Improving Implementation of e-Government Services in Rwanda:
An Organisational Perspective

To

My beloved wife Ingabire Dominique
and
My beloved children Mugisha Brave Kapiteijn and Shimwa Grace

Örebro Studies in Informatics 15

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Abstract

As part of realising development programmes faster, developing countries have been adopting, from developed ones, modern ICTs and implementing e-government towards better public services. However, efforts of implementation of e-government services have been often resulting in unsatisfactory outcomes and even total failures. This is a big challenge particularly for Least Developed Countries which have fewer resources. Such outcomes are partly due to the lack of addressing organisational issues associated with implementations.

This thesis addresses the question: *How can the implementation of e-government services be improved from an organisational perspective in the context of Rwanda?*

The thesis adopts a socio-technical perspective and uses both qualitative case study methodology and a literature review approach. Two cases of implementation of e-government services were studied. The first case, an Enterprise Content Management system concerns the sharing and working on digital documents within government agencies. The second case, the one-stop e-government is for providing online services by the central and local government agencies to the general public via a single portal, 'Irembo'. This thesis shows that implementation of e-government services has been focusing on digitalisation of services superimposing ICT over existing structures with less attention to organisational change issues related to processes, organisational structure and policies. The thesis also identifies a deficit in implementation processes in terms of lacking clear goals and formal monitoring in the local government. Those insights on the implementation of e-government services of an LDC pinpoint a need for optimisation between technical and social aspects. This thesis makes an empirical contribution by bringing forth those insights. In order to help tackle a number of challenging issues found, a comprehensive model for improving the process of implementing e-government services, called Plan-Do-Evaluate-Resolve (PDER) was developed as a theoretical contribution based on a literature analysis.

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List of Papers

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Acronyms and Abbreviations

ECM	Enterprise Content Management
EDPRS	Economic Development Poverty Reduction
EFQM	European Foundation for Quality Management
GoR	Government of Rwanda
ISO	International Organization for Standardization
LDCs	Least Developed Countries
MDG	Millennium Development Goals
MINALOC	Ministry of Local Government
MINECOFIN	Ministry of Finance and Planning
MITEC	Ministry of Information Technology & Communications
MYICT	Ministry of Youth and Information Technology
OECD	Organization for Economic Co-operation and Development
PDER	Plan-Do-Evaluate-Resolve
RDB	Rwanda Development Board
RGB	Rwanda Governance Board
RISA	Rwanda Information Society Authority
SRMP	Smart Rwanda Master Plan
STT	Socio-technical Theory
UN	United Nations
UR	University of Rwanda

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"Information technology and business are becoming inextricably interwoven. I don't think anybody can talk meaningfully about one without the talking about the other." Bill Gates

1. Introduction

This thesis investigates issues associated with the implementation of e-government services in Rwanda, from an organisational perspective, and provides suggestions for improving such implementation. This chapter presents background information, the research scope, the organisational perspective, a problem statement, and motivational factors. The chapter proceeds with the aim, the research question and the objectives operationalising the research question as well as the corresponding studies. Finally, the structure of this thesis is presented

1.1 Background

For the past several decades, Information and Communications Technology (ICT) has been perceived as one of the enablers to increase efficiency and effectiveness (Larbi, 1999) in the developed world to foster economic development. ICT has also been used to modernise operations of government agencies (Fatemi & Behmanesh, 2012; Randma-Liiv & Kickert, 2017). The benefits of leveraging ICT have led to its widespread use in both the private and the public sectors. ICT has been used to transform the public sector, to provide services to and improve interactions with stakeholders and beneficiaries, giving birth to the term "electronic government" or "e-government" (OECD, 2003; Grönlund & Horan, 2004).

E-government has different synonyms such as digital government, online government, e-Gov (Grönlund & Horan, 2004). As time went by and as e-government evolved, many different e-government definitions have been published (OECD, 2003; Grönlund, 2010). The OECD, for example, has several slightly different versions of what e-government is. Those versions culminated into defining e-government as "the use of ICTs, and particularly the Internet, as a tool to achieve better government" (OECD, 2003, p.63). More elaborately, the United Nations defines e-government as:

> "the use and application of information technologies in public administration to streamline and integrate workflows and processes, to effectively manage data and information, enhance public service delivery and to expand communication channels for engagement and empowerment of people"(United Nations, 2014, p.2).

This thesis subscribes to the United Nations' definition because this definition is wide in scope. The present thesis elaborates on elements of the definition.

Since the invention of the first browser in 1990 (Berners-Lee, n. d.), developed countries started to make use of the invention and the internet which was already there. That period marked an innovation era to start offering services online. The idea did not take long to spread towards developing countries. It is difficult to pinpoint the precise origin of e-Government in developing countries, but in Africa, e-government dates back to 1996 at the time when the African Information Society Initiative (AISA) was adopted by top African leaders (Hafkin, 2009). Developing countries including the Least Developed Countries (LDCs) (United Nations, 2016b) started embracing ICTs for modernisation and economic development purposes. They have been adopting them from contexts where their use has matured along with institutional developments (Kimenyi & Moyo, 2011). Deployment of ICTs in the form of e-government systems has become inevitable in either a developed or developing context. It is evident today that all 193 members of the United Nations have some form of online presence (United Nations, 2018).

What is meant by e-government implementation? The concept of 'implementation' can be understood in various but related ways. For instance, Fixsen et al. (2005) define it as putting into practice an activity or a program consisting of a specified set of activities. In this thesis, it is viewed as a process of putting into use or integrating a new or updated practice within a context or setting (Greenhalgh et al., 2005; Rabin & Brownson, 2012). E-government implementation in this thesis refers to integrating, within government organisations, practices or programmes involving the use of ICT to achieve envisioned goals.

However, the nature of e-government implementation for real benefits is still a challenging task in developing countries (Joshi & Islam, 2018). It is a more challenging issue in the LDCs which are characterized by lower income, weak human assets and high economic vulnerability (United Nations, n. d). In such developing contexts, e-government implementations have been characterised by few benefits and even more failures (Heeks, 2003; Dada, 2006; Gunawong and Gao, 2017). For instance, looking at the present status of online services, the quality of transactional services in the LDCs lags far behind in general. Such poor performance in that area cannot solely be attributed to the deteriorating socio-economic conditions

prevailing there. Factors including organisational implementation issues and limited context-tailored tools to be used in practice can also play important roles. However, the contemporary literature paints a picture of limited research on those issues in the least developed countries. This thesis investigates and helps address issues related to the implementation of e-government services in Rwanda, one of the LDCs (UNCTAD, 2017). The thesis draws from empirical data in two case initiatives and secondary data. The case initiatives are 1) implementation of Enterprise content management system and 2) the implementation of One-stop e-government, both in Rwandan government agencies. The thesis is framed within socio-technical thinking (Bostrom & Heinen 1977), and the empirical work is conducted using a qualitative case study method.

1.2 Research scope

In this thesis, e-government services are regarded as public services delivered by the government or in partnership with the government "using Web-based information technologies to enhance government information delivery and to enable citizens and businesses to make online transactions" (Guo & Lu, 2007, p.403). E-government services can include the provision of online certificates (e.g. birth, marital status...), land services, application for ID cards, driving licenses etc. Implementation of those services in government organisations and on portals does come easy way. It requires tackling complex issues related to aspects of organisational processes, people, technology, structures and resulting interaction of these aspects towards better services.

It is against that backdrop that the focus of this thesis is more about issues coupled with the implementation of e-government services and its underlying organisational environment than on the specific aspects of particular services. This thesis takes an organisational perspective to investigate and to help address issues related to the implementation of e-government services.

Ideally, implementation of e-government services in a given setting is a project involving at least aspects of people, processes, and technology forming a system. Such a project falls within the discipline of information systems. In this way, people are "system designers" who are users and decision makers, and ICT professionals (Bostrom & Heinen 1977) and other stakeholders including donors and IT products vendors (Heeks, 2003b). Processes refer to tasks, be it management, core or support activities undertaken

by people and non-human actors (von Scheel et al., 2014; Bergman & Klefsjö, 2010) towards providing services. Technology, in this case, is the applied "scientific knowledge that enables manipulation of human surroundings for the practical purpose of meeting human desire" (Haines & Sharif, 2006, p.107) for better services. Hardware, software, and procedures fall in this category. Those aspects, as mentioned earlier, (i.e. processes, people, and technology) are integral parts of organisations (Bostrom & Heinen 1977).

This thesis work is conducted in the discipline of Information Systems. The body of knowledge, theories, models and methods come mainly from the field of Information Systems are here applied to study and address issues about the implementation of e-government services. The environment in which the implementation of e-government services takes place, i.e. the public sector organisations, can be viewed as a socio-technical system, which is comprised of people, processes, technology and structural aspects (Nograšek & Vintar, 2014). Likewise, people, processes and technology aspects can be viewed as integral parts of an information system. In terms of an 'artificial thing' or artefact (Simon, 1996), an information system artefact is viewed as an ensemble of and an interaction between social artefacts (emanating from people and structure components), information artefacts (emanating from processes) and technology artefacts (from technology) (Lee, Thomas & Baskerville, 2015). For instance, in an organisation, the social artefacts can represent people aspects and structure, information artefacts can also represent organisational processes while technology artefacts do the same for technological aspects. In this way, information systems can be viewed as part of an organisation. More than one organisation in the public sector setting is often required for the implementation of e-government in that setting, and this situation implies an extensive and complex information system. This assumption is the case in this thesis.

Normally implementation of e-government can focus on four areas: 1) e-services (providing public online services), 2) e-management (improving managerial effectiveness), 3) e-democracy (promoting democratic values and corresponding mechanisms), and 4) e-policy (developing public policies) (Luna-Reyes et al., 2012). This thesis focuses mainly on the first two areas, i.e. e-services and e-management. The thesis draws on empirical data from physical and artificial aspects of information systems spanning multiple organisations mainly in the Rwandan public sector. Aimed towards

providing better public services, the thesis identifies issues that confront the implementation of e-government services in Rwanda. This thesis elaborates and proposes solutions to help mitigate and address some of the issues. Some of the solutions could contribute to managerial effectiveness. Investigations of the issues and elaboration of the solutions in this thesis are undertaken from an organisational perspective.

1.3 The organisational perspective of this thesis

The organisational perspective being taken in this thesis entails a focus on organisational issues related to the implementation of e-government services. This thesis pays particular attention to organisational issues due to the following four main reasons.

First, the primary reason is about the underlying assumption of this thesis on how improvements in e-government services would be made. In general, improved performances of a process are viewed in terms of quality, cycle time, costs, and customer satisfaction (Guha et al., 1997; Dumas, 2013). Such improved performances are also expected in e-government services. For instance, the quality of e-government services can be viewed as a multidimensional construct defined by ease of use, reliability, content and appearance of information, the functionality of the interaction environment, trust and citizen support (Papadomichelaki & Mentzas, 2012). This thesis holds the view that the attainment of expected improvements in e-government services would mainly depend on the activities undertaken by organisations involved in the service implementation. Public organisations — and sometimes private organisations in case of public-private partnerships — play a crucial role in influencing improvements in e-government services because they are the organisations implementing e-government projects and providing public services. This thesis on improving the implementation of e-government services views improvements of e-government services in terms of what organisations involved do to implement the services, and the thesis does not directly focus on the improved performances of the services per se. An organisation can be involved in the implementation of e-government services while being, at the same time, undertaking other non-related activities. In this way, the thesis focuses on the organisational activities directly influencing e-government services and disregards other activities. For instance, the thesis does not take an interest in conventional organisational activities such as human-resource-related issues like staffing,

compensation, and employee relations (Mathis & Jackson, 2010). Normally, these activities take place almost in any organisation, but they are not directly related to the implementation of e-government services. This principle also applies to other organisational underlying processes, including conventional governance processes of public agencies, but which do not directly influence the management of the implementation of e-government services, and the processing and the provision of the e-services. The activities by organisations involved in the implementation of e-government services would not only include ICT implementation issues (e.g. establishment of infrastructure, procurement/development of in-house software solutions and deployment) but, also, activities related to re-organising processes and adjusting the organisational structure (Heeks, 2002; Hughes, Scott & Golden, 2006; Kennedy, Coughlan, & Kelleher, 2010), dealing with peoples' issues in organisations (Nograšek, 2011), elaborating strategies and intervening in the establishment of a regulatory framework and policies (Gathungu & Mungai, 2012). This thesis considers that organisational issues influencing implementation of e-government services cannot only be at an organisational level but also an inter-organisational level because such implementation often requires the involvement of multiple organisations, their cooperation, coordination and concerted effort (Axelsson & Melin, 2008).

Second, this thesis takes organisational perspective from an understanding that organisational issues are perceived to be more challenging to address due to the inherent characteristics of the public sector such as compliance to legislation and regulations in a hierarchical structure, high demand for accountability and stringent budget conditions (Jurisch et al., 2013). Furthermore, organisational issues should be tackled in their embedding complex context, i.e. the public sector which often consists of a wide range of constituent groups sometimes with divergent interests (Robertson and Seneviratne, 1995). Furthermore, government agencies may operate in silos because their initiatives are often poorly coordinated (Irani et al., 2007). The fragmentation of government agencies can often be an obstacle to a successful implementation of e-government projects involving multiple organisation such as those related to e-government services (Axelsson & Melin, 2008).

