organize
anything. We are tired. We can only do so much.” These strained intergroup relationships reflected a deeper and wider cultural conflict that pervades the OSS development process in Uganda. It further highlighted an indigenous cultural process the OSS development model in Uganda will follow. It will be based on cultural values and idiosyncrasies that pertain locally. It appears that foreign volunteerism cultural influences may not shape the development of the OSS model in Uganda. This reluctance by Ugandan OSS adherents to assume a more flexible stance and engage in OSS volunteer activities has caused or has become a source of frustration among foreign nationals working in the ICT sector.

These foreign OSS proponents have spent time, resources, and energy to promote OSS awareness, use, and diffusion in Uganda. As a result, a sense of apathy and resignation was discernable in statements by foreign nationals. Interviewee 6, another foreign OSS developer, emphasized this culturally inspired tension, “We cannot do everything. All OSS events are organized by Bazungus (Whites) with least input from Ugandans. We decided to take a break. The enthusiasm we started with has definitely dissipated.” These conflicting and contradicting volunteer behaviors, attitudes, and perceptions characterizing the OSS policy formation process reflect the cultural experiences of the respective stakeholder groups. Kling (1987) stated that the development of processes to adopt and use ICTs involves intrinsic social activities influenced by peoples’ conflicting cultural values and diverse interests as noted above.

Inadequate education and lack of an OSS champion. This fourth category represents accounts by participants on how their respective roles and responsibilities to educate policy makers and the general public about the new OSS technology have fallen short of expectations. Because OSS pioneers and early adopters in Uganda are more concerned with financial returns than educating the population about the benefits and advantages of OSS over proprietary
software, they have taken to bickering among themselves to a point of inaction that further derails the policy initiative. A schism is widening among OSS stakeholders regarding the identification and recruitment of a national OSS champion to place the OSS policy initiative on the legislative agenda.

With over a dozen OSS communities, the majority of them inactive, and the extent to which OSS education is inadequate, questions about the competence of the collective OSS community to effectively promote the OSS policy have become frequent. Interviewee 17 described the failure by the OSS community to develop and implement an effective education campaign that would create awareness about OSS in the country. These statements captured the self-inflicted indictment the OSS community is enduring. “We are lazy. We have not gone out to educate policy makers and the public about OSS. We are ourselves to blame. Inadequate education will not secure for us an OSS champion.”

Interviewee 16 reinforced this indictment by stating, “While a lot of research has been conducted on OSS, dissemination of findings is hampered by lack of funds. NITA-U is yet to launch an education program about OSS and its other responsibilities.” These statements helped to explain why knowledge about OSS is confined to a minority group of elite users in Kampala and has not been effectively diffused throughout the country. This inadequate education of policy makers and the general public has also contributed to derailing the OSS policy initiative and failure to identify a national OSS champion to advance the policy agenda. Yet, innovation pioneers and champions play a pivotal role in gaining support and resources to move a policy agenda forward.

Minishi-Majanja and Kiplang'at (2005) suggested that innovation pioneers and early adopters should negotiate volatile social environments by recruiting a champion, an individual
with high social standing to shape, articulate, and spearhead the politics and campaign of an innovation to bring major political, financial, and social actors on board. If pioneers of a new ICT can win and receive the endorsement and support of a champion to frame the politics and social meaning of the technology in addition to influencing the national agenda toward the formation of the relevant policy, the diffusion process gains momentum and favorable adoption conditions (Zhao, 2009; Wainwright & Waring, 2006).

Rogers (1995) suggested that innovation pioneers and early adopters should clearly understand their social, cultural, political, and economic realities and harness them to develop communication strategies for effective dissemination of information about a new idea. The ICT cluster, which spearheaded the proposal to change the existing ICT law to pave the way for the recognition and formalization of OSS in 2008, has since become dormant. This inadequate education and failure to recruit a champion agreed upon by all OSS stakeholders has further exacerbated intergroup differences as reflected in opposing statements by some of the stakeholders. While only one participant indicated that a champion to move the OSS policy forward had been identified, the rest disputed such claims.

Interviewee 10 stated, “We have a champion in the Minister of ICT with some few Parliamentarians capable of advancing the policy initiative.” But Interviewee 17 echoed statements by other interviewees and contradicting statements by Interviewee 10 remarking, “The Minister of ICT has not brought OSS adoption to the national agenda. We need a competent champion to articulate the politics of OSS, gain support for it, and find resources to promote its adoption.” This contradiction in framing the direction of the policy proposal was particularly instructive in highlighting the extent to which the OSS policy promoters are a fragmented group that need to re-organize themselves to move the policy proposal forward.
Mundkur and Venkatesh (2009) and Sagasti (2004) suggested that since the adoption of any technology involves absorption, reinterpretation and diffusion of new knowledge, absence of interaction between foreign scientific knowledge about an ICT and indigenous systems of information dissemination may impede the recruitment and harmonization of heterogeneous social groups to advance an ICT policy forward. Based on the data discussed in this category, OSS pioneers and early adopters failed to address important communication features associated with two concepts from the diffusion of innovation theory: innovation pioneers and champions. The theory emphasizes important communication features, such as articulating elements about an innovation to recruit a champion and win support from policy makers, key government bureaucrats, and the population, which OSS pioneers and early adopters have failed to address.

While innovation pioneers articulate the relevance, simplicity, flexibility, and usefulness of an innovation to persuade other people to adopt an innovation based upon its benefits, (Rogers, 1995; Rogers & Kincaid, 1981), an innovation champion is a highly respected member of society who supports and elevates the cause of a new idea, finds resources, and places it on a national agenda (Backer & Rogers, 1998). This lack of effective education and communication about OSS has negatively impacted the diffusion of OSS and the progress of the policy initiative.

Contradictions between evangelism and utilitarianism. Data comprising the fifth category clustered around statements that underlined a disconnect among OSS developers in Uganda and the mainstream or conventional OSS adherents who not only passionately and simultaneously engage in developing software solutions but also participate in OSS evangelism. In the context of OSS development and diffusion, evangelism refers to the dissemination or spread of information about OSS, conducting ‘source events’ to educate and convert people to understand, appreciate, and start using OSS. In Uganda, OSS developers have only pursued a
more pragmatic approach to OSS by focusing on the utility of the software rather than on its evangelism. To most OSS developers in Uganda, a pervasive view that the flexibility of OSS should be optimized to develop tools to solve existing social problems has gained more traction than engaging in its evangelism. While the majority of interviewees and participants expressed support for OSS evangelism, they overwhelmingly emphasized the need to expend their energies and time on developing OSS tools for practical use, for offering alternative solutions to proprietary software at affordable costs, and for their own financial needs.

This tendency to exclusively focus on utilitarian elements of OSS directly contradicted the conventional OSS model that requires simultaneous development of the technology with passionate engagement in the dissemination of OSS rhetoric that exhorts its technical superiority over proprietary software and its networked, dynamic, and sustainable development model. Statements by Interviewee 12 brought to light this view that underscores the apparent contradiction between the all inclusive OSS model and the partial emphasis on utility aspects of the software developers in Uganda. “Our concerns are to develop solutions to solve social problems. I appreciate needs for OSS evangelism but time is limited. People with minimum social and economic problems should evangelize. Here, societal needs and personal survival are more paramount.” This contradictory position to the conventional OSS model was also echoed by Participant 1 who stated, “Uganda’s need for software tools to use in health, education, agriculture, and other sectors is enormous. The demand leaves no time for OSS evangelism. Developers also need to create solutions to sell, get money, and survive.”

Research on Open Source Initiative and Free Software Foundation movements suggested that to mainstream OSS and FS adherents, OSS evangelism is an integral part of the OSS model. However, exclusive emphasis on utilitarian aspects of OSS by Ugandan developers for purposes
of creating solutions to solve social problems and ensure their economic survival without integrating OSS evangelism to disseminate information that promotes the software goes against the mainstream OSS model. The data presented in this category suggested that views espoused by members of the OSS community in Uganda may not be pigeon holed as the typical OSS adherents reading from the same script and conforming to groupthink. Data in this category further lend credence to observations by Broad and Cavanagh (2006) who suggested that:

> It is no longer rational to view the adoption and impact of the globalization of ICTs from a one-size-fits-all approach—there are neither monolithic nor inevitable phenomena because they vary across countries, societal sectors, and time. They are contradictory, discontinuous, and even haphazard. Their complexities should be understood in a broad minded way. (p. 26).

Overall, narratives presented in this theme offer a snapshot into the contradictions, tensions, and conflicts that are characterizing the dynamic and fluid OSS policy formation process in Uganda. Kilker and Gay (1998) stated that because the adoption of new technologies is a socially constructed process, interactions in the development of technologies and inherent ambiguities of engineering design that are increasingly impacting the meaning and adoption of technologies are better described, analyzed, and understood as socially constructed context-specific processes. The process for the adoption of a technology or the technology itself cannot be viewed as value neutral because such processes embody the values and interests of the people taking part in the adoption of the artifact (Klein & Hirschheim, 2001; Mumford, 1981; Winner, 1999).

Reed (2000) suggested that as new technologies acknowledge and preserve indigenous knowledge and techniques, technologies have to be well chosen to meet social and human development goals of countries lest the new knowledge exacerbates the hitherto alarming levels of exclusion and inequality. Clearly, data presented in this category also correspond with research suggesting that rather than generalize the OSS model as applicable to the
implementation of all OSS projects, the specific nature of the OSS project or product should be considered within its local context (Wang & Swanson, 2008). While the thematic analysis technique reinforced other methods to illuminate complementary aspects of the OSS policy formation process, it underlined divergent points in the data that provided interesting insights into the dynamic and complex policy process.

Chapter summary. This chapter presented results of the research conducted to understand the OSS policy formation process in Uganda. In the first section, the chapter presented results from three descriptive information policy assessment techniques that included documenting the historical context, examining key policy instruments, and identifying key issues. Secondly, the chapter presented results of stakeholder analysis which highlighted strategies that could be adopted to manage stakeholder relationships to the OSS policy and among the respective stakeholder categories. In the third section, results of frame analysis technique were presented to illuminate perceptions of the diverse stakeholders and in the fourth segment, the chapter presented results of the thematic analysis technique which spotlighted themes constructed from the data. These four data analysis techniques contributed information to address the overarching and the five specific research questions presented in Chapter 5.
CHAPTER 5
DISCUSSION AND CONCLUSIONS

Chapter Overview

This chapter presents a summary of this research study by highlighting the paradigm in which the research was grounded, linkages within the paradigm, theoretical frameworks, the research design, approach, strategy, and the data collection and analysis techniques, all occurring iteratively to yield the study results. Second, the chapter presents answers to the overarching and the specific questions and highlights the findings of the study with its practical and scholarly implications. In the process, the chapter underlines the practical benefits of this research to the government, policy makers, and OSS stakeholders involved in the policy formation process in Uganda, and to developing countries, especially in Africa, in the process of formulating OSS-related policies and/or for other ICTs. The chapter also describes the contributions of this research to the interdisciplinary information policy (IP) discipline and related fields.

Third, the chapter presents recommendations to the OSS policy promoters and describes components of a proposed communication and education strategy as a management technique for the OSS policy promoters to recruit support for the policy process. Fourth, the chapter presents some policy recommendations to the executive branch and the Parliament of Uganda and recommendations to improve information policy processes in the country. Fifth, the chapter offers recommendations for future research. Finally, the chapter presents limitations of this research study, provides some conclusions, and presents a chapter summary.

Summary of the Study

This study was grounded in the pragmatist paradigm that served to link the selection of relevant theoretical concepts, an appropriate qualitative or naturalistic research approach, the use
of an effective case study strategy, and multiple data collection and analysis techniques. This study design facilitated an iterative process that generated information to create a holistic understanding of the open source software policy formation process in Uganda.

The purpose of the study was to provide timely and relevant information to enable OSS policy promoters and Uganda’s policy makers to effectively negotiate the formative stage of an information policy for the formal recognition and adoption of OSS, and develop a coherent and integrated policy that is consistent with existing ICT laws.

The scope of the study was limited to the formation stage of an information policy for the adoption of OSS. Berger (1993) stated that information policies are comprised of three stages: “Policy formation or policy making; implementation or policy production; and policy evaluation or feedback” (p. 8). Berger (1993) observed that “policy formation or policy making covers the policy process from the inception of an idea to its passage as a law by a legislative body” (p. 8). This study focused on the inception of the idea and proposal by ICT stakeholders to the government to formalize and adopt the use of OSS as an alternative choice alongside proprietary software.

The formation stage of this OSS policy initiative is still ongoing. It will end when an OSS policy in the form of an Act of Parliament is enacted and assented to by the President. The formation stage includes the responses of the executive branch and the Parliament, their interaction with the OSS stakeholders, and relationships among stakeholders and to the evolving policy process. The aim of focusing on this formative stage of the policy process was to provide reasonably timely and relevant information required to move the policy process forward.

The study used primary and secondary data to create some understanding of the process and ensured that the study findings filled the critical information gaps in Uganda’s national
policy formation processes. The use of multiple sources of data enhanced consistency in the evidence, increased confidence in the study results and the triangulation of analysis techniques reinforced the robustness of the study’s findings.

To that end, the information provided by this study is a relevant resource to guide informed decision-making processes in the formation of an information policy for the adoption of OSS and, indeed, other information and communication technologies (ICTs). Drawing from the results presented in Chapter 4, the findings presented below offer practical and theoretical value to information policy formation processes and the information policy discipline respectively.