Third, technology can be easily adapted from developed countries to the context of LDCs (Kimenyi & Moyo, 2011) but organisational contexts

from developed countries cannot be imported. Furthermore, in the context of LDCs, political will and support can be present, an acceptable level of financial means can be obtained from within or from loans, and required human resources can be achieved through capacity development programs. Moreover, socio-economic issues can be tackled for e-government development. However, effective ways of addressing organisational issues cannot easily be outsourced from other contexts.

Fourth, there is a potential advantage of addressing organisational issues in the context of LDCs. For instance, addressing these issues in LDCs context would help to spend existing limited resources judiciously and not implement e-government systems that would be 'costly' to replace in the future. Such potential advantages of addressing organisational issues are at this moment considered important because this thesis focuses on the implementation of e-government services in the context of an LDC.

Taking into account the importance of organisational issues in relation to the public sector challenge to provide better e-government services, this thesis addresses the problem of improving implementation of those services in an LDC context.

1.4 Problem statement and motivation

Developing countries including LDCs are coping with implementing the same ICTs emerging from developed countries, hoping to make e-government and the economic development journey faster (Khan et al., 2011). In such a race also termed 'leapfrog' (Kimenyi & Moyo, 2011), decision-makers and professionals in developing countries are often inspired and influenced by e-government literature and best practices in developed countries. But, from the very beginning, developed countries, have been developing their institutions using ICT all along in enabling conditions.

On one hand, the 'leapfrogging' by developing countries which adopt ICTs from a developed context is a good move towards development advancement in the context of a developing country (Kimenyi & Moyo, 2011). On the other hand, institutional settings embedded in developed countries create a conducive environment for better e-government implementation that is difficult to import in a developing country. In turn, higher rates of failure in the implementation of e-government initiatives have been reported in developing countries over time (Heeks, 2003a; Dada, 2006; Gunawong & Gao, 2017). Those failures can be attributed to political, socio-economic,

technological and organisational issues which are prevalent in that context (Weerakkody, Dwivedi & Kurunananda, 2009; Nkohkwo & Islam, 2013). Furthermore, Heeks' (2002) observations indicate that those failures are mainly attributed to the gap between e-government design in developing countries (e.g. African countries) and the reality of the public sector in such contexts. About this problem, Doherty and King (1998) had earlier pointed out that failures of e-government initiatives are more due to social and organisational issues than technical ones.

In the light of those observations, LDCs may risk not getting real benefits out of leveraging ICTs or even experiencing failure if decision-makers and professionals in that context do not get inspired by research knowledge to consider local conditions including social and organisational issues in that context. E-government implementation methods can be general in nature, but solutions to problems are context-specific. Furthermore, because limited resources are common in the majority of LDCs, the better of use of such resources would imply not implementing legacy systems which are costly to maintain and replace.

The development of e-government services is still problematic in many developing countries and more problematic for LDCs. That cannot be attributed only to limited resources related issues but also to other factors including the lack of appropriate models to guide the implementation of e-government services in developing countries (Joshi & Islam, 2018). Looking at the transactional and 'networked' stages of e-government services, LDCs lag far behind developed ones (United Nations, 2014; United Nations, 2018). This fact would imply that better transactional services would need more integration of e-government systems in government agencies in the context of LDCs. Such integration demands a certain degree of reform in operations and structural adjustments in the public sector organisations during implementation (Wimmer, 2002, Hughes, Scott & Golden, 2006; Kennedy, Coughlan, & Kelleher, 2010), i.e. a form of organisational change as to avoid unnecessary resource spending in the post-implementation period. However, Khan et al.'s (2011) pointed to a lack of e-government research on organisational change in the context of developing countries. In the course of project implementation, a need for contextually-based models is also implied. There is still a need for research on e-government implementation of services and organisational issues in that context.

Looking at the context of Rwanda, for example, the country hopes to cease being a low-income country and become a middle-income, knowledge-based economy with the help of ICTs along with implementing other poverty- reduction programs. The country expects a 142% return on investment of more than US$500M in implementing 67 e-government priority projects (MYICT, 2015b) including two service-oriented projects. One-stop e-government project is one of them for providing public online services (mostly pre-paid) nationwide. An Enterprise content management (ECM) is the other project, intended for sharing and working on documents related to services to citizens, employees, and agency in and among agencies at both the central and local government level. Cutting public spending on paper and having efficiency in internal operations are among the expected outcomes of the ECM project (MYICT, 2015b).

Despite that techno-economic ambition, there is still little knowledge about organisational issues as far as e-government implementation of services is concerned — the knowledge that would inspire decision makers and professionals in that context. Furthermore, the development of e-government services is still immature (SmartAfrica-Rwanda, n.d.) The rationale for doing this thesis work is to address the knowledge gap and to help mitigate organisational challenges confronting the implementation of e-government services in such a context. Furthermore, I was personally eager to do this thesis work towards better online services in Rwanda because I am among the beneficiaries of e-government services in Rwanda, having personally experienced delays in service delivery there. The contribution of this thesis work is also expected to be beneficial, to some extent, in other similar countries engaged in or planning the implementation of similar initiatives.

1.5 Aim, research question, and objectives

This thesis aims to contribute to e-government implementation practice and research towards better services in LDCs. The thesis attempts to answer the following main research question:

"How can the implementation of e-government services be improved from an organisational perspective in the context of Rwanda?"

In order to address this question, the following four objectives have been devised:

1. To identify critical organisational issues about the implementation of e-government services in Rwanda.

2. To investigate processes and issues related to the monitoring of the implementation of e-government services in Rwanda.

3. To explore the socio-technical changes in the implementation of e-government services in Rwanda.

4. To identify solutions for improving the process of implementing e-government services.

In order to operationalise the stated objectives, two cases on implementation of e-government services in Rwanda were selected. The first case is a project implementing the Enterprise Content Management System (ECM) in governmental organisations known locally as 'document tracking and workflow management system'. This e-government information system was implemented by the end of 2012 for sharing and working on documents among government employees in 120 agencies. In the ECM information system, service applications are initiated both externally by citizens and agencies   and internally by government employees, and they are handled internally (project coordinator, 2015, personal communication, August 12).

The second case selected consists of the 'one-stop' e-government project, known as 'IREMBO' (meaning 'common entrance' in the local language), which was launched in 2014. This project is devised to provide e-government services including civil registration services, land registration services, and registration for driver's licenses etc. via a single integrated services portal.

The two case projects were chosen because of their potential to require organisational changes as their implementations evolved towards maturity, their large spanning size and the number, and diversity, of stakeholders and operations involved. In order to achieve the set objectives, five paper studies were devised. Table 1.1 presents the four objectives, research questions and the corresponding five studies in terms of papers.

Table 1.1. *Thesis objectives, research questions, and corresponding paper studies*

Thesis objectives	Research questions	Paper titles
1) To identify critical organisational issues about the implementation of e-government services in Rwanda	1. How do critical success factors in ECM implementation in Rwanda relate to those in literature?	Paper I: E-Government Implementation in Developing Countries: Enterprise Content Management in Rwanda
	2. What are the underlying organisational issues in the implementation of 'one-stop' e-government in Rwanda? 3.	Paper II: Organisational Challenges in the implementation of 'One-Stop' e-government in Rwanda
2) To investigate processes and issues related to monitoring of the implementation of e-government services in Rwanda	4. How is the process of implementing the Rwanda one-stop e-government monitored? 5. What are the potential areas for improving the monitoring of Rwanda one-stop e-government?	Paper III: E-government implementation and monitoring: The case of Rwanda 'One-Stop' E-government
3) To explore the socio-technical changes in the implementation of e-government services in Rwanda	6. What is the extent of socio-technical changes and effects in the implementation of e-government services in Rwanda?	Paper IV: E-Government Implementation Process in Rwanda: Exploring Changes in a Socio-Technical Perspective
4) To identify solutions for improving the process of implementing e-government services	7. What measures could be taken to improve the ECM implementation?	Paper I: E-Government Implementation in Developing Countries: Enterprise Content Management in Rwanda
	8. What are the potential areas for improving the monitoring of Rwanda one-stop e-government?	Paper III: E-government Implementation and Monitoring: The Case of Rwanda 'One-Stop' E-government
	9. What would be a model for process improvement in the implementation of e-government services?	Paper V: A Model for Process Improvement in the Implementation of e-Government services: Plan-Do-Evaluate-Resolve (PDER)

1.6 Structure of the thesis

After this chapter, Chapter 2 provides an overview of the implementation of e-government and e-government services, followed by a description of the research setting in Rwanda in Chapter 3. Chapter 4 describes and discuss underlying theoretical framework for the research. Chapter 5, Methods describes main methodological approaches used in this thesis including techniques for data collection and analysis. Chapter 6 contains a summary of the five papers, and finally, Chapter 7 contains the conclusions and final remarks.

The five papers which are an integral part of the thesis are attached in Part II of this thesis.

2. E-Government implementation

This thesis identifies issues in the process of implementation of e-government services and elaborates a process improvement model. This chapter gives an overview of both e-government implementation and development in various contexts as well as the implementation of service-oriented projects. Furthermore, this chapter provides an overview account of process improvement methodologies and tools.

2.1 E-Government implementation and development stages

As previously mentioned, the term 'e-government' has several definitions which evolved over time with the progress and practices of e-government. This thesis adopts the UN definition, which is "the use and application of information technologies in public administration to streamline and integrate workflows and processes, to effectively manage data and information, enhance public service delivery and to expand communication channels for engagement and empowerment of people"(United Nations, 2014, p.2).

E-government has been implemented in various context worldwide and matured in developed countries earlier than in developing ones as ICT use has developed along with institutional advancement in the context of the former countries. The contexts of developed and developing countries are different in various aspects in terms of e-government implementation enablers or inhibitors including infrastructure, human resource development capacity, literacy, political context and investment capacity among other elements. The difference is also evident in their levels of e-government development (United Nations, 2014) and their respective research agenda on e-government implementation. Referring to e-government research topics in recent conferences, for example in both IFIP e-Government and e-Participation conferences for 2016 and for 2017 hold in developed countries, research on e-government in developed countries is more on recent trending topics focusing on 'better government' stage such as Open Government (for democracy and participation values), then Big Data and Smart Governance, and Smart Cities. Furthermore many medium-scale and even multi-national projects are implemented in the context of developed countries; for example, i2010 European Initiative, and Digital Single Market(Ron, 2015; European Commission, 2015).

On the other hand, research on the e-government trending issues in the context of developing countries, particularly in the LDCs appears to be limited. Furthermore, in that context, e-government research conducted on multi-national projects seem limited in general.

Regarding the challenges faced while implementing e-government, these appear to be different in developed and developing countries. In developing countries, these challenges include infrastructure, the lack of more qualified human resources, socio-economic problems (e.g. digital divides and language problems while accessing services) political challenges, the lack of an institutional framework supporting e-government, the lack of enough project funds, privacy and security concerns, limited IT skills, and lack of citizen awareness and participation (Nkohkwo & Islam, 2013; Weerakkody et al., 2009; Nkwe, 2012). Most of those the issues do not seem to be important challenges in developed countries. Developed countries are challenged by doing more on their e-government implementations with an increased sense of security and trust and doing more on interoperability for multi-national projects, for example, to support a single digital market, and taking advantage of opportunities offered by open government data to collaborate more with citizens and businesses for enhanced services, and to make effective use of new technologies such as cloud computing (Ron, 2015).

E-government development can be viewed in terms of Layne and Lee's four stages (2001), which are *Cataloging, Transaction, Vertical integration, Horizontal integration*. When one screens the development of e-government services in developing countries, especially LDCs via different reports (e.g. United Nations, 2014; United Nations, 2016; United Nations, 2018) , considering the four stages, one can conclude that there is a gap to bridge as from 'Transaction' to upper stages. This implies tackling issues related to systems integration calling upon addressing organisational issues.

To develop e-government from 'Transaction' stage all through to 'Horizontal integration' stage requires making substantial organisational changes in many organisations in the public sector, mainly regarding aspects of people, processes, technology and organisational structure (Bostrom & Heinen 1977). Organisational structure at large would include regulatory frameworks and policies.

For instance, in developing countries and LDCs, organisational change issues such as adapting the organisational structure to Information Technology were identified in India and Indonesia (Nurdin & Scheepers, 2012), but when it comes to LDCs, there is limited knowledge on that topic. Only a few examples are available, such as in Heeks' (2002) study recommending in general countries in Africa, where most of the least developed countries are located, to re-reorganise their organisation structures for better e-government implementation. Not only Heeks, but related recommendations by Hafkin (2009) and UNECA (2009) were also made to those nations to have government strategies in place, e.g. coordination, re-design of organisational processes, outsourcing, funding, state culture and politics, leadership, centralisation, and decentralisation of e-government project management, and performance measurement.

In Asian countries, one-stop e-government initiatives to provide online public services via a single portal were or are being implemented, for example, in India, Bangladesh, Bhutan, Sri Lanka, Mongolia (Local Governance Initiative and Network-Asia, n.d.). But there is still a lack of research on organisational issues about implementation of those initiatives. Only recently, the integration of back-office processes in Kazakhstan's one-stop e-government was discovered to be challenging (Janenova & Yesdauletov, 2017). In Bangladesh, socio-economic impact of the country's one-stop e-government is part of what was investigated (Hoque & Sorwar, 2015). In India, Paul and Paul (2014) investigated the phenomenon of e-government systems interoperability for one-stop services. A report on Liberia, in Africa, only indicates that implementation of one-stop e-government was started recently there (United Nations Public Administration Network, 2017). Analysis of those publications point to a scant attention to organisational issues necessary to address in the implementation of one-stop e-government.

Another illustration is Rwanda among the few LDCs which have implemented a 'one-stop shop' (RwandaOnline, n. d.), and Enterprise content management (ECM) system in government agencies countrywide. The two initiatives (one-stop and ECM) require some degree of streamlining and improvement among agencies' processes. However, recently, the country started to realise that improving government business processes is one of the critical success factors for its e-government implementation (GoR, 2016). Recently, issues related to information infrastructure, social inclusion, governance, management, trust in the new system, and languages

emerged as generally challenging issues confronting Rwanda's one-stop e-government in its initial phase (Twizeyimana, Larsson & Grönlund, 2018).

One can conclude that e-government in developed countries has been more advanced than in the LDCs. However, there is still limited knowledge in LDCs on issues related to organisational concerns and, particularly organisational change issues, reflecting e-government advancement in the 'Transaction', 'Vertical integration,' and 'Horizontal integration' stages. Core organisational aspects of the public sector agencies (i.e. people, processes, and technology and their relationships) still need research attention in the LDC context.

2.2 Implementation of e-government service-oriented projects

E-government implementation is generally a complex process consisting of phases or stages and activities. For instance, Hatsu and Ngassam (2016) indicate that an e-government project lifecycle consists of a Pre-initiation phase, a Definition phase, a Planning phase, an Execution phase, a Deployment phase, and a Close-Down phase. But according to Heikkilä, Vahtera and Reijonen (2004), an implementation process cycle for an information system project such as e-government consists of four phases: 1) Decision to implementation 2) Specification and building up of the technical system, 3) Introduction into the organisation, and, lastly, 4) Use and maintenance.

On the other hand, Pateli and Philippidou (2011), as well as Indihar and Jaklic (2007), show that implementation process of an e-government business process change project such a service-oriented one goes up to seven stages (e.g. Envision, Initiate, Diagnose, Redesign, Reconstruct, Evaluate, Institutionalise change). Note that these phases or stages require evaluation and monitoring. Evaluation is one of the stages in Pateli and Philippidou's work (2011), however, Hatsu and Ngassam (2016) find that evaluation and monitoring span the entire project life cycle.

About e-government initiatives in organisations for providing public services, implementation of such initiatives appears to be continuous because processes in those organisations can be socially-constructed by actors and be dynamic over time (Melao & Pidd, 2000). This is also partly because expectations from service beneficiaries can evolve over time as technology advances. The implementation of e-government service-oriented initiatives

requires continuous monitoring and evaluation for continuous improvements in the implementation of amended services, with the goal of providing better services.

Illustrations from the developed world show that implementation of e-government services has been improved early on for better services. For instance, before mid-2000's, the re-organisation of government processes and reforms in the regulatory framework have taken place in some European member states for improving e-government services (Strejcek & Theil 2003; Millard et al., 2004). The Netherlands example indicates how a 60-day service turned into a 2-day service by process re-design (Aydinli, Brinkkemper & Ravesteyn, 2009). Furthermore, gains of about 40 % reduction of time and 20 % reduction of administrative costs were reported in the Netherlands in 2007 for the provision of services (European Commission, 2017).

On the other hand, the development stage of e-government services in some developing countries and particularly LCDs has hardly reached the stage of 'vertical' integration. In that context, e-government services are less transactional when compared to those in developed countries (United Nations, 2014; United Nations, 2018); the developing world lags behind developed countries in terms of services at the 'networked presence' (United Nations, 2014). Furthermore, implementation of e-government service oriented projects in LDCs is vulnerable due to frequent failures in developing countries (Dada, 2006; Gunawong & Gao, 2017).

Those issues together with those in the previous sub-section paint a picture that e-government services, particularly in the LDCs, still lag behind. This fact implies that a step forward would be made towards 'systems' integration which is far beyond modernising public services via the mere integration of e-government websites (Sun et al., 2015). Addressing systems integration to develop e-government services in LDCs to be fully transactional with better use of economic resources would require tackling organisational issues to gain the benefits. Research and other work on organisational issues should be prioritised in LDCs to minimise costs compared to investing resources in uncertain projects that result in redundant efforts. In this thesis, process improvement in the implementation of services is viewed as one the prominent ways to address underlying organisational issues and improve managerial effectiveness. The next section gives an overview of process improvement methodologies and tools used in the improvement of public services.

2.3 Process improvement methodologies and tools

Process improvement is rooted in quality management. Quality management is based on the principles of customer focus (external customers and employees), continuous improvement, teamwork, everyone's participation, focus on facts, and management commitment (Dean & Bowen, 1994; Dahlgaard et al., 1998).

In order to improve the quality of administrative work and services to the public, processes in the public sector must be improved to optimise efficiency and effectiveness. To achieve this goal, changes in business processes can be either radical and one-time or incremental and continuous via methodologies such as Business Process Re-engineering (BPR) method or via Total Quality Management (TQM) method respectively. This is to mean that process improvement methodologies focusing on radical and incremental changes are complementary (Rashid, 2013; Kettinger et al., 1997; Peronja, 2015; Jurisch et al., 2014). Methodologies for process improvement include Six Sigma, Plan-Do-Check-Act (PDCA), Kaizen and Lean(Roeser & Kern, 2015; Rashid, 2013; Sokovic et al., 2010). In general, these methodologies originate from the private sector. (Radnor, 2008). Process improvement methodologies namely TQM, BPR, and Six Sigma can be leveraged to maximise e-government benefits such as faster, cheap, non-stop services (Saad & Bakry, 2004).

Overview on Process improvement methodologies and tools

*Business Process Re-engineering (BPR).*This is also termed Business Process Redesign. This approach, which became popular in the 1990s, suggesting radical changes in organisations' business processes to make productivity gains, was first promoted in the USA (Hammer & Champy, 1993). BPR is defined as "the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed" (Hammer & Champy, 1993, p.2).

In the public sector, a number of BPR initiatives worldwide are evident from literature. Since the 1990s, the USA, Germany, the UK, Sweden, and the Netherlands France, Belgium, and Italy embraced BPR (Coulson-Thomas, 1995 cited in Vakola, 1999). As cited in Kontolaimos' (2013) work, BPR was applied in e-government (Indihar & Jaklic, 2007; Martin & Montagna, 2006; Scholl, 2004; Scholl, 2003). It was applied in different

countries, e.g. Australia, UK, United Arab Emirates (Hesson, Al-Ameed & Samaka, 2007), Slovenia (Indihar &Jaklic, 2007), Singapore (Thong, Yap & Seah, 2000) and the Netherlands. BPR was applied in different types and levels of government organisations, e.g. in UAE local government (Hesson, Al-Ameed & Samaka, 2007), in Western Australia government, at Ministry level (Indihar & Jaklic, 2007; Thong, Yap & Seah, 2000) and at state level in the USA (Scholl, 2004; Kontolaimos, 2013).

In the UK, BPR was used to redesign land services (Kennedy, Coughlan, & Kelleher, 2010b) and in the Netherlands it was applied, for example, to cut down service requests in one department from 60 days to 2 days (Aydinli, 2007). It was applied in Greece to improve e-government services (Pateli, 2011) in a public service department and further BPR plans existed until 2013 to improve efficiency in public agencies in the Greek public sector (Kontolaimos, 2013). Furthermore, some municipalities and universities in North Sea European Countries, i.e. Norway, Sweden, UK, Netherlands, Belgium, France, and Germany, partnered to implement a BPR-based programme christened "SmartCities" for improving public services where improvement of business processes is one key focuses of the project(SmartCities, n.d.).

Recently among developing as well as least developed countries, a study on BPR in India showed how 'to-be' processes could drastically reduce time in vehicle registration (Subramoniam & Twinky, 2015). Mathew, Sulphey, and Rajasekar (2017) also identified a BPR need in the State of Kerala in India. In Africa, BPR reforms took place in Ethiopia for e-government implementation (Mekuriya, 2009; Debela, 2009). In Tanzania, about 100 organisations (both public and private) have practised or experienced BPR (Sungau, Ndunguru, & Kimeme, 2013). Likewise, Rwanda recently identified BPR as one of the critical success factors to implement one-stop shop e-government (GoR, 2016) and the Land agency of Rwanda identified the need to redesign back-end processes for land (Igihe Ltd, 2017). In other contexts for example in Latin America, Business process re-engineering in the Mexican public sector was implemented to some extent for efficiency and effectiveness (Fragoso, 2015). Martin and Montagna (2006) identified the need for BPR in a provincial state in Argentina; authorities set appropriate mechanisms for BPR implementation to reduce delays in daily processes. One can observe that improving business processes in developing countries using BPR is a move which came later compared to developing countries.

Total Quality Management (TQM). In contrast with radical change concept of BPR, TQM approach is rooted in making incremental and continuous changes. This improvement approach is utilised in Deming's PDCA cycle. TQM is a customer-focused approach; it aims to increase external and internal customer satisfaction with a reduced amount of resources and is a continuously evolving management system consisting of values, methodologies, and tools (Hellsten & Klefsjo, 2000). It appears to be an overarching approach to manage the entire organisation to excel in all dimensions of products and services which are important to customers (Chase et al., 1998).

Kaizen. Kaizen was implemented first in Japanese industries during the country's recovery after the Second World War. The approach focuses on performing small improvements in large numbers with the involvement of all employees continuously, which leads to improving the relationships between managers and employees (Titu, Oprean & Grecu, 2010). It is a philosophy of gradual, incremental and continuous improvement and generating more value and less waste on process improvement and process control. Kaizen uses the same PDCA Cycle; Plan, Do, Check, and Act (Valencia, 2006). Kaizen was applied in Spain and Mexico in local government agencies(Barraza et al., 2009; Suárez-barraza & Miguel-dávila, 2014; Barraza & Lingham, 2008), in Indonesia local government case (Study & Tengah, 2016), and the Mexican public service organisation (Barraza & Pujol, 2010).

Lean. Lean Thinking had originated in the Toyota Company and has been developed with time. Lean is regarded as a substitution to the conventional way of mass production and batching principles for high efficacy, quality, speed, and cost. The five phases of Lean are: 1) Sort, 2) Straighten, 3) Scrub, 4) Systematize, and 5) Sustain. This methodology seeks to reduce waste to enhance business performance by improving workflow. According to the approach, all activities that do not produce value are a waste and should be removed. Thus, the core of Lean is the elimination of non-added value or waste, variability, and inflexibility. Lean ensures that all activities are performed without interruption, which increases their performance effectively (Radnor, 2010; Valencia, 2006). Among the methodologies requiring incremental approaches, Lean was found to be the most used in the public sector (Radnor, 2010a, 2012a). For example in Portugal, Lean was applied in the health sector (Guimarães, 2012), and in improving processes

in municipalities which have resulted into reduction of lead time (Monteiro, Pacheco, Dinis-Carvalho, & Paiva, 2015). In the UK, Lean was applied in Business Schools and Universities (AtoZ Business Consultancy, 2011). It was also applied in the Connecticut Department of Labour, in the Solihull Borough Council and the U.S Department of Defense, (Radnor, 2010a; Radnor & Osborne, 2013).

Plan-Do-Check-Act (PDCA). The PDCA method originates from industry and Walter Shewhart and Edward Deming's articulation of iterative processes which eventually became known as the four stages of PDSA (plan–do–study– act). PDCA (plan–do–check– act) terminology was developed following Deming's early teaching in Japan. The terms PDSA and PDCA are often used interchangeably(Taylor et al., 2013). PDCA is a cyclic improvement/problem resolution tool. Each cycle moves closer to the objective. This approach builds on the fact that knowledge and skills are always limited, but can improve as we go (Marquis, 2009). It consists of four steps, i.e. 'PLAN','DO', 'CHECK', 'ACT'. The application of the PDCA cycle has been found more effective than adopting "the right-first-time" approach. Using the PDCA cycle means continuously looking for better methodologies of improvement. The PDCA cycle is effective in both doing a job and managing a programme (Sokovic et al. 2010). PDCA was applied in Japan (*Compendium of Japan's Approach of e-Government*, 2005). Furthermore, it is used as a methodological tool for self-assessment(Conti, 2017).

Six Sigma. This methodology is a business strategy that aims to determine and remove errors, defects, and failures caused by business processes by concentrating on outputs, which are imperative to customers. It is also a quality measure that seeks to eliminate defects using applications for statistical methods (Antony, 2004). The Six Sigma Model -DMAIC phases are: 1) Define, 2) Measure, 3) Analyze, 4) Improve and 5) Control (Rashid, 2013). A combination of Lean and six sigma, i.e. Lean Sigma is used in different contexts, for example in improving document management related processes in the public sector (Snyder, 2004), used in different US public sector agencies Maleyeff (2007). The public sector in Saudi Arabia was found still at the infancy stage as far as Lean Sigma is concerned (Saja et al., 2017).