**Answering the Research Questions**

The value of the research design and concepts from the five theoretical frameworks was enhanced by their capabilities to guide and facilitate this study to fully answer the overarching research question and the five specific questions. The results presented in Chapter 4 fully answer the following overarching question as discussed below:

**What are the underlying interests of ICT stakeholders in Uganda to propose a new policy for the formal recognition and adoption of OSS as an alternative choice alongside proprietary software?**

The data suggest that the ICT stakeholders who proposed a new policy for the formal recognition and adoption of OSS as an alternative choice alongside proprietary software were motivated by multiple interests. Their underlying interests in the OSS policy were identified, described, analyzed, and classified into economic, social, and academic interest categories. The identification and categorization of their underlying interests in the OSS policy were based upon an examination of the literature on the ICT sector and their declared or conceivable interests and roles in the OSS policy formation process.
Their interests were primarily focused on making money, developing OSS solutions to solve practical social problems, diversifying tools for teaching and training, promoting skill and knowledge acquisition, creating jobs and reducing unemployment rates in the country, and ensuring sustainable innovation and development of software to reduce expenditures on proprietary software. While these ICT stakeholders have multiple interests in the OSS policy process, the majority are primarily motivated by economic reasons.

An examination of the ICT-related documents revealed that international and local telecommunication corporations operating as Internet service providers, proprietors of OSS-based businesses, individual developers, and members of the various OSS communities were stakeholders with strong economic interests in the OSS policy process (Collins, 2010; Ministry of ICT, 2012a; UCC, 2005; Weddi, 2009).

Interviewee 18 captured these underlying economic, social, and academic interests of the stakeholders promoting the OSS policy by stating, “I promote an OSS policy primarily for economic interests. I develop and sell OSS to make money. But I also use OSS to teach students and train health sector professionals.” Some IT professionals who are proprietors of OSS-based companies indicated that a law to formalize the use of OSS would not only benefit those with OSS businesses and expertise but also create employment opportunities for thousands of educated but jobless youths to contribute to the economic development of Uganda. Interviewee 9 stated, “While I developed an OSS solution that I profitably sell around the world, I support a law to formalize OSS to help create jobs for thousands of unemployed IT graduates.”

Other underlying interests of the OSS stakeholders were identified and classified into the social interest category. Some of the OSS stakeholders with underlying social interests include some primary stakeholders providing services to facilitate social change in the country. Collins
(2010) and Weddi (2009) suggested that regardless of their memberships, the majority of OSS communities pursue missions and goals that aim to provide services to improve the social welfare of Ugandans.

Evidence of OSS stakeholders with underlying social interest in the policy was reflected through comments by Interviewee 3 who stated, “Most OSS communities provide free training sessions for groups on how to download, customize, and use OSS to improve their lives.”

Stakeholders with underlying academic interests who joined others to propose to the government to develop a new law to embrace OSS were comprised of some lecturers in universities and instructors in vocational institutions. Their underlying interests in the OSS policy are primarily driven by academic purposes. The data show that several international and local organizations, some universities, vocational institutions, lecturers, and instructors support the OSS policy for purely academic or educational interests (Collins, 2010; Weddi, 2009).

Interviewee 12, who took part in passing a resolution to propose to the government to change the law to embrace OSS, captured these underlying academic interests and said, “Several universities now use OSS in libraries, in teaching, and administration. At our Vocational Institute, all our computer training programs run on OSS. We support the policy to increase enrollment of students and increase our academic programs.”

The other underlying interests presented by the ICT stakeholders in proposing a change in existing laws to embrace OSS included the reduction of the digital divide, transforming Uganda into an information society, and enabling Ugandans to participate in the global economy. However, the study found as rhetorical and unrealistic the assumptions by the ICT stakeholders that the adoption and use of OSS would be a panacea to the digital divide and a sure pathway for Uganda to evolve into an information society. The foregoing data fully answer the overarching
research question regarding the underlying interests of those proposed to change the existing ICT laws to enable the formal recognition of OSS as an alternative to proprietary software.

Regarding the specific research questions that guided this study, the data also fully answered research question 1:

Who are the various stakeholders behind the proposed national information policy for the formal recognition, adoption, diffusion, and use of OSS in Uganda and what information about OSS technology do they possess?

The data presented in Chapter 4 helped to identify, describe, analyze, and categorize the individuals, groups, and organizations who proposed changes to Uganda’s existing ICT laws in 2008 and embrace OSS through an Act of Parliament. These individuals, groups, and corporations include telecommunications companies that use OSS in their operations, proprietors of OSS-based companies, OSS communities, members of OSS communities, and individual developers of OSS solutions in the public and private sectors (Collins, 2010; Ministry of ICT, 2009a; Tentena, 2008a, 2008b; Wafula, 2011; Weddi, 2009).

These are the primary stakeholders who are involved in promoting the OSS policy process. These primary stakeholders would stand to gain if the proposed OSS policy is approved and would lose if the policy for the adoption of OSS fails to progress. This identification, description, and characterization of stakeholders who are involved in promoting the policy are further reinforced with comments by Interviewee 10 who stated, “I am an OSS stakeholder, pastor, and social entrepreneur. I make money from OSS, train people to develop and use OSS, promote the OSS policy, and with associate pastors, we fish and convert many to adopt OSS.”
These high stakes in the OSS policy were complemented with remarks from Interviewee 20 who said, “We are sizeable community developing, using, and making money from OSS. We strongly support and promote a law to embrace OSS in Uganda.”

These OSS stakeholders also possess extensive knowledge and information about OSS. Both individual developers, OSS communities, and some users clearly articulated the vast features of OSS, its potential for Uganda, and its use in ubiquitous computing. The majority of them observed that OSS development is inclusive; enhances skill development, self-reliance, innovation, sustainability; is increasingly being adopted into several IT systems on the basis of its interoperability and superior security features that can be modified to suit a user’s needs.

Most of these stakeholders use OSS to accomplish various computing tasks; some have set up businesses, are employing people, providing services, and developing solutions for the local, regional, and global markets. Although the OSS stakeholders described OSS as free, they expressed awareness of costs associated with its modification and use. Statements by Participant 4 highlighted such perspective. “Most OSS developers know that OSS is not entirely free. To use OSS, one incurs some costs. But such costs are too negligible compared with buying licenses for commercial software.”

The data presented in this section clearly identify, describe, and highlight the information about OSS these policy promoters possess. Therefore, the data fully answer research question 1.

Research question 2 states: What are the complementary and competing interests among the various stakeholders supporting an information policy that would formally recognize the adoption and use of OSS as an alternative to the use of proprietary software in Uganda?

Although the interests of the various stakeholders supporting an information policy for the formal recognition, adoption, and use of OSS as an alternative to the use of proprietary
software in Uganda are diverse, they overlap, are more complementary than competitive, and reflect a common goal of getting the policy approved. The complementary interests among the various stakeholders supporting the OSS policy range from economic and social to academic. The data show that the majority of stakeholders supportive of the OSS policy hold vested economic interests in the policy outcome. Statements by Interviewee 8, for example, underline the complementary economic interests of telecommunications corporations operating as Internet service providers that are shared by other stakeholders in the OSS policy process. “I manage Internet service operations using OSS for the biggest ISPs in Uganda. We strongly support a law to embrace OSS, give business contracts to local OSS developers, and reduce our huge expenditures on commercial software.”

Remarks from supporters of the OSS policy with social interests in the process were reflected in statements by Interviewee 4 who said, “I donate OSS solutions to some local NGOs to use in their devices to monitor conditions of expectant mothers and to send them reminders about their children’s immunization dates.” Additionally, statements by OSS policy supporters with academic interests were voiced by Participant 2, who stated, “At my university, we only use OSS for all our academic programs online. We share similar visions and interests with two other universities to integrate OSS in e-learning.”

While statements by two interviewees and one participant reflect economic, social, and academic interests in the OSS policy process, they are not diametrically opposed to each other. They are diverse and complementary at the same time. When considering stakeholders supportive of the OSS policy for political interests, their sentiments are also more complementary than competitive. For example, remarks from Interviewee 11, a Member of Parliament, reflect these overlapping interests in getting the policy adopted. “I am an MP, IT
professional, a strong proponent, developer, and long-time user of OSS. Adopting OSS will liberate Uganda from digital colonization.”

While the interests by the interviewees and participants supportive of the OSS policy process are diverse, they are more complementary than the more competitive, less complementary, and contrary interests held and voiced by stakeholders in the ICT sector opposed to the OSS policy. Interviewee 16 stated, “NITA-U, mandated to regulate and guide the IT sector doesn’t use OSS. A law to formalize OSS would counteract existing government IT policy.” To further underscore this contrary view of the OSS policy process, Interviewee 7 stated, “Currently, the Ministry of ICT sees no justification to change IT laws to specifically support OSS.”

While data presented in this section fully answer research question 2, they also suggest that more competitive and contrary interests in the OSS policy process are held by stakeholders who are not supportive of the OSS policy process.

Research question 3 states: How consistent is the proposed OSS policy with the existing legislation on the use of ICTs in fostering an integrated and inclusive information policy in the attainment of Uganda’s national development goals? While the proposed OSS policy has not yet been published by the policy promoters, their statements about what an OSS policy should include are consistent with the ICT policies and laws Uganda has implemented since 1996 that enabled the evolution of the current vibrant ICT sector.

In support of the evolving OSS policy, Interviewee 11, an elected official on the ICT Committee of the Parliament, offered insights into how the OSS policy will describe the software. “Government should formally adopt OSS, establish OSS centers to equip the youth
with technical and business skills, help them start businesses, and tax them. Government will create employment, improve lives, earn taxes, grow the economy, and gain political support.”

These statements imply the mission, vision, goals, and objectives of the proposed OSS policy that would regard the software as a tool that embeds sustainable features and potential economic, social, technological, and political benefits for Uganda. Statements by Interviewee 5 also highlight the need to diversify IT tools to enable Ugandans to access and use technologies to improve their welfare and contribute to the economic development of Uganda. “We need support to urgently enact a law embracing OSS to diversify affordable IT tools to increase access and use of technology to positively change peoples’ lives.”

These statements by two interviewees are consistent with existing ICT policies whose missions, visions, goals, and objectives aim to enable Ugandans to access and use ICTs as tools to transform and improve their social welfare, communicate and collaborate with global communities, engage in sustainable technological innovations, create employment, diversify the tax base, and contribute to the economic development of Uganda.

The statements by these two interviewees, for example, correspond with the mission, vision, goals, and objectives of the National ICT Policy of 2003 that embraced three key areas: 1) Access and use information as a resource for development, 2) ICT as a mechanism for accessing information, and 3) ICT as an industry, including e-business, software development, and manufacturing (Ministry of Works, Housing, and Communication, 2003). These three areas were to simultaneously lead to convergence between available technologies and result in integrated national development (Ministry of Works, Housing, and Communication, 2003). The principle guiding the 2003 ICT Policy was derived from Uganda’s constitutional requirements, such as universal access and use of information including ICTs to create employment, social

The ideas suggested by the two interviewees would also parallel the vision, mission, goals, and objectives of the National Information Technology Authority-Uganda (NITA-U) Act (2009), which includes among other mandates, to facilitate the establishment of a knowledge-based, globally competitive Uganda where social transformation and economic development are supported through IT-enabled services (NITA-U, 2009). Additionally, the overall mission and objective of the National Information Technology Policy (2010) aims to create a supportive environment to attract IT investments from all over the world and encourage both the public and private sectors to facilitate Uganda’s national goal of becoming an IT-led center for economic development and poverty eradication among its population (Ministry of ICT, 2010). This policy also recognized the potential of OSS for playing a catalytic role in enhancing the access and use of technology by Ugandans to transform their lives and contribute to national development (Ministry of ICT, 2010).

Research question 4 states: What are the characteristics of the policy development structures and processes in Uganda and how have the legislature and government used them to respond to the OSS policy initiative?

Uganda’s policy development structures and processes (described in detail in Chapter 4) were inherited from Britain, the former colonial master, and following political independence are frequently updated to suit existing conditions in the country (Byrnes, 1990; Ingham, 1983). Policies in Uganda are political roadmaps that are devoid of any legal force. They are elaborate frameworks that define contexts, guiding principles, visions, missions, goals, and objectives from which laws are derived. The formation structures and processes for policies endure bureaucratic
procedures as well as financial and consultative challenges that often contribute to delays (Byrnes, 1990; Ingham, 1983).

In addition to their elaborate characteristics, policy-making processes take various directions, depending upon their political priority, availability of funds, complexity, and expertise to collect information and compile a draft policy proposal for debate by relevant stakeholders (Byrnes, 1990; Ingham, 1983; The Parliament of the Republic of Uganda, 2011). After thorough consultations, policies are approved by the cabinet and, for record purposes, presented to the Parliament (The Parliament of the Republic of Uganda, 2011).

With respect to laws, Byrnes (1990), Ibingira (1973), Ingham (1983), and Karugire (1980) stated that Uganda has followed West Minister (British) structures and processes with slight modifications to make laws since 1962. The intricate characteristics of those processes and structures are constantly updated to conform to those followed by Parliaments in Commonwealth member states, formerly under British colonial rule, as a way of gaining legitimacy for enacted laws (Byrnes, 1990; Ibingira, 1973; Karugire, 1980). A proposed law in Uganda is referred to as a bill and goes through several parliamentary processes and procedures, including its introduction in the Parliament, which is the bill’s first reading stage, through the second reading where a detailed debate on the bill is held, and to the third reading where a final vote is taken on the bill by the entire House to approve or reject the bill (The Parliament of the Republic of Uganda, 2011). After the bill is passed by the Parliament, it receives Presidential Assent signifying its approval before it is published in the Gazette to become an act of Parliament (The Parliament of the Republic of Uganda, 2011).

Neither the Parliament (legislature) nor the executive branch (government agencies) have so far used the structures and processes to respond to the OSS policy initiative. The policy
initiative is still in the formative stage and has not even evolved from a policy idea into a draft
document to enlist the views of the executive branch and the Parliament. Until the proposed OSS
policy gains the support of a champion either in the executive branch or the Parliament who will
articulate its politics and elevate it to a national legislative agenda, it will remain an idea and will
not move forward. The foregoing data fully answer research question 4.