In a nutshell, there exist a number of process improvement methodologies and tools which can contribute to improving public services including e-government services. In general, these methodologies and tools originated

from the private sector and were applied in the public sector and the health sector later. These methodologies and tools have been in used in developed countries earlier on. However, the analysis of literature points to the limited use of these methodologies and tools in LDCs. The existing methodologies and tools can be adopted into such contexts. However, context-tailored process improvement models can add more value. Furthermore, existing process improvement methodologies and tools aforementioned above as well as existing e-government process models (e.g. in Pateli & Philippidou, 2011; Indihar & Jaklic, 2007) are not enough to advance implementation of e-government services in LDCs context. Those methodologies, tools and models are often exhaustive or some providing mere steps which are not enough to guide implementation of e-government services at immature stage in contexts with fewer resources.

In this thesis, the perspective of process improvement was mainly adopted in Paper III and Paper V. The next chapter sheds light on the research setting, Rwanda e-government, challenges and enablers, and a description of the cases studied.

3. Research settings

> "The internet today is an open platform where the demand for websites and services dictates success. You've got barriers to entry that are low and equal for all comers…" Barack Obama

Concerning e-government practice, barriers to entry are more or less low and equal for both developing and developed countries where the cost to import technologies into developing ones can be low. However, contextual factors and underlying public sector settings can influence the level of success. This chapter describes the settings in which the thesis work was conducted; it gives background information on Rwandan socio-economics and other details including LDCs context, development initiatives, the governance of e-government, and information on Rwanda e-government development. Eventually, the chapter gives an account of e-government cases which were investigated in this thesis.

3.1 Socio-economic settings and e-government

This thesis work is conducted on e-government in Rwanda which is a small landlocked Sub-Saharan country in east-central Africa. Figure 3.1 shows neighbouring countries and other details of Rwanda. As of 2018, Rwanda had a population of 12.1 million. Both the service and the agriculture sectors predominantly drive the national economy (MINECOFIN, 2018). Rwanda is one of the 47 Least Developed Countries (LDCs). Many of those countries are geographically located in Africa (i.e. 33 countries); there are 9 in Asia, 4 in Oceania and 1 in the Americas (United Nations, 2018).
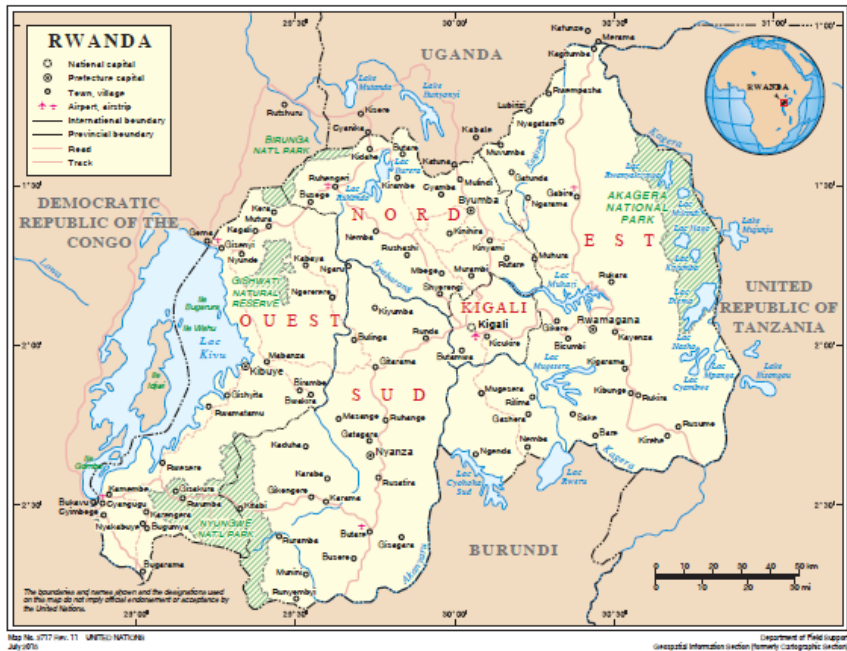
Figure 3.1. Map of Rwanda
(Source: United Nations, Geospatial information section, 2015)

The photo in Figure 3.2 portrays a typical environment and life in the sub-urbs of secondary cities of Rwanda.

Figure 3.2. Suburbs of Musanze city (Secondary city of Rwanda)

On the other hand, the photos in Figure 3.3 and Figure 3.4 shows the settings of a city in Rwanda and rural area on the highway respectively.

Figure 3.3. Musanze city (Secondary city of Rwanda)

Figure 3.4. Rural area on the highway- Huye district, Rwanda

Generally, the LDCs are characterised by low per capita gross national income, poor human assets, and high economic vulnerability among developing countries; LDCs can be viewed as countries at the lower end of developing countries (Alonso, Cortez, & Klasen, 2014; UNCTAD, 2017). As of 2017, Rwanda's GDP per capita was 748 USD (World Bank, 2018) which ranked it among the 47 Least Developed Countries (UNCTAD, 2017). Rwanda was also classified as a 'Low income' country, whereas a country such as Nigeria, which has a GDP per capita of 1,968.56 USD was categorised a 'Middle income' country (United Nations, 2018).

Regarding e-government development, LDCs generally lag behind. For instance, of the 16 countries worldwide which scored the lowest on the e-government development index (0.25 EGDI and lower) as per United Nations survey, 14 are LDCs located in Africa (United Nations, 2018). Two years before, 29 LDCs were among 32 countries with lowest EGDI worldwide. Bangladesh, Nepal, and Rwanda are the leading countries as far as the development of e-government services are concerned among LDCs (United Nations, 2018).

Regarding issues that constrain the implementation of e-government in LDCs, digital divide is reported as one of the socio-economic issues they face. For instance, as of 2015, out of 940 million people living in LDCs only 9.5 %, i.e. 89 million people used the internet. The telecommunication infrastructure index and its components (e.g. percentage of households using internet, mobile cellular telephone subscription per 100 inhabitants, fixed broadband subscription per 100 inhabitants and wireless broadband subscription per 100 inhabitants) in LDCs are all lower than the world average where Europe is a world leader in all other these categories of countries (United Nations, 2016). Likewise, a United Nations report indicates, two years later, that telecommunication infrastructure index in LDCs was still far lower than the world average index. The human capital index in LDCs was relatively lower than the one in Asia. Likewise, the average index for online services among the LDCs is lower than the average world index (United Nations, 2018).

Because Rwanda is one of the LDCs, it exhibits signs of the socio-economic issues related to the digital divide. For instance as of 2015, only 6.7 % of households had internet, and mobile cellular telephone subscription per 100 inhabitants was at 70.5 (ITU, 2016). Those numbers are comparable to other LDCs. For instance, among LCDs, the percentage of individuals

with internet was at 10.53, and those with mobile cellular telephone subscription per 100 inhabitants were 64.60 in the same period (United Nations, 2016).

Regarding other socio-economic issues such as literacy, in Rwanda, as of 2015, gross enrolment ratio for secondary schools stood at 40.2% while that ratio for tertiary education was at 7.5%. The mean years of schooling in the same year was only 3.7. These figures are lower than other developing countries with upper-middle-income economies. For instance, South Africa (United Nations, 2018) had a gross enrolment ratio in secondary schools of 98.2 %, 19.7 % in tertiary education, and 10.3 years of schooling was the mean in the year of 2015 (ITU, 2016).

Countries are evaluated every three years, and these can dynamically be included or excluded from the category of LDCs (Alonso, Cortez, & Klasen, 2014; UNCTAD, 2017).

Specifically looking at Rwanda, the country wants to become a knowledge-based middle-income economy by 2020, through its Vision 2020, devised to implement socio-economic development programmes including ambitious e-government initiatives hoping to make the development journey faster (Republic of Rwanda 2000; MYICT, 2015b). Rwanda embraced the use of ICT and elaborated e-government plans from 2000 towards achieving its ambitions. Rwanda project plans which partly included e-government are Economic Development and Poverty Reduction Strategies (EDPRS I, 2008- 2012 and EDPRS II, 2013-2018) (Sida, 2008). This culminated into projects involving establishing infrastructure and services (MYICT, 2015c; GOR, 2016).

Thanks to the implementation of socio-economic programmes including e-government initiatives, significant achievements in socio-economic development have been made from 2000 to date; for instance, the GDP per capita rose sharply from 225 USD in 2000 to 774 USD in 2017 (MINECOFIN, 2018).

Despite that growing developmental progress, Rwanda is still among the LDCs. To leave this category, the country will have to increase its gross national income (GNI) per capita at least to 1, 242 USD for three consecutive years, and improve its human capital assets, and reduce its economic vulnerability (UNCTAD, 2017). By doing so, the country would eventually manage to materialise its current plans, through its Vision 2050, to achieve

an 'upper middle income' status (USD4000 annual per capita income) by 2035 (The New Times, 2018d).

3.2 Governance of Rwanda e-government

Decentralisation as a governance policy, as part of the New Public Management, has been common globally and in Africa (Kempe & Bornwell, 2000). In the case of Rwanda, the country adopted such policy in 2000; subsequently, new provinces and districts have been delineated, and structural reforms took place in agencies for better public services (Budlender & Hewitt 2002). Besides making those structural reforms, Rwanda put e-government plans in place towards achieving Vision 2020. Those plans include steps related to establishing institutional, legal and regulatory frameworks and infrastructure, to develop skills, the private sector, the community, and e-government services that generate revenues (GoR, n. d.; GOR, 2016).

When it comes to the Rwanda e-government, its governance is still more centralised. For instance, starting from the top, the National Information Technology Commission (NITC) serves as a national steering organ at the highest level (Munyengabe, Haiyan & Yiyi, 2016). This commission is "the advisory group and think-tank that offers visionary leadership for the Rwanda government on ICT areas of development", it is chaired by the president of the Republic (Global e-Schools and Communities Initiative, 2017, p.19). Since 2002, prominent actors with decision-making power on e-government in Rwanda have been at the central government level. For instance, decision-making powers have been vested with government agencies such as the Rwanda Information Technology Authority (RITA), an autonomous agency and the Rwanda Utilities and Regulatory Authority (RURA) both established in 2002 for the implementation of ICT policy and its regulation, respectively (Harrison, 2005; The New Times, 2017). RURA being a regulatory agency, its functions include overseeing the operations and licensing in the telecommunication sector. E-government related solutions implemented by RITA have been rolled out into public service agencies at the central and local government level with ICT directors and ICT officers in those agencies playing the roles of local implementers in their respective agencies.

The Ministry in charge of Science, Technology, and Scientific Research(STSR) was established in 2006 in the President's office and RITA was mandated to report to that Ministry (The New Times, 2007; Sci Dev

Net, 2006). Subsequently, RITA was dissolved; its functions and responsibilities were assumed by the ICT department of the Rwanda Development Board (RDB) (GoR, 2010). The Ministry in charge of STSR was turned into the ministry of ICT in 2011. This was later merged with the Ministry of Youth and became MYICT the subsequent year (Global e-Schools and Communities Initiative, 2017).

Today it is the Ministry of ICT & Innovation and Rwanda Information Society Authority (RISA) which are in charge of policy elaboration and implementation respectively. The latter agency consist of the Government Chief Information Officer (GCIO) and the Government Chief Innovation officer (GCINO) (RISA, n. d.). ICT-related initiatives and Government information systems to be implemented are, as in the past, initiated, developed and deployed or launched for use by the Central government. Today, the local governments come in secondarily either at development or deployment stage or at both stages depending on the nature of the initiative. Implementation of e-government initiatives at the central and local government occur in 'user agencies' that are undertaken primarily by ICT directors and ICT officers and respectively (Government Chief Information Officer, personal communication, October 11, 2018).