Research question 5 states: What recommendations should be made to improve the policy
formation structures and processes to enhance the legitimacy of national development policies?
To answer this question, two contrasting viewpoints from the study participants are presented.
First, the majority of study participants was comfortable with the existing policy formation and
law-making structures and processes and was also less receptive to changing them.

Consensus emerged from the majority of participants in support of maintaining the status
quo as a way of ensuring legitimacy for the policies and laws adopted in the country. Interviewee
2 underscored support for the current policy structures and process. “We cannot rush to enact
laws or adopt policies to appear efficient. There are so many interests and views to consider
before a law or policy is approved. These procedures are inevitable.” These sentiments were
echoed by statements by Participant 4. “For laws and policies to gain legitimacy, they go through
complicated and time-consuming bureaucratic processes. That is the high price for democracy.”

However, a few individuals expressed some disquiet over politically inspired obstacles to
the implementation of existing parliamentary legal rules of procedures that are practically
impossible to overcome by minority parties in the opposition. They described the
implementation of parliamentary rules as biased and marginalizing to opposition party members
who introduce Private Members’ Bills. Interviewee 8 observed, “Currently, the likelihood that a
Private Members’ Bill sponsored by a minority opposition party in Parliament can go through all
policy structures and processes and become a law is unthinkable.” Participant 5 remarked that marginalizing views of minority political parties is undemocratic and should be reversed. “Rules on law-making structures should be reversed and enforced by a neutral body not a sitting government. That is the only way fairness can be realized.”

To address issues of bias and fairness in the implementation of parliamentary legal rules of procedures by an incumbent government and to improve the policy formation structures and processes to enhance the legitimacy of national development policies, a recommendation from Participant 5 should be considered. A neutral and non-partisan body should indeed be established to oversee and implement such rules in a more egalitarian manner to reflect a fair and less bureaucratic process for all Members of Parliament. Given the overwhelming consensus to uphold the status quo, the recommendation from the two participants to improve the implementation of the rules of procedure is applied to fully answer research question 5.

Findings of the Study

Emerging from this research process, the findings indicate that Uganda has developed a vibrant ICT sector guided by dynamic policy and legal frameworks that have, in turn, created an environment capable of integrating new initiatives to diversify products and services. This well-regulated and flexible ICT environment is responsible for the emergence of the OSS policy initiative. The dynamic ICT environment is also responsible for the increased availability of networked technologies, the continuous need of Ugandans to seek affordable software for ubiquitous computing, and the growth of OSS communities that are collaborating in modifying and developing OSS solutions for local, regional, and global markets.

The policies and laws resulting in the evolution of an expanding ICT sector imply that they have continuously integrated new innovations contributing to the economic and social
transformation of Uganda. But the challenge persists to update policies and laws governing the ICT sector, upgrade the infrastructure to provide basic capacity for the population to equitably access and use ICTs, and for the government to improve the delivery of services. Yet, a prerequisite for Uganda to make a strategic transition into the information society is to access and use timely and relevant information about recognized problems to make informed choices about policies for the adoption of new ICTs, such as OSS. This empirical and theoretically based research is a first step in that direction.

While clearly identifiable stakeholders are playing a pivotal role in driving the ICT sector in Uganda, they hold multiple interests that are both complementary and competing at the same time. From these multiple stakeholders, OSS proponents emerged to propose the enactment of a new law to embrace OSS. While the government established a friendly ICT environment from which the OSS policy is emerging, its reluctance to invest in the development of OSS has partly contributed to a delay in the policy process.

Yet, findings from the research indicate that the use of OSS is gaining ground with the government as the largest consumer of OSS, followed by the private sector, international agencies, universities, and nongovernmental organizations, among others. But OSS policy promoters are also responsible for derailing the process because they have done little to educate the executive branch, the Parliament, government officials, and/or the general public about OSS to help them understand and support the policy initiative. Rather, they have mainly focused on the utility of OSS and their own economic survival.

The apparent lack of organization and unity among the various OSS communities in Uganda to present a well-coordinated and consistent communication and education strategy to promote the OSS policy initiative is seriously undermining their legitimacy as deeply vested
stakeholders that the relevant government agencies and the Parliament can deal with to move the policy forward. This lack of organization and consistency is exemplified in the demise of the ICT Cluster, the association through which OSS proponents proposed, in 2008, to the government to change the existing laws to purposely embrace OSS to fairly compete with proprietary software (Tentena, 2011). Members of the defunct ICT Cluster have since either formed new OSS communities or joined new ones. Policies are developed through constant engagement with key stakeholders to demonstrate the exigency of reform objectives and as a way of developing coalitions to realized desired goals (World Bank Group, 2012).

While knowledge about OSS among sections of the elite is increasing with private OSS-based businesses emerging, creating employment opportunities, developing OSS solutions for regional and international markets, and bringing tax revenues to the national treasury, it is puzzling that the government continues to display skepticism and ambivalence toward developing a law for the formal recognition and adoption of OSS. Given the historical flexibility of ICT policies and laws that helped to establish the vibrant sector, the continuous reluctance by the government to the OSS policy initiative undermines its own success that characterized the past.

To compound this ambivalence toward OSS, the government continues to pursue the technology/software neutrality approach adopted in 2006 that undoubtedly favors proprietary software over OSS. The technology/software neutrality approach grants investors in the ICT sector the freedom to select and use a technology of their choice (Ministry of ICT, 2009; UCC, 2005).

This approach was adopted when knowledge and use of OSS in Uganda was generally limited. The approach is assumed to have granted procurement freedoms only to proprietary
technology/software, an arrangement that neither supports the adoption nor the development of OSS. The technology/software neutrality approach, a component of the liberal ICT policies the government has pursued since 1996, clearly privileges investors more than users of ICTs.

Additionally, the historical role of facilitation and non-intervention that the government assumed in the ICT sector may not result in the attainment of desired policy goals and objectives in the newly established information and technology (IT) sector in which OSS falls. This role by the government is to some extent an abdication of its critical responsibility to pursue a holistic approach “to stimulate social change by training citizens to enable universal participation in the ICT sector to ensure economic growth for all citizens, social stability, and cohesion” (Moore, 1996, p. 280).

The resultant challenge by OSS stakeholders to this governmental role of facilitation was, therefore, an inevitable outcome. To escalate these contestations in the OSS policy process, corruption has become a huge liability for the government, increasingly tarnishing its image from both within and outside the country. The problem of corruption has had far reaching implications on the Ugandan economy that are reverberating in the ICT sector. The effects of corruption have undermined the moral authority of the government to develop and implement fair policies and laws to guide the ICT sector because any policy change or lack of action is perceived and interpreted as being motivated by either corruption or incompetence.

From 1996, all ICT-related policies focused more on the telecommunications and broadcasting sectors with little attention given to information technology (IT). With the enactment of the NITA-U Act in 2009, the establishment of a fully fledged IT sector and creation of an authority to guide and regulate all IT activities signaled governmental recognition that the IT sector was poised to play a transformative role in the country (Ministry of ICT, 2009a; NITA-
U, 2009). While this was a positive recognition of the IT sector, the National Information and Technology Authority-Uganda (NITA-U), which is mandated to guide the development of the IT sector, still lacks adequate funding to recruit and to train the required human resources to execute its wide-ranging mandate.

The NITA-U Act (2009) does not clearly state its role in supporting the formalization, development, promotion, adoption, and use of OSS. Although the authority is mandated to promote and carry out research and development in IT-related activities, it does not use OSS in its computing operations. Yet, the National IT Policy of 2010 recognized the critical role OSS can play in increasing access and use of technologies by citizens for social transformation. The NITA-U Act of 2009 has not been amended to operationalize this policy recommendation.

Evidence suggests that the adoption of OSS may result in facilitating an emancipatory educational process through which individuals acquire life-long skills and knowledge that free them from the dominant proprietary software (Camara & Fonseca, 2007; Weber, 2004). What is confounding, though, is that the government continues to act indifferently to an initiative that may significantly contribute to resolving the escalating national problem of unemployment among the youths and diversifying IT tools to increase access and use of technology in the country. It appears that NITA-U has not fully grasped the extent to which it has to execute its mandate to advise the government on IT-related matters such as adopting a policy that would result in the reduction of government expenditures on software. It may also be the case that while the authority is accountable to Parliament and is supposed to implement its mandate according to the NITA-U Act of 2009, the influence of the Ministry of ICT and the Minister of ICT over the operations of NITA-U and has sometimes led to micro-managing its affairs. Given the evidence from the data, the inference that one of the major problems that has negatively impacted the ICT
sector in Uganda is not the lack of a law to strategically attain national goals but the failure or poor implementation of existing policies and laws that impede progress towards attaining national goals is plausible.

In this study, the claims by OSS proponents that OSS can provide a pathway to bridging the digital divide and transform Uganda into an information society became increasingly untenable. The digital divide is a multi-faceted concept that cannot be simply eliminated through the mere access, adoption, use, development, and diffusion of OSS. Even in developed countries where OSS and other ICTs are widely used, elements of the digital divide are still prevalent (Castells, 1998; Chang, 1995; Webster, 2002, 2006). While some sections of the Ugandan society may transform into an information society, the entire population may not undergo such a transformation at the same time as literacy, social, cultural, technological, gender, geographical, and physical factors influence the access and use of ICTs (Cullen, 2001; Ebo, 2002; Warschauer, 2003).

Practical Benefits of the Study

This study provides information to policy makers, OSS policy promoters, professionals in the ICT sector in Uganda, and to some extent, policy makers in developing countries to use and understand information policy formation processes for the adoption of ICTs. This information is a resource that addresses a continuously fluid process that requires constant update. For the OSS policy promoters, ICT professionals, and policy makers in Uganda, this study provides timely and relevant information to stakeholders involved in the OSS process to resolve the impasse and enact a law to embrace OSS. First, this study identified, described, and categorized the multiple ICT stakeholders and highlighted their underlying interests in the OSS policy initiative.
The information in this study is relevant to policy makers to understand OSS and reasonably assess the pertinent knowledge, skills, and associated costs involved in the adoption and use of OSS. The study highlights the risks Uganda may experience if policy makers develop an information policy but fail to strategically consider and address such risks that are often overlooked and underestimated in other contexts.

This study also provides information on the current state of Uganda’s ICT environment as impacted by social, economic, and political factors under which the formal adoption of OSS is taking place to ascertain whether Ugandans will benefit from the proposed policy goals. Additionally, this study underlines the typical conflicting and turbulent characteristics associated with information formation policy processes for the adoption of any ICT to assure all stakeholders that contrasting viewpoints can be overcome through communication, education, negotiation, and tradeoffs. An understanding of such complexities in policy processes may help to reduce the uncertainty in the process and move the policy forward. Fully implemented, the information in this study may reduce the negative impact upon the legislative mandate of policy makers as they utilize the information to fulfill their mandates and avoid leaving a gap that would hinder Ugandans from maximizing opportunities in the ICT-based global economy.

The study identified little or no evidence of elements of technological utopianism in the OSS policy process, ensuring that high sounding rhetoric associated with OSS promoters does not mislead the policy process. Rather, the findings indicate that an amendment of the NITA-U Act of 2009 could formally recognize OSS to favorably compete with proprietary software in Uganda. Ultimately, the pertinent information in this study will empower policy makers to strategically develop informed and justifiable decisions in executing their legislative mandates.
To some extent, information in this study offers policy ideas for modification and application by developing countries seeking to adopt new technologies that emerge on the global ICT scene. While these study findings are context specific, they are consistent with those articulated by the African Information Society Initiative (Scan-ICT Project, 2002). In developing countries, and the Africa continent in particular, OSS is now viewed as a strategic and transformative technology that will change and advance societies more than commercial software (Free Open Source Software Foundation for Africa {FOSSFA}, 2013; Karume & Mbugua, 2012).

Contributions of the Study to the Information Policy Discipline

In theoretical terms, this study makes a contribution to scholars in the information policy discipline and related fields of study. Grounded in the pragmatist tradition, this research breaks ground in the IP discipline by providing systematic and theory-based research on the formation stage of an information policy for the adoption of a new technology, such as OSS. This research shows that information formation policy processes for the adoption of ICTs, such as OSS, are characterized by competing interests, perspectives, and values held by individuals or groups to advance their economic, political, social, and/or cultural interests.

This study extends the IP literature by underlining the consistency of the findings with some of the theoretical concepts through which this information policy formation process was viewed. The application of these theoretical concepts: Stakeholder attributes (Freeman, 1984; Freeman et al., 2004; Grimble et al., 1995; Mitchell et al., 1997); Frame theory (Rowlands, 1998; Rowlands et al., 2002); Interpretive flexibility and the technology frame (Bijker, 1995; Pinch & Bijker, 1986); and, Ideological approach (Galprin, 2004) contributed to a holistic understanding
of the dynamics and complexities associated with an information policy formation process for OSS.

The study shows that the use of triangulation of theoretical concepts incrementally enhances a holistic understanding of nuances characterizing an evolving dynamic and complex policy process. While the theoretical concepts may overlap in the way the data are viewed, the triangulation of theoretical concepts underscores a significant contribution by creating an understanding of policy formation processes. This study also repudiates the reductionist paradigm that only considers the technological aspects of a technology and diminishes the social, cultural, economic, and political elements that holistically contribute to the description, understanding, adoption, and use of a technology in any social context.

For the purposes of this study, the convergence of the theoretical concepts through which the formative stage of an OSS policy process was viewed, a value-oriented approach, lent itself favorably to underlining a middle-range strategy that would pragmatically integrate elements from the OSS and proprietary models to develop context-specific solutions, enabling the transformation of Ugandans to fully participate in the global economy. To some extent, this study, therefore, serves as confirmatory to previous anecdotal research suggesting that processes of framing new ICTs are profoundly influenced by ideologies of individuals whose attributions of meanings to new ICTs and their adoption are not ahistorical, do not exist in a vacuum, and cannot be viewed as value neutral.

But limiting the scope to an inception stage in the policy formation process restrained the full application of the two elements adopted from the diffusion of innovations theory: innovations pioneers and early adopters and an innovation champion. Thus, all interactions that would typically characterize the entire OSS policy formation process were incomplete. The OSS
The use of descriptive information policy assessment techniques on the ICT environment in Uganda as the first step in an iterative and interactive study process, provided a powerful context and enhanced the research field activities, including face-to-face interviews and the focus group discussion. This study also applied, in a dynamic and unique way, the stakeholder analysis and the frame analysis techniques. For policy formation processes in particular, policy promoters should not only be viewed as the typical key stakeholders, government agencies, and donors that wield influence, importance, power, and resources. Not all reform processes are necessarily promoted by governments and donor agencies. Rather, any group that spearheads a reform process should assume the role of a policy promoter and then work strategically towards persuading key stakeholders to move to their side and support the reform process as this study has showed. The stakeholder analysis technique may be used in this manner in future studies that focus on formative stages of a reform process.

For frame analysis, this is an initial application of this holistic and value-oriented technique in applied information policy research. It facilitated the understanding of the politicization of the policy process and uncovered competing market forces and human-oriented
interests underlying the proposed OSS policy. These facets, especially those that illuminated the politicization of the process would not otherwise been illuminated through a quantitative research approach. Future studies may consider using the technique by sketching contrasting perceptions of stakeholders in a policy process along several dimensions to compare, contrast, and enhance understanding of their viewpoints in an evolving process.

Consistent with the pragmatist tradition, the triangulation of data collection and analysis techniques in an iterative process ensured that this exploratory research offer both theoretical knowledge and practical solutions to contribute to an understanding of the process and to the resolution of the impasse that has impeded the progress of the OSS policy in Uganda.

Recommendations to OSS Policy Promoters

Based upon the data, it is apparent that customization, development, and use of OSS are gaining momentum in Uganda, which bodes well for OSS developers; but, the exploitation of its full potential to benefit the entire country remains in the balance. Camara and Fonseca (2007) suggested that large scale development, diffusion, adoption, and use of OSS to optimize its full potential requires direct government support to champion, invest, and promote the software in any developing country. For Uganda in particular, heavy financial investment in the development and use of OSS by the government is of essence. But to recruit the support of the executive branch, the Parliament, government officials, and the general public to drop their skepticism about OSS, shift their loyalty from proprietary software, and endorse OSS through an act of Parliament will require continuous education and communication about the software from a unified, organized, and well-coordinated body of OSS policy promoters.

This responsibility for OSS promoters is summarized in comments by Participant 14 who remarked, “As OSS promoters, we must unite, form a strong organization under one leadership,
and develop a communication strategy to educate government officials, parliamentarians, donors, and the public about OSS to win support for the policy.” Based upon these statements and the data presented in Chapter 4 that mostly represent the thinking of all OSS policy promoters, a brief communication strategy that highlights key elements is proposed to assist in restoring momentum into the OSS policy process. This strategy also draws from research on stakeholder management that emphasizes communication, education, and information dissemination to gain support, commitment, and continuous participation by stakeholders promoting a policy.

Proposed Communication Strategy

Consistent with the data presented in Chapter 4 and the participants’ statements above, this proposed communication strategy first considers the organization of the OSS promoters into a unified body under one leadership before they can launch a communication and education initiative to recruit support from other stakeholders. Research also suggests that stakeholder management should prioritize and resolve the needs of stakeholder groups that are most likely to be positively or negatively affected by an endeavor because they have the highest interest in the success of an endeavor (Freeman, 1984; Freeman et al., 2004; Friedman et al., 2006; Grimble et al., 1995; Mitchell et al., 1997).

Rabinowitz (2012) and World Bank Group (2012) suggested that if a stakeholder management or communication strategy aims to recruit support to ensure success for an endeavor, each stakeholder group will require specific techniques and different levels of attention. Therefore, the stakeholder management strategy recommended for the OSS policy initiative in Uganda will first focus on stakeholders with high interest and high influence (upper right or quadrant A). See figure 1 on page 247. A Reflection of the Different Stakeholder Groups Presented in a two-by-two Matrix Using the Attributes of Interest and Influence. These
stakeholders would then be followed by those with high influence and low interest (upper left or quadrant D). Stakeholders with high interest and low influence (lower right or quadrant B) will come next while those with low interest and low influence (lower left or quadrant C) will come last.

Strategies to manage OSS promoters. These primary stakeholders include individuals who proposed to the government changes to the existing ICT laws to embrace OSS as an alternative to proprietary software. As promoters, they are the most important stakeholders that will lead the communication and education campaign to win support of other stakeholders to move the OSS policy forward. They are the most economically vested in the policy and must take the responsibility to organize and manage them as a first step before interesting other stakeholders in the process. The overriding goal of the OSS policy promoters is to persuade as many stakeholders as possible to shift their positions, drop their skepticism towards OSS, and join them to support the formal recognition and adoption of the policy in Uganda. See figure 2 on page 252 showing positions of the various stakeholders towards the OSS policy initiative.

The OSS policy promoters should form one umbrella organization and elect a leadership to execute the communication and education process about OSS. The leadership must analyze and decide how much time and energy to spend on other stakeholder categories and draw a plan to execute the communication and education process. The key elements of the communication and education strategy include:

- Expending preliminary efforts on cultivating support, unity, and commitment of all promoters to the policy by providing them with information to increase their knowledge about Uganda’s policy and statutory formation processes;
• Involving all promoters as team players in all processes to sustain their interest and loyalty by educating and converting skeptical promoters to become reliable allies in continuous communication and education about OSS to others;

• Engaging all promoters in efforts to continuously recruit stakeholders in other quadrants to support the initiative and help them understand that continuous participation would benefit them all; and

• Drafting a clear OSS policy blueprint recommending it to government and other key stakeholders, using it in all communication and education events to win support for the initiative and clearly outline the mission, vision, goals, and objectives of the proposed policy.

Pickstock (2007), Rabinowitz (2012), and World Bank Group (2012) suggested that promoters of an endeavor should be constantly involved in the process as a way of cultivating commitment among them, listening to one another and integrating their suggestions into the process, and ensuring that all promoters are not alienated. This would help avoid conflicts among promoters.

Strategies to manage the latents. These are the high influence, low interest stakeholders, key people and organizations with low interest in the endeavor but with high influence, importance, power, and resources with the potential to block the OSS policy. These latents include representatives of the executive branch, such as government officials working with the Ministry of ICT, NITA-U, and UCC, among others, the Parliament and its members, and some donor agencies.

Rabinowitz (2012) stated that because of lack of information and knowledge about an idea, some key stakeholders may act as if the implementation of an endeavor may not affect them. However, if such key stakeholders or the latents are educated and persuaded to support the
endeavor, they are capable of moving the policy process forward if they are assured that the
effort will either benefit them or their political supporters (Rabinowitz, 2012; World Bank
Group, 2012). The leadership of the OSS policy promoters should spend much of its time and
energy by engaging and informing these key stakeholders in quadrant D of Figure 1, about the
policy initiative to purposely develop a good working relationship with them. The recommended
key tasks that OSS policy promoters should execute to win over the support of the latents
include:

- Seek and use their advice regarding policy and law making processes; involve them in
  conceiving, planning, implementing, and evaluating the policy formation process;
- Use success stories of people whose lives have been transformed by OSS to educate these
  key stakeholders, demonstrate how OSS will positively impact them, their political
  constituents, and Uganda’s development goals. As an effective communication tool, use
  stories of people known to some of these stakeholders for maximum effect and to inspire
  the most indifferent of these key stakeholders;
- Assure them that they are true OSS stakeholders by showing them how the policy will
  increase knowledge and skills in schools and communities, how it will enhance
  employment opportunities and software innovations to boost exports, and broaden the tax
  base;
- Invite them to deliver keynote addresses to OSS communities, to open training
  workshops, to officiate at functions that purposely enhance their esteem and respect; and
- Remind them consistently of their contribution towards the attainment of some
  milestones in the policy process.
The OSS promoters should strive to move these key stakeholders from quadrant D in Figure 1 and from the top left axis in Figure 2 to join the promoters in quadrant A in Figure 1 or in the top right side of the axis in Figure 2. If key stakeholders or the latents move from their quadrant D or the top left side on the axes, then policy promoters would have gained the collaboration of critical allies to render their power, influence, and resources to significantly advance a policy initiative (Bowie & Schnieder, 2012; Johnson & Sholes, 2001; Martin & Henderson, 2001; Rabinowitz, 2012; World Bank Group, 2012).

However, since some stakeholders in quadrant D of Figure 1 and in the extreme top left side of the axes in Figure 2 are local agents of proprietary products, there is a possibility that they could pose fierce opposition to the OSS policy initiative and try to block it. Stakeholder groups who may be negative as identified through the data include Microsoft, Oracle, Samsung, Apple, Dell, and Hewlett Packard, among others. Rabinowitz (2012) and World Bank Group (2012) suggest that cognizance of the existence of such potentially opposing forces is the first step in managing their actions.

The leadership of the OSS policy promoters should first find out whether these potentially opposing stakeholders, some of the latents, engage in negative actions or distribute harmful or false information about OSS and the policy initiative.

If the OSS promoters ascertain that these opposing stakeholders are not engaged in any negative campaign against the effort, they should leave them alone. However, if they engage in negative opposition, then the OSS promoters should communicate with them through education to persuade them to appreciate that fair competition in a free ICT market would benefit both sides and all Ugandan ICT users. In case all efforts at persuasion fail, then OSS promoters should continuously counter their negativity with communication rebuttals.
Strategies to manage policy defenders. These are stakeholders with high interest but low influence in the evolving OSS policy. These are mainly primary stakeholders who are interested in the policy but their influence in the process is low. They mainly fall in quadrant B of Figure 1 and in the bottom right of the axes in Figure 2. As primary stakeholders, the OSS policy initiative would impact them directly either positively or negatively. These OSS policy defenders include all OSS communities in Uganda, some savvy OSS users, universities, vocational institutions, some schools, lecturers and instructors. Some of the key recommendations to the OSS promoters to ensure that policy defenders are mobilized to fully and continuously participate in the process and become reliable allies include:

- Engaging and equipping these policy defenders with communication techniques through training and provide them with information to disseminate about OSS to other stakeholders that promoters may not reach;
- Providing these defenders with relevant education to enable them to enhance the policy formation process as a complimentary force in accomplishing policy-related work;
- Fully maximizing the energies and enthusiasm of these policy defenders and avoid neglecting them because they have every reason to work hard for the success of the policy.

Rabinowitz (2012) and World Bank Group (2012) suggested that since these policy defenders include stakeholders that are most affected by an endeavor, policy promoters can only ignore them at their own peril and that of the policy process. These policy defenders are so vested in the process they can be counted on to offer their time to do most of the volunteer work to ensure the progress of an endeavor (Freeman, 1984; Freeman et al., 2004; Friedman & Miles, 2006).
Strategies to manage the apathetics. These are stakeholders with low interest and low influence, people and organizations that may appear least concerned about a policy initiative, whichever way it goes. In the evolving OSS policy, these individuals and institutions, most of them secondary stakeholders, fall in the social and academic interest categories. They include some teachers, students, hospitals, some nongovernmental organizations, and civil societies, among others.

While the OSS policy promoters should not spend as much time and energy on these stakeholders, they should occasionally send them some information about the OSS process as a way of exciting their interest as users and potential supporters in the future. However, care should be taken not to offend these apathetics by virtue of their presence in the community where the policy process is evolving. Friedman and Miles (2006), Rabinowitz (2012), and World Bank Group (2012) suggested that since a policy may only have a slight effect on the apathetics, they require little or no management or communication at all. While policy defenders and apathetics fall in the lower quadrants on either side of the figure 1 and 2 stakeholder maps, policy promoters should never view them as the least educated, poorest, or most vulnerable and irredeemable members of society (Rabinowitz, 2012; World Bank Group, 2012). Policy promoters should instead spare some of their time to help them gain interest and influence in an endeavor (Rabinowitz, 2012; World Bank Group, 2012). This is a recommendation that OSS policy promoters in Uganda should heed.

These recommendations, primarily derived from the data and informed by research on stakeholder analysis, purposely contribute to how OSS policy promoters can strategically communicate with the various stakeholders and positively shift their relationships to the evolving OSS policy. To assure the usefulness of these recommendations to the policy formation process,
implementing the above and timely proposals may help to restore momentum into the stalled process before a new bill on OSS or an amendment to the NITA-U Act of 2009 is introduced in the Parliament.

With these recommendations, OSS policy promoters should competently assess the possibility of approving the policy proposals, how to sustain the communication and education campaign, continuously make some adjustments and improvements in the strategy. This will enable them to overcome opposition, build coalitions, and channel information and resources into areas that will ensure the progress of the process. As stakeholders with the highest interest in the policy, OSS promoters must do more than focus on financial aspects of the software by restoring enthusiasm into the policy process.

Recommendations to the Executive Branch and the Parliament

For nearly two decades, ICTs have played a catalytic role in Uganda’s economic growth and development, a transformative function reinforced by findings from this study. As the first study on the formative stage of an information policy for the formal recognition and adoption of OSS in Uganda, this study recommends that practical and strategic steps should be taken by the government to develop a policy for the adoption of OSS through an Act of Parliament. Such actions will allow the government to support, invest, and promote OSS development to enable Ugandans to acquire technical skills and knowledge to develop solutions, engage in innovations, and sustain software development in the country.

This study recommends a middle-range strategy to pragmatically integrate elements from the OSS and proprietary software development models to develop technologies to facilitate the transformation of the predominantly agrarian Ugandan population to fully participate in the global economy. The recognition by the government that access and use of ICTs as a catalyst to
its goal of attaining a middle income status by 2040 should logically be followed by changing existing ICT laws to embrace OSS. This will partly operationalize the objectives of the National Development Plan and the Vision 2040.