As indicated in Figure 3.5 through arrows, agencies in the central government are in charge of e-government policy-making and implementation (e.g. MINICT and RISA) have no direct mandate to supervise local government agencies or to get direct reports from these entities, except in the case of NITC which has the overall authority (GoR, 2017a; GoR, 2017b). However, e-government systems developed by those central government agencies in charge of e-government policy implementation are deployed in both central and local government through conventional communication channels or through supervising agencies by proxy.
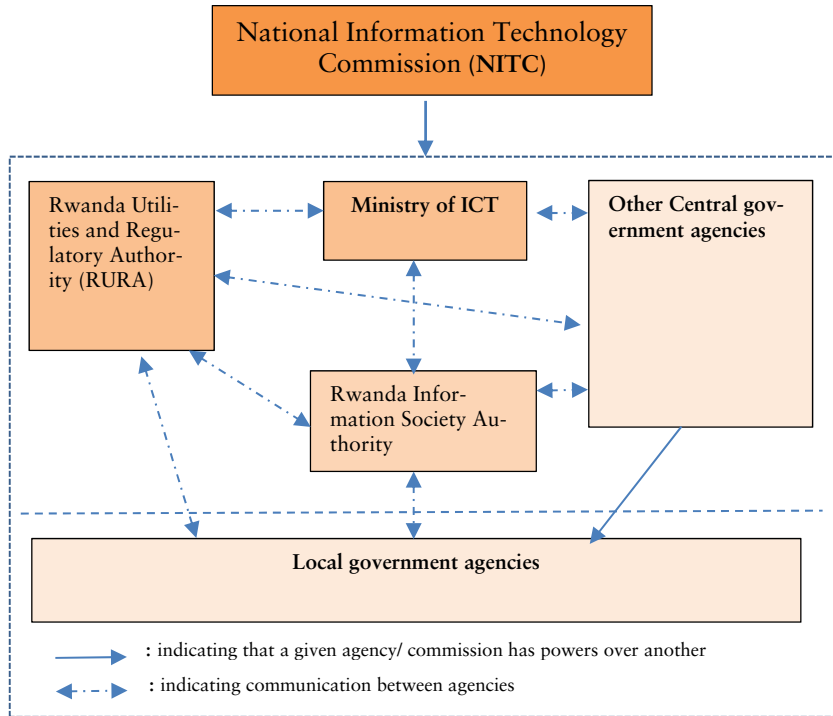
Figure 3.5. Influential agencies in Rwanda e-government

Regarding the funding of e-government projects in Rwanda, it is carried out at the central government; by or through the Rwanda Ministry of Finance and Economic planning, MINECOFIN. Internal funds and external ones such as those from World Bank (e.g. World Bank, 2013) are allocated to different government projects including e-government projects by MINE-FOFIN(MINEFOFIN, 2019). Table 3.1 depicts an overview of primary stakeholder agencies, their functions and the primarily-concerned people in Rwanda e-government.

Table 3.1 Primary Stakeholder agencies and functions

Agency	Functions	Primarily concerned People
National Information Technology Commission (NITC)	Vision and Policy	Top Leadership
- Ministry in charge of Science, Technology, Scientific Research (2006) - Ministry of ICT (from 2011, Ministry of Youth and ICT from 2012, then the Ministry of Information Technology & Communications, MITEC from 2017)	Policy Making	Ministry Leadership and Managers
- RURA (2002)	Regulatory	Agency Leadership and Managers
- RITA (2002) - RDB/ICT (2010) - ROPL*(2014) - RISA (2017)	-Policy Making (partly) and Implementation(-IS designers and Developers, Procurement)	Agency Leadership and Managers
Other central government agencies including: -Ministry of Local government -Rwanda Land Management and Use Authority (RLMUA) -National ID Agency (NIDA) -Agencies in the local government including: -Huye District -Ruhango District -Nyanza District -Kicukiro District	-Government Information Systems user agencies and Adopters - ICT users	IT managers and IT professionals

Table Legend:

*ROPL is a private company mandated to develop and operate services on a single integrated digital platform.

Furthermore, Rwandan e-government also has external players, not only for funding but also for e-government design. For instance, the current

driver for Rwandan e-government for the provision of public services is a public-private partnership where the government cooperates with a private company, RwandaOnline Platform Ltd., ROPL (see, Table 3.1). The company is mandated to launch and operate digital services through a single portal for 25 years (GoR, 2016). Furthermore, cooperation exists with foreign consultants such as Korea which help Rwanda to shape and advance its e-government (the Republic of Korea, 2017). The ROPL outsources a Singaporean company to develop digital public services together with Rwanda public agencies, according to the CEO of the company in one interview (C. Ujeneza, personal communication, August 9, 2017).

3.3 Rwandan e-Government and its development

Rwanda has the vision to transition from a low income, agrarian economy, to a middle-income country through implementing development programmes such as Economic Development and Poverty Reduction Strategy (EDPRS I and EDPRS II) for 2008-2012 and 2013-2018 respectively along with undertaking ambitious e-government projects (MYICT, 2015b).

However, e-Government in Rwanda dates back to the early 2000s when Rwanda ICT strategy "National Information and Communication Infrastructure plan" (NICI) was put in place (MYICT, 2015c). Since 2000, Rwanda set a plan for 20 years up to 2020. The e-government implementation plan was scheduled into 4 phases. Throughout this transformative plan, the Government of Rwanda (GoR) has been implementing different e-Government projects, be it government-to-government, government-to-citizens, and government-to-businesses projects, through its central government organisations namely the Ministry of Youth and ICT (MYICT), Rwanda Development Board (RDB), and Rwanda Utility Regulating Agency (RURA):

Phase one (2000-2005) focused on projects including policy, legal and regulatory frameworks development, human resource development, ICT infrastructure development and ICT in education(MYICT, 2015b).

Phase two (2006-2010) focused on infrastructure development and implementing projects such as 10M USD e-Rwanda project consisting of enterprise content management (ECM) project for document sharing among government agencies, e-Soko, i.e. Agricultural Market Information project, Capacity Building, setting up District Telecenters, and elaborating Cyber Security Framework. Other projects in this phase were a 95M USD National

Fiber Optic Backbone Project to cover all Rwandan district headquarter offices, 16M USD National Data Center, National Internet connectivity (World Bank, 2011) and One Laptop Per Child (MYICT, 2015b).

Phase three (2011-2015) was focused on service development including projects such as Single Integrated Service portal (GoR, 2016), Rwanda National informational Portal (MYICT, 2015b), Government Enterprise Architecture, Government Intranet, continuing implementation of ECM (locally named document tracking and workflow management system, DTWMS), e-Procurement System, and National ID and Smartcard System (NID) (MYICT, 2015b).

Currently, the fourth phase (2016-2020), with its corresponding plan, the 'Smart Rwanda Master Plan', is focused on a digital transformation of the Government agenda including 24/7 self-service from Government, and cashless and paperless economy with 95% of Government services transacted online by 2018 (MYICT, 2015b).

We learn that socio-economic issues such as digital divide (Mumporeze & Prieler, 2017) and infrastructure related challenges can constrain e-government development in a given context. As of 2015, households with computers in Rwanda were 4%, whereas households with internet were 6.7 %. Likewise, mobile-cellular subscriptions per 100 inhabitants in Rwanda was 70.4 and individuals using internet were 18% whereas active broadband subscriptions per 100 inhabitants was 25.9. These digital divide related issues, together with the aforementioned current enrolment ratios in schools from section 3.1, combine to challenge Rwandan e-government.

There are also challenging issues related to infrastructure in e-government in Rwanda. For instance, as of mid-2018, 133 sector offices out of 416 comprising 30 districts of Rwanda lacked Local Area Networks to access the internet for the provision of public services (RISA, 2018).

On the one hand, there has been a number of enabling factors. For instance, Rwanda is among the top three countries with the cheapest mobile-broadband services in Africa (ITU, 2016). Furthermore, regarding infrastructure, Rwanda e-government is enabled by a national optical fibre backbone network reaching all district headquarter offices. Moreover, a broadband network amounting to over 90% population coverage in Rwanda has also been supporting Rwanda e-government (ITU, 2018). In addition to that, there is top leadership support. For instance, the incumbent president of Rwanda received an ICT Africa award in 2007 for having demonstrated

'excellence in promoting the use of ICTs for the overall development of the African continent' (Kakimba, 2007). Those factors together with the public-private partnership mentioned in section 3.2 constitute enabling factors for the advancement of Rwanda e-government.

From a most recent survey, one can notice an improvement in Rwanda e-government. In that survey, the United Nations ranked Rwanda first among other African Least Developed Countries (LDCs), the third in place among all 47 LDCs in the UN after Bangladesh and Nepal; and it comes in 120th place, worldwide, out of 193 United Nations member states (United Nations, 2018). Regarding the contribution of the Rwandan ICT sector to economic development, a report showed that, in 2015, it was 3% to GDP (MYICT, 2015a).

3.4 Description of e-government cases

Two case projects were chosen to investigate e-government implementation issues and to contribute to the improvement of the e-government implementation practice and research as well. The two cases were chosen because they exemplify nation-wide projects involving several stakeholders in Rwanda:

1. Case ECM. This project is supposed to implement enterprise content management system (ECM) named locally as 'document tracking and work-flow management system' (DTWMS) to enable management, sharing and working on digital documents among government agencies nationwide both at the central and local government level. The project started in 2011 and was expected to be completed by 2015(MYICT, 2015b).

ECM e-government information system got launched in 2012 to be used by staff for administrative work and processing of requests from the public, employees, and other agencies. The system was first used by government staff in 20 Rwanda ministries. Later, all 5-provincial headquarters, all 30 district offices, and a number of central government agencies, amounting to 120 agencies were added to the list of users from resolutions of a national retreat (project coordinator, 2015, personal communication, August 12). The Enterprise content management system is still in use today in governmental organisations in Rwanda. Services provided via the ECM system include enabling the processing of service requests by citizens, employees, or agencies and the corresponding responses. These include mails incoming and outgoing from and to the public as well as internal memos, leave requests, or office requisitions and transport requests by staff and responses.

These are shared and worked on in a government agency using ECM systems according to the national project coordinator (E. Ujeneza, personal communication, February 16, 2018).

2. *Case 'IREMBO'.* The second project known as 'IREMBO' locally literally means 'entrance' is the implementation of a single integrated services platform, i.e. 'one-stop shop' portal that provides e-services to the general public— the project which started in April 2014 via a twenty-five year public-private partnership between the Government of Rwanda, and a private company (GOR, 2016). The project was put in place to digitalise 100 services. By February 2018, at least 85 public services in total in various categories (land, civil status,) were online on 'IREMBO' platform according to e-government coordinator at the national level (G. Kalema, 2018, personal communication, January 30). Services provided via the platform include services related to national registration, land, civil status, immigration and emigration, education, driving licenses, notarization, etc. (ROPL, n. d.). Those services are accessed through service centres of private agents (about 60% of applications), through web-self services conventional channels (about 30% of applications) and USSD code messaging scheme (dialling *909#, comprising about 10% of applications) (ROPL, 2018)

The two cases were considered appropriate for this thesis. They are both service-oriented projects needing of involvement of a multiple of government agencies including those at the central and local government level. These projects include agencies making e-government policies at different levels and those providing services. Furthermore, both initiatives appear to consist of diverse service operations leading to changes in organisations and the public sector as services would evolve towards maturity.

4. Theory in this thesis

The concept of 'theory' has no common, agreed upon definition (Presthus & Munkvold, 2016). Ågerfalk (2014) views it as "a statement of concepts and their interrelationships that shows how and/or why a phenomenon occurs" (p.594). On the other hand, it is defined as a set of interrelated constructs, definitions, and propositions that present a systematic view of phenomena by specifying relations and variables, with the purpose of explaining and predicting such phenomena (Presthus & Munkvold, 2016). More broadly, a theory is viewed as a set of concepts and their interrelationships that help either to analyse, or explain, or predict, or both explain and predict a phenomenon or even direct how to design and do an action (Gregor, 2006). This thesis uses socio-technical theory (STT), and this chapter describes the theory, its use in e-government research, how it is used in this thesis and the motivation for using it.

4.1 Socio-technical theory

The implementation of ICT-related projects has seen two important paradigms:

The 'technological imperative' paradigm (2003) also termed 'technological determinism (Nograšek & Vintar, 2014) and the 'social imperative' paradigm (Omoteso et al., 2007 cited in Rawas, 2013). According to Caglio (2003), ICT in the 'technological imperative' paradigm "is conceptualised as a material cause, as a driver of change, which can transform organisational structures automatically and social contexts, both at the micro and at the macro level. Information technology is considered to have an independent influence on organisations, exerting unidirectional and causal effects over individuals and structures" (p. 125). On the other hand, in the 'social imperative' paradigm, Omoteso et al. (2007 cited in Rawas, 2013, p.80) consider ICT as "a product of human action rather than an objective external constraint....the organisation's social contexts are the main driving force for the adoption and use of ICT". Among the two paradigms, neither could explain the relationship between ICT and the 'social' of organisations (Rawas, 2013). Socio-technical theory (STT) reconciles the views in the two paradigms. For instance, by considering underlying components of an organisation, the technical sub-system (i.e. technology and processes) and the social sub-system (aspects of people and their structure) are viewed as

interdependent variables forming a system. All the elements forming either sub-system are interdependent among themselves in the system, and they jointly interact (Bostrom & Heinen 1977), and none has primacy over another.

STT emanates from the work of the Tavistock Institute in London during the 1950s and1960s. The theory originated as a means of coping with the non-linear and unpredictable effects that accompany the deployment of new technologies into organisational systems (Trist, 1956; Trist & Bamforth 1951 cited in Huiping, Zhiwei & Krishna, 2018). The theory asserts a need for a joint fit between both the social sub-system and the technical sub-system to achieve intended outcomes (Bostrom & Heinen 1977). In other words, the theory is based on the concept that the performance of a system can be optimal if social and technical aspects of a system are considered together during the design process (Clegg, 2000; Cherns, 1976). If a technical sub-system is established at the expense of a social sub-system or vice versa, the results would be expected to be sub-optimal (Mumford & Beekman, 1994). In relation to this phenomenon, Walker et al. (2008) asserts that the theory is based on two principles: 1) "the interaction of social and technical factors creates the conditions for successful (or unsuccessful) system performance", these interactions create 'designed', linear and partly 'undesigned', complex and 'non-linear relationships 2) optimization in either sub-system, and far more common in the technical sub-system, "tends to increase not only the quantity of unpredictable, 'un-designed', non-linear relationships but those relationships that are actually injurious to the system's performance"(p.480). Socio-technical theory assets a need for a joint optimisation in both sub-systems (Walker et al., 2008).