Fully optimized, OSS can add value to existing government policies to increase access and use of ICTs to disseminate information to create employment opportunities, eradicate poverty, improve education, promote democracy through e-government programs, health, and other social services, among others.

The high unemployment rate among the youth in Uganda, which currently stands at 62%, poses a real security threat to the country as a ticking demographic time bomb. This study recommends that this national threat could be defused or mitigated by optimizing opportunities offered by the OSS model that have proven transformative elsewhere in the fast changing ICT environment around the world. Already, policies and efforts to address illiteracy, to develop human resource capacities, and to expand the national information infrastructure are ongoing. Equitable distribution of affordable ICT access and use to benefit the rural population, women, and the youth should be emphasized. These segments of society, which comprise the majority of the population, must be targeted as their demand for ICTs is on the rise and will continue increasing in future.

As the biggest consumer of ICTs, including OSS, the government should consolidate its position by offering leadership in the uptake, diffusion, and development of OSS. The OSS model, in particular, offers potential avenues to create sustainable employment opportunities for the millions of jobless youths to become self-reliant, pay taxes, and contribute to the economic growth and development of Uganda.
The OSS model has enabled individual developers in the private and public sectors to customize, adopt, use, and market OSS solutions without formal recognition through an Act of Parliament. The government should build on this private sector-led momentum in the development of OSS solutions as it appears irreversible. More organizations and educational institutions are taking steps to reduce their software costs by either fully migrating to OSS or gradually developing interoperable systems that use a combination of proprietary and OSS solutions.

The government should extend financial and technical support to private companies enabling them to expand their services and development of OSS solutions to meet the growing local, regional, and global market for these affordable and flexible solutions. Continuous skepticism toward the adoption of OSS as a strategic ICT tool for social transformation may, therefore, dent the government’s historic role of effectively developing a vibrant ICT sector.

The onus is on the government to respond to these privately driven initiatives to strategically intervene in the IT sector, assume a leading role in promoting OSS and financing the formation process of an OSS policy as an Act of Parliament to enable it to favorably compete alongside proprietary software. The government should avoid adopting and implementing ICT practices, policies, and laws that perpetuate dependence on proprietary software to benefit multinational corporations. Rather, it should help the population access and use affordable ICTs, OSS in particular, to participate in the global digital environment.

To ensure fairness in the ICT sector, the government should also reverse the implementation of the technology/software neutrality approach as recommended by OSS stakeholders. Reviewing the technology/software neutrality approach may ensure that OSS and proprietary software receive equal and fair treatment in the ICT market as well as in procurement
processes and procedures to secure public contracts under the law. Unless these recommendations are adopted, it will be long before OSS becomes a strategic ICT tool to merit government action and support. Failure to reverse this approach will also keep Uganda hostage to proprietary software.

As a matter of urgency, the government should prioritize and address the issue of institutional corruption, which has become a huge problem for Uganda, with negative perceptions both within and outside the country increasingly tarnishing the image of the country. The problem of corruption in the public sector has undermined the moral authority of the government leadership in the ICT sector and is negatively impacting investments in the sector. A campaign against corruption and incompetence requires collective efforts through recognizable and enforced measures to combat the vice and change perceptions to restore confidence in government’s ability to lead the country through the transition into the information society.

The Ministry of ICT and NITA-U, the two leading agencies at the forefront of formulating, implementing, and evaluating government ICT policies, need to harmonize their policy mandates to offer clear leadership to the sector without spending scarce public resources by duplicating efforts. For now, the test of their leadership competences, the Ministry of ICT in particular, will be assessed by what recommendations the ongoing review of the national ICT policy will adopt.

The NITA-U Act of 2009 should be amended to integrate recommendations in the National IT Policy of 2010 that recognized the importance of the adoption, development, diffusion, and use of OSS. But NITA-U should lead by example. It should reduce its costs on proprietary software by using OSS in its computing operations and actively promote and enforce the use of OSS as a teaching tool in the implementation of a new school curriculum on computer
studies. As the leading agency in this sector, if NITA-U adopts the use of OSS, its recommendation to the public sector to follow suit will be heeded.

But for NITA-U to execute its wide-ranging mandate, it needs adequate funding from the government to mature from its formative stage, recruit and train the required human resources, coordinate with other government agencies on IT-related matters, set standards for IT-related issues, and make its impact in the IT sector visible and felt. Unless these administrative recommendations are implemented, NITA-U will not be able to lead Uganda towards attaining its goal of being an IT-led developed economy, a middle income country, and transform into an information society.

Recognizing that policy formation processes are inherently turbulent, prone to conflict, and are characterized by contrasting viewpoints as this study has highlighted, stakeholders should understand these contradictions and sometimes volatile tendencies as integral elements of the process. This study recommends, therefore, that stakeholders involved in the evolving OSS Policy Process strategically negotiate with each other, make tradeoffs, resolve impasses, and strive to develop a consensus. These complexities associated with the formation process of an information policy for the adoption and use of any ICT, the new OSS policy for Uganda in particular, create uncertainties and gridlocks in the process that findings from this study should help to resolve.

Additionally, to resolve contesting ideological positions in an information policy formation process, especially for the adoption of ICTs, policy makers involved in such a process need to balance their conflicting interests, perspectives, and values to advance the public good (McClure, Hernon, & Railye, 1989). This is a call ICT stakeholders involved in the OSS policy formation process in Uganda should heed to move the process forward to serve the national
interests. With respect to parliamentary rules of procedure concerning Private Members’ Bills, they should be reviewed to become more egalitarian and parallel national development goals to ensure legitimacy for adopted laws.

Recommendations for Future Research

Rapid changes are taking place within the ICT sector in Uganda that inevitably subject the findings in this study to similar changes. Since this exploratory study pursued an evolutionary process, of necessity, therefore, findings of this research will be subject to continuous update. An ongoing research process to review and bring up to date information about the trends in the ICT sector in Uganda is, therefore, highly recommended to address new developments. Additionally, because stakeholders and their positions may change over the course of negotiations and analyses, stakeholder analysis should remain an ongoing process allowing for an information policy formation process to adjust as more is known about dynamic political realities in the country.

This study adopted a qualitative approach and a case study methodology to support the exploratory and descriptive nature of the research that limits the generalizability of the results and findings to other ICT-adoption contexts. However, a detailed description in the narrative may assist researchers, policy makers, and practitioners to draw meaningful lessons and determine applicability of the findings in other settings.

While it may be plausible that individual and organizational factors that influence stakeholder interests in a new technology could be viewed as revelatory or exemplary, a longitudinal quantitative study with a larger sample to measure the extent to which factors highlighted in this study, if conducted, may yield generalizable results. Such results may explain,
clarify, and further advance frontiers of knowledge regarding an information policy formation process in the adoption of new ICTs.

Future studies should consider collecting statistical stakeholder data to reflect how their attributes can be statistically mapped on a continuum as a measure of their interest into the policy process. Applied as a quantitative research technique, SA assigns values to the interest, influence, power, and potential impact each stakeholder or group of stakeholders may have on an evolving endeavor. Mapping the collected values on a continuum could provide a statistical assessment and understanding of respective stakeholder support for the policy. Variations in the values, low or high, will indicate stakeholder preferences for the policy.

Limitations of the Study

Despite efforts that were undertaken to conduct this research in Uganda, a number of issues remain outstanding. Methodological issues, including the selection of participants from the Kampala metropolitan area, left out stakeholders in upcountry districts where ICT challenges are most pronounced. The researcher could not cover the whole country to collect data due to limited time and resources. Therefore, views from the rural population concerning the impact of the Rural Communication Development Program implemented by the Uganda Communication Commission since 2001 were not collected and assessed. This is an area that future research efforts should address. The limited coverage of this study to primarily city dwellers, therefore, restraints this study from reflecting a total national picture of the impact of existing ICT policies on the population.

Some government bureaucrats, wary of a backlash from their superiors, declined to participate in the study. Also, one member of the executive branch and two Members of Parliament belonging to an opposition political party declined to tape record their interviews for
fear that their positions would be known and, thereby, risk their political positions. Local agents of multinational companies dealing in proprietary software and hardware repeatedly turned down requests from the researcher seeking their participation in the study. Additionally, the researcher could not access and interview some of the key stakeholders as their organizations demanded payment of a fee to involve their employees in the study. The researcher rejected this demand as it was not only primarily contrary to research ethics but because it would be construed as perpetuation of corruption.

This research was limited to inception aspects of the OSS policy initiative, part of an information formation policy process, by ICT stakeholders and the response by government, thus far, to the proposed change in the law to adopt the use of OSS.

The OSS policy initiative in Uganda is in its formative stages (at the inception level); the entire policy formation making processes and structures have not yet been fully exhausted. As a result, data to address research question 5 only highlighted structures and processes that have thus far been associated with the inception of the OSS policy.

This limited scope to an inception stage in the policy formation process also applies to the two elements adopted from the diffusion of innovations theory: innovations pioneers and early adopters and an innovation champion. The OSS policy initiative is at its inception stage (the conception of a policy idea); the entire process in which pioneers and early adopters should maximize existing communication networks to diffuse the idea and recruit an OSS champion has not fully played out. Thus, the two elements through which their activities were to be viewed and examined were limited to this somewhat narrow inception but critical agenda-setting stage of an information policy formation process. Therefore, all interactions that would typically characterize the entire OSS policy formation process were incomplete.
Inevitably, limitations of this research are consistent with the narrow scope to which this study was focused. Overall, this research is a snapshot of the inception of the policy idea, part of an information policy formation stage in Uganda on a specific policy issue. The lackluster response to the policy initiative by the government and the Parliament, thus far, may not be generalized to all other policy proposals. It may be the case that lack of knowledge about OSS by majority of government officials and parliamentarians, and the lack of a communication strategy by the policy promoters has compounded the slow progress of the OSS policy process.

Focusing on the formation stage of an information policy process may not uncover nuances that could impede the next two policy stages, policy implementation and evaluation. Additionally, given the nature of qualitative or naturalistic research that aims to explore, capture and describe a specific phenomenon in a distinct social context, the findings of this study should be applied in other contexts with caution.

Conclusions. This initial theoretical and empirical-exploratory study relating to information and communication technology (ICT) trends in Uganda provides a ground-breaking step in the understanding of information policy formation processes for the adoption of a new ICT, such as OSS. While findings from this study are not generalizable, they provide insights into the dynamics and complexities that characterize an information policy formation process. Such characteristics continuously change as invested stakeholders negotiate trade positions, move towards a consensus, or fail to resolve a gridlock.

Such fluid circumstances may also result from changes in both time and space to impact technologies to become obsolete as new ones emerge, while geographical or geo-political factors may assume more influence and power to shape the policy process. Also, stakeholders may become more familiar with the technology and its utility to national development, change their
minds, or intervening factors that previously influenced their communication behaviors cease to exist and become insignificant in their decision-making processes.

Considering that ICT policymaking, e-strategies, and/or indeed e-government formation and implementation have a relatively brief history in Uganda, and indeed Africa in general, the findings of this study are timely because not many countries in Africa have fully developed an understanding of formulating and implementing policies from a theoretically and empirically based research perspective. Even where some African countries have developed ICT-related policies, especially those for the adoption of OSS, they have endured long, tedious, little understood, and dysfunctional processes. South Africa is an indicative case of a tumultuous OSS-related policy implementation process (Mtsweni & Biermann, 2008).

For Uganda, since neighboring Kenya adopted an OSS policy in 2012 and launched a 10-billion-dollar African Silicon Savannah project to champion ICT development and use in Africa, the powers in Uganda may rouse and meaningfully lend their support and encouragement to local OSS hardware and software development initiatives. Other African countries in formative stages of information policy development for the adoption of OSS and other new technologies as well as those contemplating to formulate such policies should find useful information in this study to draw lessons applicable to their contexts.

While OSS offers great potential to benefit Uganda, the formal adoption of the software, if not strategically prioritized, the country could lag behind its regional neighbors and become the regional laggard in a digital wave sweeping through Africa, and East Africa in particular. East Africa has increasingly become an attractive destination where exciting IT developments are taking place. One of the previous global digital followers, neighboring Kenya, has taken bold steps to attract top global ICT developers to invest in the country, turn its fortunes around, and is
emerging as the center of data entrepreneurship on the African continent (Smith, 2012; The East African, 2013).

This momentum has not left OSS developers in Kenya behind either. They are also customizing OSS solutions and making tremendous contributions to a digital environment that had previously relegated them to a status of an observer (Smith, 2012; The East African, 2013). These developments in the region represent a digital momentum of significant magnitude to which the Ugandan government must stop and pay attention. While this study serves as confirmatory for earlier anecdotal research in this area, it also emphasizes the short history of ICTs in Africa where by 2003, only about a third of African countries had developed ICT-related policies (Business Monitoring International, 2012c, 2013a; Lange, 2012).

Chapter summary. This chapter presented a summary of the study, offered answers to the overarching and the five specific research questions, and highlighted the findings of the study. While highlighting the implications of this study, its practical benefits or significance to policy makers and OSS policy promoters as well as the contribution of the study to the information policy discipline were underlined. The chapter presented recommendations that could help to advance the process for the formal adoption of OSS in Uganda. The recommendations aimed to assist the OSS policy promoters, the executive branch, and the Parliament to overcome some of the challenges currently derailing the policy. The chapter underlined the contributions of the research to ICT professionals and policy makers involved in policy formation processes for the adoption of new ICTs, such as OSS, in contexts similar to those pertaining in Uganda. The chapter suggested some recommendations for future research, highlighted limitations of this study, provided some conclusions, and presented a chapter summary.
APPENDIX A

IRB LETTER OF APPROVAL
April 13, 2012

Supervising Investigator: Dr. William Moon
Student Investigator: Samuel Muyangiri
Department of Library and Information Sciences
University of North Texas

Re: Human Subjects Application No. 12181

Dear Dr. Moon:

As permitted by federal law and regulations governing the use of human subjects in research projects (45 CFR 46), the UNT Institutional Review Board has reviewed your proposed project titled “The Adoption of Open Source Software by Uganda: A Pragmatist Approach to the Formation of a National Information Policy for a New Technology.” The risks inherent in this research are minimal, and the potential benefits to the subject outweigh these risks. The submitted protocol is hereby approved for the use of human subjects in this study. Federal Policy 45 CFR 46.109(e) stipulates that IRB approval is for one year only, April 13, 2012 to April 12, 2013.

Enclosed is the consent document with stamped IRB approval. Please copy and use this form only for your study subjects.

It is your responsibility according to U.S. Department of Health and Human Services regulations to submit annual and terminal progress reports to the IRB for this project. The IRB must also review this project prior to any modifications.

Please contact Sheila Bounce, Research Compliance Analyst, or Boyd Herndon, Director of Research Compliance, at extension 3240, if you wish to make changes or need additional information.

Sincerely,

Patricia L. Karinski, Ph.D.
Associate Professor
Department of Psychology
Chair, Institutional Review Board

UNT
UNIVERSITY OF NORTH-Texas
Discover the power of ideas.

OFFICE OF THE VICE PRESIDENT FOR RESEARCH AND ECONOMIC DEVELOPMENT

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APPENDIX B

IRB LETTER OF EXTENSION
Supervising Investigator: Dr. William Moen
Student Investigator: Samuel Muwanguzi
Department of Library and Information Sciences
University of North Texas

RE: Human Subjects Application No. 12181

Dear Dr. Moen:

The UNT Institutional Review Board has reviewed and approved the extension you requested to your project titled "The Adoption of Open Source Software by Uganda: A Pragmatist Approach to the Formation of a National Information Policy for a New Technology." Your extension period is for one year, April 13, 2013 through April 12, 2014. Federal policy 45 CFR 46.109(e) stipulates that IRB approval is for one year only.

Enclosed is the consent document with stamped IRB approval. Please copy and use this form only for your study subjects.

It is your responsibility according to U.S. Department of Health and Human Services regulations to submit annual and terminal progress reports to the IRB for this project. The IRB must also review this project prior to any modifications. If continuing review is not granted before April 12, 2014, IRB approval of this research study expires on that date.

Please contact Shelia Bourns, Research Compliance Analyst, or Boyd Herndon, Director of Research Compliance at extension 3940, if you wish to make changes or need additional information.

Sincerely,

Patricia L. Kaminski, Ph.D.
Associate Professor
Chair, Institutional Review Board
PK:sh
University of North Texas Institutional Review Board

Informed Consent Form

Before agreeing to participate in this research study, it is important that you read and understand the following explanation of the purpose, benefits and risks of the study and how it will be conducted.


Student Investigator: Samuel Muwanguzi, University of North Texas (UNT) Department of Library & Information Sciences. Supervising Investigator: Dr. William F. Moen.

Purpose of the Study: The purpose of this study is to investigate, identify, and describe the various information and communication technology (ICT) stakeholders in Uganda, describe their knowledge about Open Source Software (OSS) technology, and their competing interests in the formation of a new ICT policy for the adoption and use of OSS by Uganda. This follows a proposal by the ICT stakeholders to the government of Uganda to develop a new ICT policy that would formalize the use of OSS technology as an alternative to proprietary software.

The study aims to examine and highlight the unpredictable factors and multiple interests associated with an information policy formation process for the adoption of OSS by Uganda. The goal is to generate information to help create a thorough understanding of the changing factors and interests associated with information policy formation processes in Uganda. The study also aims to provide relevant information about OSS for Uganda’s policy makers to render informed decisions on the formation of a national information policy for the adoption and use of OSS.

Study Procedures: You will be asked to participate in a face-to-face interview with the principal investigator and in a focus group discussion with four to five other study participants conducted by the principal investigator. Each face-to-face interview and focus group discussion will be tape-recorded. Some participants who may choose not to be tape-recorded will also be allowed to participate in the study. Each face-to-face interview will last approximately 60 minutes while each focus group discussion will last approximately 90 minutes of your time.

Foreseeable Risks: No foreseeable risks are involved in this study.

Benefits to the Subjects or Others: As Ugandans interested in the development of the ICT sector to positively change the lives of the population and leapfrog the country into the information society, I expect this study to provide relevant information that may facilitate the formation of a comprehensive and integrated information policy for the adoption and use of the new Open Source Software technology that is consistent with the development goals of the country. The study may result in the development of a policy that will formalize the adoption and use of OSS to enable ICT stakeholders and end-users in Uganda to access and use an alternative
and affordable software technology. The outcomes of the study may facilitate Ugandans to acquire the necessary knowledge and skills to customize and use OSS products to bridge the digital divide, advance into the information society, and benefit from opportunities offered by the digital-driven global economy. The study may also benefit my field of study by presenting new qualitative information to better understand the unpredictable and multiple factors and interests associated with an information policy formation process for the adoption and use of a new technology such as OSS.

**Compensation for Participants:** No compensation will be received for participating in this study.

**Procedures for Maintaining Confidentiality of Research Records:** The confidentiality of your individual information will be strictly maintained in any publications or presentations regarding this study. Data from individual interviews and focus groups will not be associated with the name of the person who provided the data. No names or other identifying information will be associated with direct quotes or paraphrased information from interviews and focus group discussions. As interviewees and focus group participants, you will be assigned identifying letters and numbers, which will be used in transcripts rather than actual names. After transcribing and coding the data, cassette tapes, transcribed, and coded materials will be stored in secure, safe, and in separate locations where they will not be accessed by anybody except me. Apart from demographic information, your names will not appear anywhere in the research materials.

The table of demographic information connecting identifying letters and numbers will be stored separately from transcripts and recordings. I will destroy the tapes and other research materials after three years in accordance with United States government federal regulations. Apart from my dissertation advisor, I will not disclose the contents of my research materials to anybody. The purpose of disclosing the material to my Advisor will be to seek guidance on how to better interpret the data more effectively.

**Questions about the Study:** If you have any questions about the study, you may contact Samuel Muwanguzi: (817) 204 7689 or at: samuelmuwanguzi@my.unt.edu or Dr. William E. Moen at: William.moen@unt.edu

**Review for the Protection of Participants:** This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT IRB can be contacted at (940) 565-3940 with any questions regarding the rights of research subjects.

**Research Participants' Rights:** Your signature below indicates that you have read or have had read to you all of the above and that you confirm all of the following:

- Samuel Muwanguzi has explained the study to you and answered all of your questions. You have been told the possible benefits and the potential risks and/or discomforts of the study.
• You understand that you do not have to take part in this study, and your refusal to participate or your decision to withdraw will involve no penalty or loss of rights or benefits. The study personnel may choose to stop your participation at any time.
• You understand why the study is being conducted and how it will be performed.
• You understand your rights as a research participant and you voluntarily consent to participate in this study.
• You have been told you will receive a copy of this form.

Printed Name of Participant

Signature of Participant
Date

For the Student Investigator:

I certify that I have reviewed the contents of this form with the subject signing above. I have explained the possible benefits and the potential risks and/or discomforts of the study. It is my opinion that the participant understood the explanation.

Signature of Student Investigator
Date

APPROVED BY THE UNT IRB
FROM 4/13/13 TO 4/12/14

Office of Research Services
University of North Texas
Last Updated: July 11, 2011
APPENDIX C

LETTER OF INVITATION
Invitation Letter for non-UNT participants

Greetings:

My name is Samuel Muwanguzi, a Ph.D. student in the department of Library and Information Sciences in the College of Information, at the University of North Texas (UNT). I am conducting research for my dissertation on the proposed change of the existing information and communication technology (ICT) policy to develop a new policy to formalize and recognize the use of Open Source Software (OSS) technology as an alternative to proprietary software.

Since you are an individual who is very knowledgeable about ICTs and who is also a key stakeholder in the ICT sector in Uganda, I would very much like to talk with you about the research I am conducting. Specifically, I am writing to invite you to participate in a face-to-face interview and a focus group discussion on the proposed OSS policy initiative by the ICT stakeholders in Uganda to be scheduled during the month of May 2012 in Kampala, Uganda.

While the proposed OSS policy initiative by ICT stakeholder is in its formative stage, I recognize that policy makers (executive and legislature or parliament), government bureaucrats, and other ICT stakeholders in Uganda may require pertinent information about the adoption of the new OSS technology, which may not be readily available, to help inform their policy decisions.

Since the purpose of the policy initiative is to streamline the ICT sector in Uganda, facilitate the development of OSS by a pool of OSS experts in the country, enable Uganda to probably bridge the digital divide, and facilitate the population to optimize opportunities in the ICT-driven global economy, I invite you to share your perspectives on these issues of national interest.

Given the importance of ICTs in national development, I am conducting face-to-interviews and focus group discussions to get your input about the policy proposal. Your input is important for the formation of an inclusive and coherent information policy for the adoption and use of OSS technology by Uganda.

Results of the interview and discussion with you will lead to a better understanding of the dynamics and complexities associated with the adoption and use of OSS technology and provide relevant information needed to develop a coherent and integrated OSS policy consistent with Uganda’s development goals. The face-to-face interview and focus group discussion will be conducted in Kampala, Uganda and will last approximately 60 and 90 minutes respectively.

During the interview and focus group discussion, I will ask you questions to which you will provide answers and freely share your perspectives on the characteristics of OSS technology and the prospects by Uganda to recognize and adopt its use. The interview and focus group discussions will be tape-recorded and later transcribed for analysis.

Since this is an entirely academic project with no commercial interests involved, your participation will be entirely voluntary and no monetary compensation for your participation will be provided.
Could you please respond to me via email at samuelmuwanguzi@my.unt.edu, indicating whether you will be able to voluntarily participate in the interview and focus group discussion in May 2012 on some dates and times that work best for you? I will confirm the dates and send you further information. Please feel free to contact me if you have any questions. I am looking forward to hearing back from you confirming your interest and willingness to participate in this research on the critical ICT sector in Uganda.

Thank you.

Samuel Muwanguzi
APPENDIX D

INFORMED CONSENT FORM

Student Investigator: Samuel Muwanguzi, University of North Texas (UNT) Department of Library & Information Sciences. Supervising Investigator: Dr. William E. Moen.

Purpose of the Study: The purpose of this study is to investigate, identify, and describe the various information and communication technology (ICT) stakeholders in Uganda, describe their knowledge about Open Source Software (OSS) technology, and their competing interests in the formation of a new ICT policy for the adoption and use of OSS by Uganda. This follows a proposal by the ICT stakeholders to the government of Uganda to develop a new ICT policy that would formalize the use of OSS technology as an alternative to proprietary software. The study aims to examine and highlight the unpredictable factors and multiple interests associated with an information policy formation process for the adoption of OSS by Uganda. The goal is to generate information to help create a thorough understanding of the changing factors and interests associated with information policy formation processes in Uganda. The study also aims to provide relevant information about OSS for Uganda’s policy makers to render informed decisions on the formation of a national information policy for the adoption and use of OSS. The goal is to contribute practical, theoretical, and methodological knowledge towards policy formation processes for the adoption of OSS and other new technologies in diverse contexts and on research in the Information Policy discipline. The study seeks to address the overarching question: What are the basic interests of ICT stakeholders in Uganda to propose a new policy for the recognition and adoption of OSS as an alternative choice alongside proprietary software?

Study Procedures: You will be asked to participate in a face-to-face interview with the principal investigator and in a focus group discussion with four to five other study participants conducted by the principal investigator. Each face-to-face interview and focus group discussion will be tape-recorded. Some participants who may choose not to be tape-recorded will also be allowed to participate in the study. Each face-to-face interview will last approximately 60 minutes while each focus group discussion will last approximately 90 minutes of your time.

Foreseeable Risks: No foreseeable risks are involved in this study.

Benefits to the Subjects or Others: As Ugandans interested in the development of the ICT sector to positively change the lives of the population and leapfrog the country into the information society, I expect this study to provide relevant information that may facilitate the formation of a comprehensive and integrated information policy for the adoption and use of the new Open Source Software technology that is consistent with the development goals of the country. The study may result in the development of a policy that will formalize the adoption and use of OSS to enable ICT stakeholders and end-users in Uganda to access and use an alternative and
affordable software technology. The outcomes of the study may facilitate Ugandans to acquire
the necessary knowledge and skills to customize and use OSS products to bridge the digital
divide, advance into the information society, and benefit from opportunities offered by the
digital-driven global economy. The study may also benefit my field of study by presenting new
qualitative information to better understand the unpredictable and multiple factors and interests
associated with an information policy formation process for the adoption and use of a new
technology such as OSS.

Compensation for Participants: No compensation will be received for participating in this study.
Procedures for Maintaining Confidentiality of Research Records: The confidentiality of your
individual information will be strictly maintained in any publications or presentations regarding
this study. Data from individual interviews and focus groups will not be associated with the
name of the person who provided the data. No names or other identifying information will be
associated with direct quotes or paraphrased information from interviews and focus group
discussions. As interviewees and focus group participants, you will be assigned identifying
letters and numbers, which will be used in transcripts rather than actual names. After transcribing
and coding the data, cassette tapes, transcribed, and coded materials will be stored in secure,
safe, and in separate locations where they will not be accessed by anybody except me. Apart
from demographic information, your names will not appear anywhere in the research materials.
The table of demographic information connecting identifying letters and numbers will be stored
separately from transcripts and recordings. The digital recordings and other research materials
will be destroyed after three years in accordance with United States government federal
regulations. Apart from my dissertation advisor, I will not disclose the contents of my research
materials to anybody. The purpose of disclosing the material to my Advisor will be to seek
guidance on how to better interpret the data more effectively.

Questions about the Study: If you have any questions about the study, you may contact Samuel
Muwanguzi at: samuelmuwanguzi@my.unt.edu or Dr. William E. Moen at:
William.moen@unt.edu

Review for the Protection of Participants: This research study has been reviewed
and approved by the UNT Institutional Review Board (IRB). The UNT IRB can
be contacted at untirb@unt.edu with any questions regarding the rights of
research subjects.