Cherns (1976) elaborated the principles of socio-technical design. Those principles include elements of compatibility (i.e. the congruence of design and organisational goals); the principle of minimal critical specification (only essential tasks are to be defined); the elements of the socio-technical criteria (expectations of deviations in the expected technical standards and norms in the social system cannot be predictable). The multi-functionality principle (meaning that work groups should be designed flexibly), incompletion (implies that design is an iterative process) (Mumford, 2006; Huiping, Zhiwei & Krishna, 2018). Later, Clegg (2000) updated the socio-technical design principles to encompass the internet and Information Tech-

nology. In turn, Mumford (2003) came up with an information systems development methodology called ETHICS based on sociotechnical principles (Leitch & Warren, 2010).

Socio-technical design thinking has been applied in the design and implementation of new technologies in office work and production industry and service design (Trist & Bamforth, 1951; Clegg, 2000; Rice, 1958; Hussein, 2014). For instance, according to Bostrom and Heinen (1977), an organisational work system is seen as a socio-technical system composed of people, structures, tasks, and technology (See Figure 4.1).
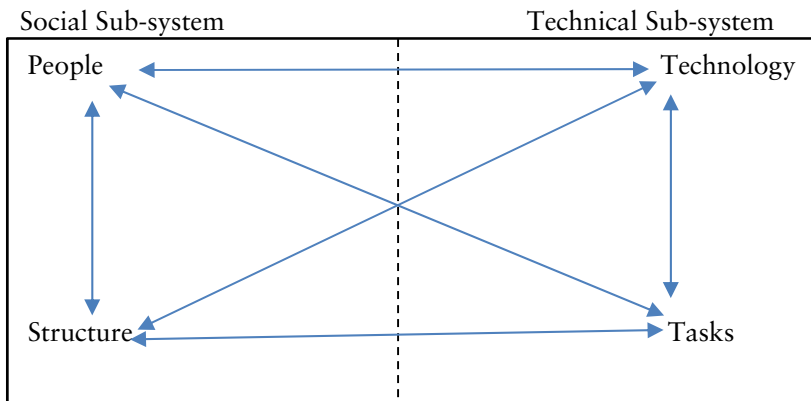
Fig. 4.1: A representation of an organisational work system
(adapted from Bostrom and Heinen, 1977).

Technology, tasks, and processes make up the technical sub-system of the organisation and transform input to output. People aspects (behaviour, skills, values ...), relationships among people, rewards systems, and authority structures constitute a social sub-system. It is worth noting that, in the Leavitt's model, the organisational culture aspect is viewed as one of the socio-technical elements and the term 'processes' is used instead of tasks (Kovačič et al., 2004).

The two sub-systems being interdependent, the outcome of the formed system depends on the joint interactions of elements comprising the sub-systems (Bostrom & Heinen 1977; Nograšek, 2011, Nograšek & Vintar, 2011). For example, Nograšek (2011) points out that "changes in technology cause changes in processes and consequently in people, culture, and

structure" (p.16). Once processes, people, and structures remain bureau-cratic, i.e. unadjusted, the potential of modern technologies cannot be exploited for better e-government; a change in one element causes changes in another or all the other elements (Nograšek, 2011). For instance, intro-duction of ICT in an organisation would require new skills, changes in work processes, and changes in mind-set of people in the organisations. Con-versely change in processes and new skilled personnel in the organisation would require at least some changes in technology. This can also imply ad-justments in organisational structure and job re-design. A primacy of one aspect in terms of optimising it over the others can result into undesirable effects.

The outcomes of ICT implementation in a given setting can be seen in terms of quality, cycle time, operational cost, and customer satisfaction (Guha et al., 1997) and even in terms of quality of working life (Bostrom & Heinen (1977). However, from a socio-technical standpoint, optimal results and outcomes of the implementation would be determined by the balanced attention to socio-technical aspects and by the joint interaction of those as-pects in that setting.

In terms of the constructs used in socio-technical theory, variant sets are observed in the literature. For instance, people, technology, and tasks are used to describe the constructs (Association for Information systems, n.d.; Levy, 2011). Furthermore, four constructs: technology, tasks, structure, and people are used in Management Information Systems research (e.g. Bostrom & Heinen, 1977). Technology, business processes, working practices, and citizen participation are used as one set constructs (Damodaran et al., 2005; Levy, 2011) and technology, society and organisation as another set (Levy, 2015) exemplify STT constructs in e-government research. Socio-technical design thinking can be applied in the design and analysis of complex systems such as service design, crowd events, and environmental sustainability sys-tems (Beaumont et al., 2014; Davis et al., 2014; Hussein, 2014). For in-stance, in Davis et al. (2014), the technical system comprises processes/pro-cedures, technology, and building/infrastructure, whereas the social system consists of people, goals, and culture. Because of the variant constructs used in socio-technical theory, one can conclude that the number and scope of elements comprising the technical and social sub-systems vary depending on nature and the complexity of the phenomena under investigation or depend-ing on the choice and even the focus of researchers.

Socio-technical philosophy permeated information systems (IS) research discipline. For instance, Avgerou et al. (2004) pointed out that such a philosophy is often applied in IS even if it not always referred to as such (Avgerou et al., 2004).

It is worth noting that when STT is applied to the design of a system for optimal results, two conflicting values can arise. These are humanistic and managerial values. It appears to be challenging to design systems that balance humanistic principles (e.g. working life quality and well-being), technology, and managerial values to achieve the optimum output of an organisation (Rawas Mahmoud, 2013; Association for Information systems, n.d.).

STT was widely recognised among managers and systems developers in the past, but despite the existence of socio-technical principles, the theory did not have a significant impact on the pragmatic design of systems (Bansler; 1989; Fuglerud, 2014). That thought emanates from STT assumption of an agreeable relationship between workers and management which does not hold in practice; the importance of forces (e.g. economic, political, and social) behind the technological development cannot be underestimated. When it comes to the design of socio-technical systems, Fuglerud (2014) suggests a Participatory Design (PD) approach rooted in the Scandinavian school of systems development because it espouses STT principles and considers the existing forces behind the scenes that are driving technological development including aspects of power and resources. Despite the weakness of pragmatic applicability of STT in the design of systems, the theory is still used today more as a theory for analysis as evidenced by contemporary literature. It is used in this thesis, more as a theoretical framework for studying phenomena than as a methodological framework for design.

In this thesis, STT is adopted to investigate the implementation of e-government services from an organisational perspective. The socio-technical systems considered consist of processes, technology, people (i.e. here meaning organisational employees), and organisational structures in two project cases in the Rwandan agencies. Furthermore, STT thinking is adopted in this thesis in elaborating some solutions to issues.

4.2 Socio-technical theory in e-Government research

In order to explore how socio-technical theory (STT) is used in e-government research, a systematic literature review was undertaken. For this, two searches were performed.

Search 1. The first search was made on 3rd March 2019 in Google Scholar using the keyword: "socio-technical theory" AND "e-government" for the period from 2000 to 2019 (i.e. up to 3rd March 2019). The number of publication hits was 210.

Inclusion and exclusion criteria include:

- All the publications had to be written in English and on e-government
- All the publications using STT nominally were discarded
- All the publications with 'no data', i.e. with no relevant information related to use of STT in e-government research, were excluded

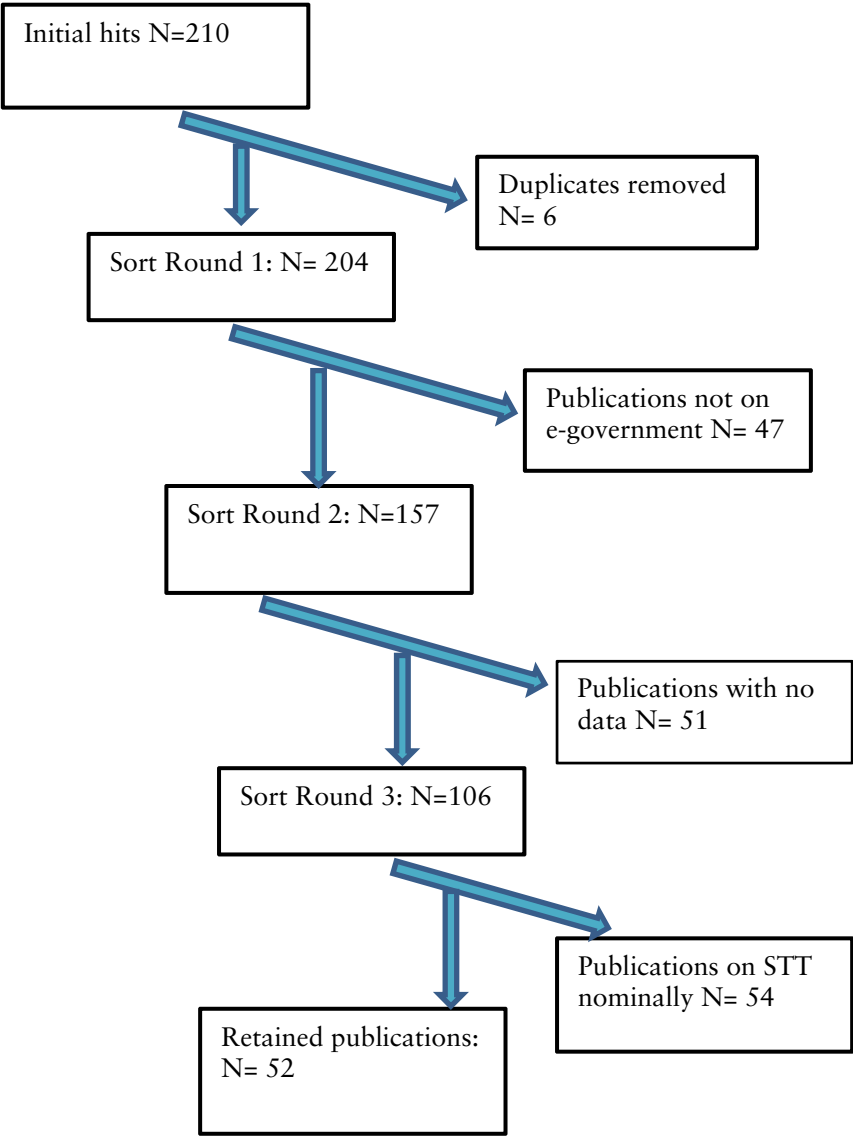Figure 4.2 indicates more information on such literature review process.

Figure 4.2. Literature review process

Out of the 52 publications retained, two primary uses of STT were identified:

In the first case, a set of publications address the social sub-system and the technical sub-system as two interdependent sub-systems. In this case, STT is defined with varying definitions of the social sub-system and the technical sub-system, and the two sub-systems are viewed as interdependent—the sub-systems whose joint interaction is to produce benefits. Taking the example of a study, for instance Damodaran et al.'s (2005) work concluded from a UK case study that e-government service delivery according to citizens' needs "requires the development of socio-technical sub-systems, combining technology and communication processes which meet the task needs of citizens and the procedural and legal requirements of local government" (p. 9). The components comprising the socio-technical system in Damodaran et al.'s work (2005) are society, organisation, and technology.

A second group of publications take the technical and the social systems as two separable and even inseparable components or factors making up a comprehensive system in which interdependency of the factors can also exist. For example, Zuiderwijk et al. (2013) identify socio-technical impediments as inseparable comprehensible elements of open data from the user perspective. In that work, availability and access, findability, usability, understandability, quality, comparability and compatibility, metadata, interaction with the data provider are examples of category factors making part of a comprehensive set of factors that impede open data. In the same way, Khan et al. (2011) conceptualise e-government as a phenomenon consisting of society, organisation, and technology factors—the factors viewed as a comprehensive set of necessary aspects. Those scholars analyse e-government literature in developing countries given those aspects (i.e. 'society', 'organisation', 'technology' and a 'combined' category) to investigate a balance in addressing a variety of issues. Here, a lack of balance in literature on those aspects would imply a gap that has a potential to hinder optimal way of advancing e-government in developing countries. Likewise, Dawes (2009) draws from her conceptual framework to indicate that an infrastructure that suits future e-governments consist of values and policies, and human, organisational, institutional, and societal factors in addition to tools and technologies.

Another example is the Zhang et al.' (2018) study which investigates the impact of a cybersecurity law on the technical and social sub-systems in China regarding trusting e-government services. In their study, the set of comprehensive factors in the technical sub-system consists of management practices and protocols, information management practices, and applications in addition to hardware and software. On the other hand, the factors in the social sub-system are human users of a system, their behaviours, and expectations and the social norms governing the interactions between the system and its users (Zhang et al., 2018). Cybersecurity law is taken as part of environmental factors impacting both the sub-systems (Zhang et al., 2018). See Table 4.1 on the use of STT.

Table 4.1 publications classified according to how sub-systems are treated

Use of STT	Number of studies	Examples of publications
Theory use where technical sub-system and social sub-system are viewed interdependent	27	-Shin, 2010 -Brown, 2016 -Damodaran et al., 2005
Theory use where technical aspects and social ones are viewed as comprehensive factors or comprehensive components making up a system	25	-Khan et al., 2011 -Dawes et al., 2016 -Zhang et al., 2018 -Zuiderwijk et al., 2013

Furthermore, the retained publications were subsquently classified according to contexts in which STT was used. The contexts were grouped according to continents. However, publications on a developed context were combined because one of the objectives for the review was to find out the extent to which STT was used in LDCs. Table 4.2 depicts how STT is used context wise. Note that in the table, the 'other' context refers to an undefined context to capture, in one category, the STT retained publications on which do not explicitly specify the context of study. This also applies to literature review STT publications.

Table 4.2 STT papers categorised based on geography

Context	Number of studies	Example of studies
Africa	5	Ruhode, 2013 Mahundu, 2016 Wayi, 2014
Asia	15	Korea: Shin, 2010
South America	2	Welch, 2012
Europe, North America USA and Australia	21	Brown, 2016 Dawes et al., 2016 Zuiderwijk et al., 2013
Other	9	Khan, 2011

Particularly, the 52 retained publications on STT were also screened for e-government literature on LDCs context. The screening was performed using the list of LDCs in Table 4.3.

Table 4.3 List of LDCs (adapted from UNCTAD, 2017)

Afghanistan	The Gambia	Niger	Yemen
Angola	Guinea	Rwanda	Zambia
Bangladesh	Guinea-Bissau	Sao Tome and Principe	
Benin	Haiti	Senegal	
Bhutan	Kiribati	Sierra Leone	
Burkina Faso	Lao People's Democratic Republic	Solomon Islands	
Burundi	Lesotho	Somalia	
Cambodia	Liberia	South Sudan	
Central African Republic	Madagascar	Sudan	
Chad	Malawi	Timor-Leste	
Comoros	Mali	Togo	
The Democratic Republic of the Congo	Mauritania	Tuvalu	
Djibouti	Mozambique	Uganda	
Eritrea	Myanmar	United Republic of Tanzania	
Ethiopia	Nepal	Vanuatu	

The findings showed that the use of STT in LDCs was limited. However, it was used in a study by Mahundu (2016) on a student's admission system in Tanzania. The findings showed that STT was more used in Europe, the US, and Russia, followed by Asian countries. The same review of the retained publications showed that STT was used in a limited way in African countries which are not LDCs including South Africa (e.g. in Wayi, 2014), Kenya, and Zimbabwe (e.g. in Ruhode, 2013).

Search 2. The search was performed in Web of Science using the query string "TOPIC: (socio-technical) AND TOPIC: (e-Government OR "digital government") for a default period 1975-2018. The search retrieved 43 publications. Out of those 43 publications, one conference publication focus in the context of a Least Developed country i.e. Lesotho. The publication studies human, technology and organizational aspects in a companies' registry system (Rammea & Grobbelaar, 2017).

Specifically looking at LDCs, the findings of the literature survey in this thesis show that use of STT is limited. From the first literature search, it was

identified that STT was used in the Tanzanian context in one study to identify socio-technical challenges. The findings in that study pointed out a need for integration of education related systems, addressing issues related to ICT infrastructure and access to services, technical design of the students' central admission system, resistance to change and training of users (Mahundu, 2016). From the second literature search a case study on Lesotho, showed that prevalent challenges are related to technical support and maintenance of the technical system, necessary infrastructure to access services, lack of local staff with adequate ICT skills, funding and investments in the project, and few users (Rammea & Grobbelaar, 2017). In a nutshell, the analysis of existing STT studies generally implies a dire need for further application of STT for better implementation of information systems in the provision of public online services in LDCs.

4.3 Socio-technical theory in this thesis

This thesis aims to improve the implementation of e-government services from an organisational perspective. Implementation of e-government services are undertaken within organisations viewed as socio-technical systems (Bostrom & Heinen 1977). According to socio-technical theory, once a technical sub-system is optimised at the expense of a social sub-system or vice versa, that leads to sub-optimal results (Mumford & Beekman, 1994). Furthermore, this circumstance "tends to increase not only the quantity of unpredictable, 'un-designed', non-linear relationships but also to those relationships that are injurious to the system's performance" (Walker et al., 2008, p.480). A joint optimisation in both sub-systems is required. This thesis holds the view that the successful implementation of e-government services would require investigating issues that can undermine implementation efforts in socio-technical systems of organisations in the public sector setting.

Implementation of e-government services can be challenging because of the various characteristics of the public sector. These characteristics include legislation, regulations, high demand for accountability, and pre-set budgets (Jurisch et al., 2013), and a broad range of constituent groups, sometimes with divergent interests (Robertson & Seneviratne, 1995). Furthermore, the implementation of e-government services requires making changes in government processes and organisational structures (Hughes, Scott & Golden, 2006; Kennedy, Coughlan & Kelleher, 2010).

As pointed out in section 1.4 and in Chapter 2, there is an apparent need to address e-government implementation challenges in LDCs where organisational change is still important and needed for better transactional services. Addressing organisational change issues would lead to the better economic use of resources instead of spending on the implementation of legacy systems which are costlier to replace in the future. The same afore-mentioned parts of this thesis indicated that Least Developed Countries (LDCs) are struggling to achieve online transitional services; these countries are lagging behind developed countries. In order to address those issues, underlying organisational issues would need peculiar attention and changes would be needed in the core organisational components comprising information systems in organisations, i.e. in tasks, and technology making up '*technical sub-system*' and people together with structures comprising '*social sub-system*' in organisations.

As e-government evolves in LDCs, a good fit between these sub-systems would help to avoid the production e-government systems which result in legacy systems that are costly to replace in future; this would allow the re-source-constrained context to use better little resources available for imple-menting e-government services. This thesis holds the view that addressing issues about those sub-systems must be prioritised to avoid spending resources on unnecessary aspects; resources are always scarce in developing countries. Adopting a socio-technical perspective for the fit between core organisational components would be a good choice in this case. Adopting such perspective in LDCs appear promising because it would expedite, to some extent, the process of organisational change still needed.

Furthermore in relation to making socio-technical changes and institu-tionalising them for better implementation of e-government services, e-gov-ernment practitioners can sometimes find it difficult to convince decision-makers and other staff about the changes. Employees in the public sector can be reluctant about such changes. There would be a quest for tools to assist in the generation of information about existing implementation issues as a guide regarding the making of rational decisions in a continuous pro-cess of implementation that requires improvements. There is an apparent need for model tools which embed socio-technical thinking that could be used by practitioners during the implementation of e-government services.

In the light of these considerations, a socio-technical perspective was adopted in the thesis. Socio-technical theory in this thesis is first used for

analysis purpose to investigate and understand e-government organisational issues, the potential ones and those confronting currently the implementation of e-government services in Rwanda, an LCD. Furthermore thesis suggests some solutions to issues— solutions incorporating a socio-technical thinking— by elaborating a model to assist practitioners towards institutionalising changes and addressing those issues.

Drawing from literature and depending on the phenomenon of study, the socio-technical system (STT) in this thesis consists of four main components: people, processes, structures, and technology (Bostrom & Heinen, 1977). However, because of the nature of the phenomenon studied in this thesis, i.e. implementation of e-government services from an organisational perspective, such socio-technical system is complex; it spans multiple agencies at central and local government levels in Rwanda (including a private agency in the second case initiative, i.e. implementation of one-stop e-government).

The roles of those agencies vary. Regarding the implementation of e-government services in Rwanda, the role of agencies at the central government level and the private agency, ROPL include:

- Designers, implementers, and evaluators. They initiate and carry out the design of the e-government service technical systems (design of government processes, assessment of requirements (infrastructure, hardware equipment, procurement, design and implementation of the technological systems of government, deployment of technological systems, assessment and monitoring)
- Funders (direct and indirect) and fund allocators in the implementation of e-government services
- Users of e-government service systems. Some of the agencies at the central government are also users of the technological systems designed and implemented at that level.
- Authors of laws, regulatory frameworks, policies, and organisational structures. Some agencies at central government level establish and enact laws, policies, rules, regulations and organisational structures influencing the implementation of e-government services. Regarding organisational structure, one agency (i.e. Prime Minister's Office) determines and oversees the organisational structure of other government agencies.

Furthermore in such implementation, the functions and roles of local government agencies include:

- Using e-government technological systems designed and implemented at central government level
- Working with staff from the central government/private company (i.e. Rwanda Online Platform Ltd., ROPL) in the identification of needs and reporting of the needs to the central government in charge/ ROPL
- Maintaining equipment and reporting issues related to the technological systems to the central government agencies in charge/ ROPL other contractors
- Enhancing and overseeing the use of technological systems and establishing related internal policies where applicable
- Participating in meetings and events including training sessions — meetings and events related to e-government practice organised by agencies at the central government level.

The socio-technical system in this thesis consists of the social sub-systems and technical sub-systems in two case projects. Figure 4.3 shows both the sub-systems and their underlying components.

The social sub-system is shown on the left in the figure while the technical sub-system is shown on the right; the two sub-systems are separated by a 'permeable' dash boundary symbolising interactions which should take place in the system.
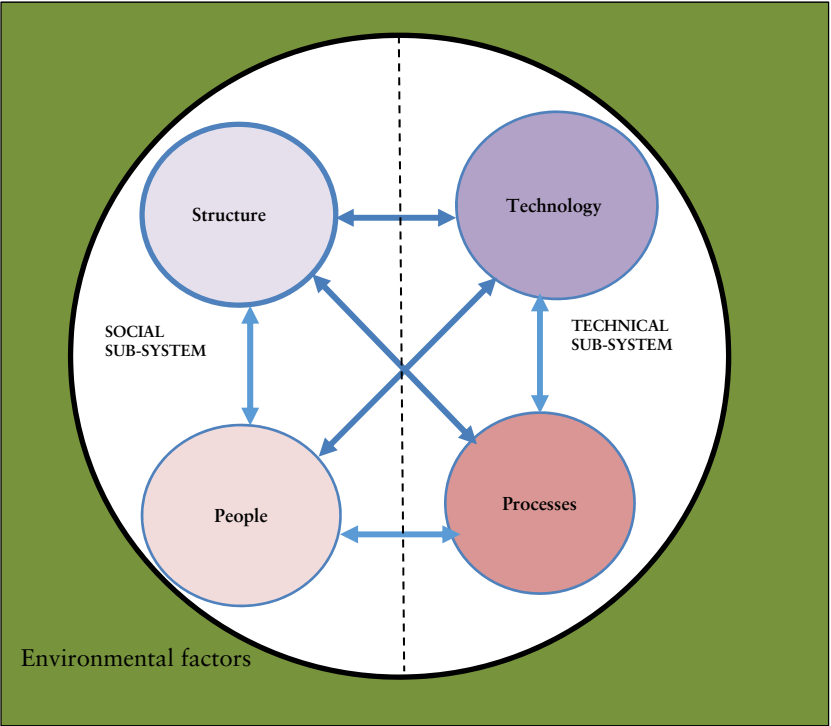

Figure 4.3. The organisational socio-technical system in the implementation of e-government services (adapted from Bostrom and Heinen, 1977).

The social sub-system is comprised of people and structural aspects:

- *People.* These people are integral parts of organisations. Aspects of people include attitudes, skills, values, believes and interactions among people (Bostrom & Heinen, 1977). In this thesis, the people aspects are those about government employees.

- *Structure.* Organisational structure is viewed as a foundation on which operating procedures rest (Jacobides, 2007). It can also be viewed as a framework for defining the relations between people's jobs and operating processes to achieve envisaged goals (Mintzberg, 1972 cited in Ahmady (2016). Pugh (1990) sees the organisational structure as a framework directing the allocation of tasks, coordination, and supervision towards achieving organisational goals. Comprehensively, Pugh et al. (1968) view it as a multidimensional construct which consists of a formalisation of procedures, standardisation, and specialisation of work in units, centralisation/decentralisation of control, and hierarchical job configuration in an organisation.

In this way, in thesis work on the implementation of e-government services, policies, rules, and regulations are considered as part of the structure. Henceforth, aspects related to job design and re-design, formalisation of procedures, regulatory framework, and policies, in Rwanda government agencies influencing e-government services, are part of the social sub-system in this thesis.

On the other hand, the technical sub-system is also comprised of technology and processes aspects:

- *Technology.* Technology is defined as "the application of scientific knowledge that enables manipulation of human surroundings for the practical purpose of meeting human desire" (Haines & Sharif, 2006, p.107). In this thesis, the technological aspects which are part of the study are the technical infrastructure, the hardware equipment, the software, and any innovative procedures and applied knowledge used by and/ or in public organisations— all of that influences the implementation of e-government services.

- *Processes.* A process is defined as "a structured, measured set of activities designed to produce a specified output for a particular customer or market" (Davenport, 1993, p.5). Tasks as are viewed as elementary

parts comprising a business process (Bititci & Muir, 1997). A process consumes resources (Harrington's 1991 cited in Suárez-Barraza, 2013) and may have a starting point and end or be continuous (Ould, 1995 cited in Lee & Dale, 1998, p.215). Processes can be classified into three categories of organizational processes, i.e. 1) main processes or core or primary or operational processes to achieve the goals of an organisation 2) management processes, carried out by the management to achieve the goals and 3) support processes to up-keep an organisation (ABPMP, 2013; von Scheel et al., 2014). In this thesis, tasks or activities include those carried out by agencies designing, implementing, and evaluating e-government services and those undertaken by user agencies. In this way, both management and operational processes undertaken or lacking in the implementation of e-government services comprise part of the technical sub-system.