Research Participants’ Rights: Your signature below indicates that you have read
or have had read to you all of the above and that you confirm all of the following:

- **Samuel Muwanguzi** has explained the study to you and answered all of
  your questions. You have been told the possible benefits and the potential
  risks and/or discomforts of the study.
- You understand that you do not have to take part in this study, and your
  refusal to participate or your decision to withdraw will involve no penalty
  or loss of rights or benefits. The study personnel may choose to stop your
  participation at any time.
- You understand why the study is being conducted and how it will be
  performed.
• You understand your rights as a research participant and you voluntarily consent to participate in this study.
• You have been told you will receive a copy of this form.

____________________________________
Printed Name of Participant

____________________________________                                ___
Signature of Participant                                   Date

For the Student Investigator or Designee: I certify that I have reviewed the contents of this form with the subject signing above. I have explained the possible benefits and the potential risks and/or discomforts of the study. It is my opinion that the participant understood the explanation.

____________________________________
Signature of Student Investigator  Date
APPENDIX E

PROTOCOL FOR FACE-TO-FACE INTERVIEWS
INTRODUCTION
SECTION ONE

Dear Participants,

I want to thank you for accepting to participate in this study and for sacrificing your precious time to share your perspectives in this interview on the proposed OSS policy by Uganda. My name is Samuel Muwagingzi, a Ph.D. student at the University of North Texas, Denton, USA. I am conducting this interview to generate information about the proposed formation of a new ICT policy for the recognition, adoption, and use of Open Source Software (OSS) by Uganda.

The new ICT policy was proposed by software stakeholders to the government of Uganda in 2008. I want to generally seek your understanding and knowledge about OSS—history, development model, philosophy, OSS movements, diffusion, use, benefits, setbacks, impacts, etc. More particularly, I want to seek your perspectives on the proposed new ICT policy for the recognition, adoption, diffusion, and use of the new OSS technology by Uganda as an alternative to proprietary software.

I also want you to share your knowledge about how your fellow ICT professionals, users, other stakeholders, organizations, institutions, the government of Uganda, and the global OSS community understand, diffuse, use, and promote the new OSS technology. More importantly, I would like you to share your thoughts on how ICT professionals, political and opinion leaders, government bureaucrats, Non-Governmental Organizations (NGOs), software vendors, the various stakeholders in the ICT sector, and the end-users access and use OSS, how they customize it, and their attitudes towards OSS. Also, I also wish to discuss with you how the entire country is using OSS, how the technology is benefiting it, how they maintain the technology, and how they adjust or migrate to OSS from proprietary software and why.

This interview will cover four major topics regarding OSS: (1) Knowledge and perceptions about the new OSS technology; (2) the identification and description of ICT stakeholders in Uganda and their interests in the proposed policy for the adoption of OSS as an alternative to proprietary software; (3) the implications of OSS adoption by Uganda, e.g. benefits, development, diffusion, and limitations; and (4) the legislative structures and processes in Uganda. This interview will last about one hour. Your participation in this interview is completely voluntary, and you do not have to answer any questions you do not want to answer.

INFORMED CONSENT FORM

Before we start the interview, I request you to listen to me as I read to you contents in this informed consent form, you will also take a few minutes to read and understand the contents, and if you accept to voluntarily participate in this study, sign it and I will counter sign so that we get started.
SECTION TWO
DEMOGRAPHIC INFORMATION FORM

Before we start the interview, I will take a few minutes to complete this brief form which asks for some demographic information about you. I will not write your name on the form but I will assign it a letter and number, such as P1, P2, etc.

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<td>Employment institution or workplace:</td>
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<td>Affiliations /professional organizations:</td>
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<td>Length of time you have used computers:</td>
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<td>When was the first time you heard about OSS?</td>
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<td>Length of time using OSS:</td>
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<td>Length of time in OSS development:</td>
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SECTION THREE
RESEARCH QUESTIONNAIRE

This section comprises of open-ended questions that require you to describe, in great detail, your understanding and knowledge about OSS—history, development model, philosophy, OSS movements, diffusion, use, benefits, limitations, impact in Uganda and around the world, etc. As much as possible, try to remember your impressions the very first time you heard about OSS and the first time you witnessed its use in Uganda. Recall your initial reaction, the reaction from ICT professionals, and government response to OSS and its use in government departments.

The main focus will be on your knowledge about OSS, the history of OSS in Uganda, its current levels of use around the country and the world, and the proposal by ICT stakeholders to the government of Uganda to develop a new OSS policy. Of equal importance too, is how ICT stakeholders in Uganda and yourself as an ICT professional/stakeholder are involved in the proposed OSS policy formation process, its implications, and the response thus far, by government, legislature, bureaucrats, and other associated ICT stakeholders to the proposed policy initiative.

Knowledge & Perceptions About OSS Technology
1. Describe in detail your personal understanding and knowledge about OSS technology.
2. What is so special about the use of OSS that proprietary software cannot accomplish in Uganda to merit the formation of a new policy to formally recognize and adopt OSS?
3. How prepared are Ugandan ICT professionals to undertake migration to new OSS platforms or applications and maintenance of the software as recurring requirements?
Stakeholder Identification, Interests, & Associations
1. Who are the major proponents of a new policy by Uganda to recognize, adopt, and use the new OSS technology as alternative software alongside proprietary software?
2. What are the strongest reasons that compelled ICT stakeholders in Uganda to propose to the government to change the existing ICT policy to pave way for the formal adoption and use of OSS alongside proprietary software?
3. Which organizations and institutions, local or foreign, strongly support the process for the formation of the new policy to recognize, adopt, diffuse, and use the new OSS technology by Uganda?
4. How do the various ICT stakeholders expect to benefit from the proposed OSS policy by Uganda?

Implications of OSS Adoption—benefits, Development, & Limitations
1. What do you think would be the social, cultural, economic, and political implications of OSS adoption and use in Uganda?
2. How can the proposed policy on the adoption of OSS be integrated with existing ICT policies to foster Uganda’s national development goals?
3. Which factors exist in the country that favors the adoption, diffusion, and use of the new OSS technology? Which factors do you think may impede the adoption and use of OSS?
4. What impact can the adoption and use of OSS have on Uganda’s ICT strategy to bridge the digital divide and transform into an information society?

Legislation Structures & Processes in Uganda
1. Why has the formation of a new policy for the recognition, adoption and use of OSS technology by Uganda taken so long to materialize since it was proposed to government by ICT stakeholders in 2008?
2. What efforts have ICT stakeholders undertaken to educate and lobby the executive, legislature, bureaucracy, and the civil society to support the new OSS policy initiative?
3. How should delays and other shortcomings in the formation of policies and laws in Uganda be overcome?
4. What do you think should be done to improve the legislative structures and processes in Uganda to ensure that formulated policies gain national support and benefit all Ugandans?
5. What other comments or suggestions do you wish to share regarding the formation of a policy to formalize the recognition, diffusion, and use of OSS in Uganda?

Thank you for sacrificing your time to contribute to this study.
APPENDIX F

PROTOCOL FOR THE FOCUS GROUP DISCUSSION
INTRODUCTION

SECTION ONE

Dear Participants,

I want to thank you for sacrificing your precious time to come for this group discussion. My name is Samuel Muwanguzi, a Ph.D. student at the University of North Texas, Denton, USA. I am conducting this focus group discussion to generate information about the formation process for an ICT policy for the recognition, adoption, and use of Open Source Software (OSS) proposed by software stakeholders to the government of Uganda in 2008. I want to discuss with you your knowledge and utility about OSS in Uganda and in any other locale. I especially want you to share your knowledge about the adoption, diffusion, use, and development processes of the new OSS technology compared with proprietary software.

You will also discuss how you’re fellow ICT professionals, users, other stakeholders, organizations, institutions, the government of Uganda, and the global OSS community understands, diffuse, use, and promote the new OSS technology. More importantly, I would like you to share your thoughts on how ICT professionals, political and opinion leaders, government bureaucrats, Non-Governmental Organizations (NGOs), software vendors, the various stakeholders in the ICT sector, and the end-users access and use OSS. You will also share your knowledge about how the various users of OSS customize it, and their attitudes towards OSS. I also wish to discuss with you how Ugandans are using OSS, how the technology is benefiting them, how they maintain the technology, and how they migrate to OSS from proprietary software and why.

This group discussion will cover four major topics regarding OSS: (1) Knowledge and perceptions about the new OSS technology; (2) the identification and description of ICT stakeholders in Uganda and their interests in the proposed policy for the adoption of OSS as an alternative to proprietary software; (3) the implications of OSS adoption by Uganda, e.g. benefits, development, diffusion, and limitations; and (4) the legislative structures and processes in Uganda. This discussion will last about one hour. No one outside this group will know your specific answers to any of the questions asked.

Your participation in this group discussion is completely voluntary, you do not have to answer any questions you do not want to answer, and you can leave at any time if you decide you do not want to participate. This discussion is an opportunity for each of you to share your thoughts and opinions. You are encouraged not to share information that will make you uncomfortable. You do not have to share personal stories or experiences if you do not want to. If you decide to discuss your own experiences, do so in a way that makes you feel as comfortable as possible. I am here to make sure we fully discuss each topic and ensure that everyone gets an opportunity to speak, so please talk to one another and don’t worry about talking specifically to me.

RULES OF PROCEDURE

1. There will be no criteria to determine an answer as right or wrong.
2. You don’t have to agree with what anyone else says.
3. Respect each other and give anyone a chance to speak.
4. What we talk about in this room must stay in this room.

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INFORMED CONSENT FORM
Before we start our discussions, I request you to listen to me as I read to you contents in this informed consent form. You will also take a few minutes to read and understand the contents and if you accept to voluntarily participate in the discussion, sign it and I will counter sign so that we get started.

ICE BREAKER
I would like to begin by going around asking each of you to introduce yourself by your first name only, and then say a few words about what you do for a living and in your free time.

RESEARCHER/MODERATOR
As much as possible, try to remember your impressions the very first time you heard about Open Source Software (OSS) and the first time you witnessed its use in Uganda. Recall your initial reaction, the reaction from ICT professionals, and government response to OSS and its use in government departments. Our main focus will be on knowledge about OSS, its utility compared with proprietary software, the history of OSS in Uganda, its current levels of use around the country, and the proposal by ICT stakeholders to the government of Uganda to develop a new policy to recognize, and adopt the use of OSS as an alternative to proprietary software. Of equal importance too, is how ICT stakeholders in Uganda and yourself as an ICT professional/stakeholder are involved in the proposed OSS policy formation process, and the response thus far, by government, legislature, bureaucrats, and other associated ICT stakeholders to the proposed policy initiative.
SECTION TWO
DEMOGRAPHIC INFORMATION FORM
Before we start the focus group discussion, I will take a few minutes to complete this brief form which asks for some demographic information about you. I will not write your name on the form but I will assign it a letter and number, such as P1, P2, etc.

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SECTION THREE
RESEARCH QUESTIONNAIRE
This section comprises of open-ended questions that require you to describe, in great detail, your understanding and knowledge about OSS—history, development model, philosophy, OSS movements, diffusion, use, benefits, limitations, impact in Uganda and around the world, etc. As much as possible, try to remember your impressions the very first time you heard about OSS and the first time you witnessed its use in Uganda. Recall your initial reaction, the reaction from ICT professionals, and government response to OSS and its use in government departments.

The main focus will be on your knowledge about OSS, the history of OSS in Uganda, its current levels of use around the country and the world, and the proposal by ICT stakeholders to the government of Uganda to develop a new OSS policy. Of equal importance too, is how ICT stakeholders in Uganda and yourself as an ICT professional/stakeholder are involved in the proposed OSS policy formation process, its implications, and the response thus far, by government, legislature, bureaucrats, and other associated ICT stakeholders to the proposed policy initiative.

Knowledge &Perceptions About OSS Technology
1. Describe in detail your personal understanding and knowledge about OSS technology.
2. What is so special about the use of OSS that proprietary software cannot accomplish in Uganda to merit the formation of a new policy to formally recognize and adopt OSS?
3. How prepared are Ugandan ICT professionals to undertake migration to new OSS platforms or applications and maintenance of the software as recurring requirements?

Stakeholder Identification, Interests, & Associations
1. Who are the major proponents of a new policy by Uganda to recognize, adopt, and use the new OSS technology as alternative software alongside proprietary software?
2. What are the strongest reasons that compelled ICT stakeholders in Uganda to propose to the government to change the existing ICT policy to pave way for the formal adoption and use of OSS alongside proprietary software?
3. Which organizations and institutions, local or foreign, strongly support the process for the formation of the new policy to recognize, adopt, diffuse, and use the new OSS technology by Uganda?
4. How do the various ICT stakeholders expect to benefit from the proposed OSS policy by Uganda?

Implications of OSS Adoption—benefits, Development, & Limitations
1. What do you think would be the social, cultural, economic, and political implications of OSS adoption and use in Uganda?
2. How can the proposed policy on the adoption of OSS be integrated with existing ICT policies to foster Uganda’s national development goals?
3. Which factors exist in the country that favors the adoption, diffusion, and use of the new OSS technology? Which factors do you think may impede the adoption and use of OSS?
4. What impact can the adoption and use of OSS have on Uganda’s ICT strategy to bridge the digital divide and transform into an information society?

Legislation Structures & Processes in Uganda
1. Why has the formation of a new policy for the recognition, adoption and use of OSS technology by Uganda taken so long to materialize since it was proposed to government by ICT stakeholders in 2008?
2. What efforts have ICT stakeholders undertaken to educate and lobby the executive, legislature, bureaucracy, and the civil society to support the new OSS policy initiative?
3. How should delays and other shortcomings in the formation of policies and laws in Uganda be overcome?
4. What do you think should be done to improve the legislative structures and processes in Uganda to ensure that formulated policies gain national support and benefit all Ugandans?
5. What other comments or suggestions do you wish to share regarding the formation of a policy to formalize the recognition, diffusion, and use of OSS in Uganda?

Thank you for sacrificing your time to contribute to this study.
APPENDIX G

LIST OF ABBREVIATIONS AND FULL EXPLANATIONS
• Wk Pl. Work Place
• Yrs: Years
APPENDIX H

CODEBOOK
The Adoption of Open Source Software (OSS) in Uganda: A Pragmatist Approach to the
Formation of a National Information Policy for a New Technology

1. Historical Context (HC)
   1.1. This comprised of information describing the historical evolution of the ICT sector in Uganda; the state of the sector in the 1990s, the policy instruments that facilitated the establishment of this vibrant and private sector-driven industry, the various stakeholders and their multiple interests, and the role of the government in guiding the development of the nascent sector.
   1.2. State of ICT sector in 1990s
   1.3. Conceptualization of ICTs
   1.4. Facilitation versus intervention
   1.5. Private investors and government incentives
   1.6. Position of citizens as ICT users
   1.7. Rapid growth and dynamism of ICT sector
   1.8. Contribution of ICT sector to national economy

2. Key Policy Instruments (KPI)
   2.1. Missions and visions of ICT instruments
   2.2. Goals and objectives of ICT instruments
   2.3. Mandates or functions of ICT instruments
   2.4. Implementation of policy instruments
   2.5. Impacts on the social, economic, political, technological, and cultural environment.
   2.6. Major strategic interventions by the government that facilitated the rapid growth and development of the ICT sector.
   2.7. Who benefited and who didn’t benefit from such interventions
   2.8. Evidence of value and ideological orientations
   2.9. Contradictions of ideologies and interests of multiple stakeholders

3. Emerging issues (EI)
   3.1. This refers to emerging issues since the evolution of the ICT sector in Uganda from the early 1990s.
   3.2. Positive aspects of the ICT instruments
   3.3. Evidence of ICT access and use in the country
   3.4. Automation of service delivery on population
   3.5. Communication and networking with global communities
   3.6. Formation of IT sector & recognition of OSS as low cost software
   3.7. Emergence of OSS policy proposal.
   3.8. Ambiguities in ICT instruments
   3.9. Unfavorable conditions to OSS diffusion and development
   3.10. Favorable conditions for proprietary software dominance
   3.11. Evidence of growing use of OSS in the country
   3.12. Differences between policies and Acts of Parliament
   3.13. Making sense of policy structures and processes
   3.14. Understanding law-making structures and processes

4. Participant Id Number (PIN)
   This refers to a unique number assigned to a participant
5. Knowledge and Perception of OSS (KP)
   5.1. This refers to how interviewees and participants described, defined, and understood
       OSS, how they assigned meanings to the OSS model, how they compared OSS with
       proprietary software, how they described the unique features and benefits of OSS,
       including technological, economic, social, educational, and political over proprietary
       software.
   5.2. Knowledge about OSS
   5.3. Description and meaning
   5.4. History of OSS and global use
   5.5. Uniqueness of OSS model
   5.6. Benefits of OSS model
   5.7. Benefits of OSS
   5.8. Global impact of OSS
   5.9. Distinction from proprietary software
   5.10. Limitations of OSS
   5.11. Ignorance about OSS
   5.12. Necessity for OSS adoption
   5.13. OSS access & use in Uganda
   5.14. OSS expertise in Uganda
   5.15. Readiness of Uganda to adopt OSS
   5.16. Challenges to OSS use and development

6. Stakeholder Identification, Interests, and Affiliations (SIIA)
   6.1. This refers to how the data revealed the identities, attributes, and categories of OSS
       stakeholders in Uganda, their description, underlying interests in the outcomes of the
       OSS policy initiative, their levels of interests, involvement, their affiliations, and how
       the data revealed national and international organizations and corporations that support
       and oppose the proposed OSS policy.
   6.2. OSS proponents
   6.3. OSS skeptics
   6.4. OSS opponents
   6.5. OSS policy promoters
   6.6. Primary stakeholders
   6.7. OSS proprietors
   6.8. Internet Service Providers (ISPs)
   6.9. Telecom corporations
   6.10. OSS developers
   6.11. OSS communities
   6.12. Universities and tertiary institutions
   6.13. Lecturers and instructors
   6.14. Extensive information about OSS
   6.15. Secondary stakeholders
   6.16. Hospitals and NGOS
   6.17. Schools and students
   6.18. Key stakeholders
   6.19. Executive branch
   6.20. The Parliament
6.21. Government agencies
6.22. Donors agencies
6.23. OSS policy opponents
6.24. Vendors of proprietary software
6.25. OSS policy rationale
6.26. Freely available and affordable
6.27. Interoperable software
6.28. Superior security features
6.29. National support
6.30. National opposition
6.31. Government ambivalence
6.32. External support
6.33. External opposition

7. Stakeholder Attributes and Affiliations (SIA)
7.1. This refers to the degree of interest, including economic, social, educational and political
    the multiple stakeholders had in the proposed OSS policy in addition to organizations
    they were affiliated with or those they were reasonably assumed to belong to.
7.2. Stakeholder Attributes
7.3. Political interests
7.4. Economic interests
7.5. Social interests
7.6. Academic interests
7.7. Diverse but complementary
7.8. Competitive & contradictory
7.9. Conflicting and antagonistic
7.10. Influence and importance
7.11. Resources and power
7.12. Legitimacy
7.13. Salience
7.14. Multiple affiliations
7.15. Roles and responsibilities
7.16. Level of involvement in policy activities
7.17. Financial verses educational interests
7.18. Evangelism versus utilitarianism
7.19. Inadequate knowledge
7.20. Technological utopianism
7.21. Cultural conflicts
7.22. Intergenerational differences
7.23. Intergroup tensions

8. Implications of OSS Adoption (IOA)
8.1. This refers to the potential implications of the OSS policy outcomes, including its
    unique model and benefits inherent in implementing the OSS development model and
    challenges associated with it
8.2. Positive impacts
8.3. Social, economic, technological, and political
8.4. Technology innovations and sustainability
8.5  Create jobs and reduce unemployment
8.6  Alternative and affordable software
8.7  Diversify national tax base
8.8  Contribute to national development
8.9  Ugandans participate in global economy
8.10 Reduce monopoly of proprietary software
8.11 Emancipatory knowledge and skills
8.12 Increase access & use of ICTs
8.13 ICT environment favors OSS adoption
8.14 Availability of educated workforce
8.15 Need for affordable & flexible software
8.16 Local, regional, and global markets available
8.17 Initiative consistent with ICT policies
8.18 Potential to bridge digital divide
8.19 Uganda to attain a middle income status
8.20 Transform Uganda into information society
8.21 Avert unemployment-inspired insecurity
8.22 Inadequate OSS education derailing policy
8.23 Lack of national OSS champion
8.24 Corruption undermines OSS initiative
8.25 Government non-interventionist policies
8.26 Entrenched proprietary software
8.27 OSS no silver bullet to development
8.28 Not a panacea to digital divide
8.29 not sure pathway to information society
9.  Legislation Structures & Processes (LSP
   9.1 This refers to the state of legislation structures and processes, and their degree of
       application on OSS initiative, recommended the approval of policy and
       improvement of structures and processes.
9.2  Proposed communication strategy
9.3  Organize and unite OSS promoters
9.4  Mobilize promoters to speak with one voice
9.5  Recruit an OSS champion
9.6  Provide relevant information to executive
9.7  Educate policy makers about OSS
9.8  Sensitize bureaucracy about OSS
9.9  Government should drop facilitation role
9.10 Government should strategically intervene for OSS
9.11 Government should drop skepticism & embrace OSS
9.12 Educate public about OSS
9.13 Policy structures inherited from Britain
9.14 Bureaucratic and under funded processes
9.15 Law making structures very intricate
9.16 Differences between policies and law making structures
9.17 Consensus on policy structures and processes
9.18 Review rules to reduce bias and unfairness
9.19 Democratize structures & processes
9.20 Neutral body should implement rules

10. Comments and suggestions (CS)

10.1 This refers to comments and suggestions participants made that, in their opinion, could contribute to progress in the information policy formation process for the formal recognition and adoption of OSS in Uganda and consequences the country may face if the government fails to enact a law embracing OSS.

10.2 Failure of OSS policy not an option

10.3 Emulate Kenya and Rwanda on ICT policies

10.4 Uganda cannot afford lagging behind

10.5 ICT-based global economy for the future
APPENDIX I

SAMPLE ANSWER SHEET FOR CODING
This exploratory study was designed to examine an information policy formation process for the formal recognition and adoption of Open source software (OSS) as alternative to proprietary software in Uganda. The study also aimed to provide information about OSS and the policy formation processes in the country. Additionally, it aimed to identify, describe, and analyze the multiple stakeholders involved in the evolving OSS policy process, and categorize their underlying interests in the policy outcomes. It also aimed to describe the policy formation structures and processes in Uganda and to propose recommendations for their improvement.

Three information policy descriptive assessment techniques were applied on ICT-related literature in Uganda, 20 face-to-face interviews, and a focus group discussion were conducted with a purposeful sample of 22 participants in Kampala. Five participants took part in the focus group discussion. The overall goal of the study was to provide relevant information to policy makers and stakeholders involved in the policy process to resolve their impasse and embrace the use of OSS through an Act of Parliament.

An examination of ICT-related literature on Uganda established the historical context in which the OSS policy is emerging, identified various ICT stakeholders with multiple interests, and described the major ICT instruments that facilitated the evolution of the vibrant sector, highlighted the role of the government, and underlined key issues that have characterized the ICT environment from the early 1990s.

The questionnaire for the face-to-face interviews and the focus group discussion was divided into four major parts that addressed such topics as stakeholder knowledge and perspectives about OSS, stakeholder identification, attributes, and affiliations, implications of the formal recognition and adoption of OSS in Uganda, and characteristics of policy structures and processes in the country. There were 16 open-ended questions on each questionnaire that also attracted multiple follow-up questions from the researcher seeking additional information to clarify discussed and emerging issues.

Through a data familiarization, organization, reduction, and description process, the researcher created a single dataset that included information from the relevant ICT-related documents and transcriptions from interviews and the focus group discussion. The researcher further reviewed and closely examined this large body of information, segmented it into small text units, and developed some categories based on associations, patterns, relationships in the text. During this process, also referred to as content analysis, the researcher matched segments/lines of the data to a set of 10 definitions (codes). This process facilitated a further summarization of the dataset which was reduced from 12335 lines of data segments to 2484 smaller and more understandable text units. This process eliminated irrelevant lines in the dataset and only information relevant to purpose of the study and to the research questions were retained.

After this process, the dataset was ready for effective and meaningful interpretation or analysis. This was the dataset presented to the two independent coders to match the 2484 statements of interview transcript data into 10 definitions (codes).
Instructions
- I will provide you with a printed list of 2484 statements
- Each statement will have a unique number assigned to it “Statement ID”.
- This Answer Sheet has 10 categories/items/definitions (Definitions 1-3, and definition 5-10;
- You will not use Definition # 4. This item is for the researchers’ use only, thus unused).
- Your task is to read each statement from the list of statements I will provide to you and to
  match it to the definition that best corresponds to it.
- An example of a definition and what you are required to do looks as below:
- completed page of the answer sheet looks as below:

Example

Definition A:
A Definition is provided below as an example:
Definition A:
"Kampala is a crowded city."
Statement:" Kampala is a crowded city."
Statement ID #: 8.

<table>
<thead>
<tr>
<th>Statement ID</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Kampala is a crowded city</td>
</tr>
<tr>
<td>Write</td>
<td>Check this box if the entire Statement fits the Definition</td>
</tr>
<tr>
<td>Statement ID</td>
<td>Write those words or phrases here if only a partial amount of the statement applies to the Definition</td>
</tr>
<tr>
<td>12</td>
<td>X</td>
</tr>
<tr>
<td>14</td>
<td>Kampala is crowded</td>
</tr>
<tr>
<td>224</td>
<td>X</td>
</tr>
</tbody>
</table>
Below are more instructions and the Answer Sheet you will use to accomplish this task:

- As the above example shows, there will be one line for each instance you find with 3 blank boxes/fields/spaces to write/enter your response:
  1. Input 1: “Statement ID.” This is where you will write the “statement ID” that best corresponds with or fits each definition.
  2. Input 2: “The entire statement fits the definition.” This is a box you will check if you agree that the entire statement corresponds with the definition.
  3. Input 3: “Only these following words or phrases.” This is a field box in which you will write the words or phrases in the statement that correspond with or fit the definition.
- You must use each statement at least once. (i.e., each statement ID must be categorized into at least 1 definition.
- You can categorize a Statement ID into more than one definition. For example, Statement ID 112 may apply to both Definitions 6 and 9, depending on how you understand the content of the statement and the definition.
- There is no right or wrong answer. Your limit is the 10 definitions

**Definition (Code) 1: Historical Context**

<table>
<thead>
<tr>
<th>Write Statement ID</th>
<th>Check this box if the entire Statement fits Definition 1</th>
<th>Write those words or phrases here if only a partial amount of the statement applies to Definition 1,</th>
</tr>
</thead>
</table>

This is comprised of information describing the historical evolution of the ICT sector in Uganda including the state of the sector in the 1990s, the policy instruments that facilitated the establishment of this vibrant and private sector-driven industry, the various stakeholders and their multiple interests, the role of the government in guiding the formation and development of the nascent sector, and the position of Ugandan citizens as ICT consumers.
<table>
<thead>
<tr>
<th>Write Statement ID</th>
<th>Check this box if the entire Statement fits Definition 1</th>
<th>Write those words or phrases here if only a partial amount of the statement applies to Definition 1.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>□</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX J

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Dear Samuel Muwanguzi

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Yours sincerely,
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