The four aspects mentioned above comprise the socio-technical system in this entire thesis. However, it is worth noting that the size and scope of such a system studied varies across four of the five papers on which this thesis is based. It is worth noting that the social-technical system considered in this thesis as indicated in Figure 4.3 is embedded in an environment mainly consisting of political, financial, socio-economic factors as well as factors of stakeholders external to organisations implementing and using the e-government technical systems (e.g. citizen needs, values, and expectations). In this thesis, it is recognised that those environmental factors can influence the outcome of the implementation of modern technologies in public sector settings. However, the socio-technical system of this thesis is limited to organisational issues and environmental factors are out of scope.

Each of the studies in this thesis focus to one or more socio-technical aspects depending on the research question to address and e-government case under investigation. Table 4.4 depicts the main socio-technical aspects of focus in studies of this thesis.

Table 4.4 Studies and socio-technical aspects of focus

Studies	Socio-technical aspects
Paper I	- Processes - People - Technology - Aspects involving interaction of those aspects above
Paper II	- Processes - Structure - Technology
Paper III	- Processes
Paper IV	- Processes - People - Structures - Technology - Aspects involving interaction of the other four aspects
Paper V	- Processes, mainly, and other socio-technical aspects

5. Methods

This chapter describes the methodological approaches followed in this thesis. These methodologies considered include the literature review and qualitative empirical research. For qualitative research, a case study method was adopted. The chapter also describes the data collection and data analysis techniques used in empirical studies.

5.1 Literature review

Review of prior and relevant literature is necessary for any research work. Such a review is a firm means for advancing knowledge because it unveils the background of a research topic and areas where further research is needed and facilitates the development of theories (Webster & Watson, 2002). Cronin, Ryan, and Coughlan (2008) distinguish between two types of literature review, the systematic and the traditional.

The traditional literature review also termed conventional literature review (e.g. in Okoli & Schabram, 2010), is used to provide a comprehensive knowledge background about a research topic. The traditional literature review summarises the topic of research, identifies the gap, highlights significance of the research and concludes by selecting relevant literature sources where the selection process and criteria are not always made explicit to the reader (Cronin, Ryan and Coughlan 2008).

On the other hand, a systematic literature review follows a more rigorous process in a given area of research (Cronin, Ryan and Coughlan 2008). For instance, Parahoo (2006) indicates that such a type of literature review should specify the period for which the literature was selected, and methods used to analyse the literature and synthesize the findings. Regarding techniques for conducting a systematic literature review, Webster and Watson (2002) indicate that it is always good to start searching sample publications from top journals depending upon the topic and area of research. Second, to go backward to discover publications cited in the selected samples and go forward to uncover publications citing the selected sample publications. In the process of analysing publications, the same authors advise the analysis to be concept-centric rather than author-centric. Okoli and Schabram's (2010) work describes an 8-step guide for conducting a systematic literature review. The steps are 1) Defining the purpose of the review, 2) Establishing

a protocol to follow and training in case when more than one researcher does a literature review, 3) Elaborating a strategy for searching publications, 4) Doing a practical screening, 5) Doing a quality appraisal, 6) Extracting Data, 7) Synthesising studies and 8) Writing the review. Webster and Watson (2002) show that a systematic literature review often culminates into theoretical development.

In this thesis, both systematic and traditional literature reviews were conducted. The former type of review was conducted in Chapter 4 exploring the use of socio-technical theory. It was also used in the elaboration of the PDER model— a model for process improvement in the implementation of e-government services in Paper V. The traditional literature review was conducted throughout this thesis; in different chapters of this thesis cover paper as well as in the individual papers of this thesis.

5.2 Qualitative research approach and epistemology

The underlying research of this thesis is mainly qualitative. The first four papers drew from the qualitative data while the fifth paper is based on a systematic literature review.

5.2.1 Epistemology

In relation to assumptions about knowledge and how such knowledge is obtained i.e. epistemologically (Myers & Avison, 2002), qualitative research can be categorised as positivist, interpretive, and critical (Klein & Myers, 1999).

A positivist stance assumes that reality is objective; it can be accessed and described via measurable properties independently from an observer (researcher) and his/her instruments. The aim of qualitative positivist research is generally to test theories to predict phenomena. For instance, Information systems (IS) research is viewed as positivist if it consists of the quantifiable measure of variables, formal propositions, and the testing of hypothesis, and the drawing of inferences from a sample to population (Myers, 1997; Orlikowski and Baroudi, 1991).

On the other hand, a critical research stance assumes that social reality is historically constructed, and it is reproduced by people. The underlying belief is that people can act to improve their socio-economic conditions, but changes can be constrained by some forms of social, cultural and political

domination. The research seeks to be emancipatory by bringing to light alienating conditions that people can undergo (Myers, 1997; Klein & Myers, 1999).

In research with interpretive stance, it is assumed that reality is accessed via social constructions, for instance through language, consciousness and shared meanings. The general aim of interpretive research is about understanding phenomena from the perspective of people in that context i.e. via meanings that those people assign to the phenomena (Myers, 1997). Furthermore, according to Walsham (1993), IS research is interpretive if the aim is generally to understand information systems in their context, and how these two influence each other. This understanding is developed from people's perspectives and other data produced by people.

This thesis takes an interpretive epistemological stance in the sense that the phenomena of study—i.e. implementation of e-government services along with their embedding context— is understood from people involved in such implementation and from contextual data related to such implementation. The understanding of the phenomena is mainly done through people in agencies implementing e-government services in Rwanda and through artefacts produced by people in those agencies.

In qualitative research, research methods such as Action Research, Ethnography, Grounded Theory, and Case Study are examples of methods that can be applied (Myers, 1997). A research method is viewed as an inquiry strategy which starts with the underlying philosophical assumptions and moves to research design and data collection. Action research "aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework" (Rapoport, 1970, p. 499). The ethnography approach requires spending a considerable amount of time at the empirical site (Lewis 1985). On the other hand, Grounded theory is a method that is used to develop theory grounded in data which is systematically collected and analysed (Myers, 1997). When the primary concern is not to develop theory but rather to gain an in-depth understanding of a particular case, situation, or process, a case study methodology is appropriate in that situation (Yin, 1994). This is the case in this thesis; gaining an understanding of the phenomenon of implementation of e-government services from an organisational perspective in Rwanda is the aim of this thesis's

first four studies. A case study method is used in those four studies to investigate and understand underlying organisational issues in the implementation of the services. This is followed by the devising of solutions to issues which mainly comes in the fifth study. A Case study method was also chosen over Action research, for instance, in this thesis so that the empirical contribution of the thesis goes beyond solving immediate issues constraining implementation of e-government services in Rwanda. Through the case study method, the thesis contribution would also help address potential challenges and have implications for practice in other LDCs.

5.2.2 Case study

This thesis address the question of, "*How can the implementation of e-government services be improved from an organisational perspective in the context of Rwanda?*" . The thesis adopts a case study method to first establish an understanding, from the context, on e-government issues associated with implementation of services from an organisational perspective in Rwanda. The thesis goes on to elaborate solutions for improvements depending upon issues on the ground.

A case study research approach is an appropriate method for gaining an understanding of the meanings of phenomena as interpreted by people in the real-life setting of those phenomena (Yin, 1994; Yin, 2003; Walsham, 1995). A case study research method is viewed as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when boundaries between the phenomenon of study and context are not clearly evident; and in which multiple sources of evidence are used" (Yin, 1984, p. 5). Such method is appropriate in this thesis as the boundary between the phenomena of study (i.e. issues related to the implementation of e-government services in Rwanda) and the context in which such implementation takes place is blurred.

According to Benbasat, Goldstein, and Mead (1987), a case study method is used to examine "a phenomenon in its natural setting, employing multiple methods of data collection to gather information from one or a few entities (people, groups, or organisations)" (p. 370). Furthermore, the method is suitable when the phenomenon of study is contemporary and there is a lack of theoretical base for such phenomena (ibid). This is the case of this thesis on implementation of e-government services—the thesis in

which empirical research is carried out from a number of Rwanda organisations using multiple data collection techniques.   A qualitative case study method was chosen to have an in-depth understanding of the phenomena related to e-government implementation issues in the case of Rwanda's service-oriented projects. Implementation of such projects is a complex phenomenon as it involves multiple agencies, people in those agencies at different levels; gaining an understanding of those implementation issues requires at least digging into government processes into agencies, understanding technological issues, people's issues as well as organisational structure and regulatory framework.

Both qualitative and quantitative data can be collected for a case study, however, analysis should go beyond quantitative measurement to establish understanding based on the actors' perspectives (Zainal, 2007). In this thesis, it is mainly the qualitative data which was collected. However, in few instances, quantitative data was also collected from some documents related to the topic of research. Yin (1994) indicates that generalisation of findings in a case study should be based on theoretical premises, rather than on the population in statistical terms. However, case study findings can be generalised to similar cases or situations (Laws & McLeod, 2004).

In order to uncover, understand multiple facets of a phenomenon and gain an in-depth understanding, a case study method is applied to study complex phenomena in their own setting context using different data sources (Baxter & Jack, 2008). Those data sources can include observations, textual data, visual data and interviews with individuals and in a group i.e. focus groups (Sylverman, 2013). Baxter & Jack (2008) indicate that textual data includes documents while observations can be direct and participant observations. All those different data sources are triangulated or put together in the analysis process rather than being treated individually (Baxter & Jack, 2008).

 In the case of this thesis, two case projects were selected. The first case is one project implementing the Enterprise Content Management System in governmental organisations known as 'document tracking and workflow management system'. The second case project is related to the implementation of one-stop e-government services. Both projects involve multiple agencies in Rwanda. Data sources for empirical work in this thesis are interviews, focus groups, observations, documents, and online materials.

5.2.3 Data collection

In a case study, multiple methods for data collection are normally used to gain rich data about a phenomenon under study in a given context as well as to capture underlying contextual complexity (Benbasat, Goldstein & Mead, 1987; Silverman, 2013). For instance, interviews, documents, and archival records, observations and physical artefacts are among sources of empirical data. However, research questions and unit of analysis would determine the specific data to be collected (Benbasat, Goldstein & Mead, 1987).

There are three main types of interviews i.e. structured, semi-structured and unstructured. Structured interviews are easy to conduct, but they may lead to data which is not rich. Semi-structured and unstructured or open-questions can lead to in-depth understand of a phenomenon but unstructured interviews can be better in terms of limiting preconceived theories and ideas but they can be time-consuming because of open questions which are loosely focused. On the other hand, semi-structured interviews allow a flexibility for an interviewer to diverge and pursue responses for details (Gill , Stewart, Treasure, Chadwick, 2008). Interviews can be conducted with individuals or conducted with groups. In the latter case, the oral data collection from a group would qualify to be called a focus group if it is a group discussion organised on a particular topic for research purposes. In that case, discussions should be guided and recorded by a researcher. Focus groups are used to gain collective views and meaning behind those views. They are used where appropriate (Gill, Stewart, Treasure, Chadwick, 2008).

Regarding documents as a source of empirical data, they are any source of written information. Documents include writings, photographs, oral testimonies in a written form, and even archaeological artefacts in a written or drawn form (Caulley, 1983). The writings can be technical reports (e. g. articles viewed as a form of secondary of data) or non-technical documents viewed as a source of empirical data (Bowen, 2009). For instance, internal correspondence and reports and other types of organisational documents can be a possible source of empirical data for case studies (Mills, Bonner, & Francis, 2006).

Concerning observations, there are two main observation types: non-participant observations and participant observations (Kaplan & Maxwell, 2006). Non-participant observations are the ones in which an observer

keeps a distance from the phenomenon being observed so as not to make any influence (Flick, 2009). These observations can be conducted, for example, by videotaping or collecting data without informing subjects where applicable, in open spaces. In participant observation, an observer plays a role for example by engaging with subjects and even in informal discussions. Such observations generate a detailed account of what is going on and elicitations from users' explanations. In both cases, an observer records data and the collected data can describe the setting (Kaplan & Maxwell, 2006).

In this thesis, empirical data were collected via interviews, documents analysis, focus groups and via participant observations. As shown in Table 5.1, in some of the papers, a combination of the techniques was used. The table gives an account of the data collection methods used in each paper for this thesis work.

Table 5.1 Overview of empirical data collection techniques

Paper	Data collection techniques			
	Interviews	Document Analysis	Focus groups	Observations
Paper I	X	X		
Paper II	X	X		
Paper III	X	X	X	X
Paper IV	X	X		

Interviews. Interviews for this thesis were conducted with government employees in the two case e-government initiatives i.e. implementation of the enterprise content management system (ECM) and the implementation of one-stop e-government ('IREMBO') in Rwandan agencies. Interviews were also conducted with employees from the private agency, ROPL in the second case. Table 5.2 gives an overview of e-government initiatives in the cases , the respondents, and their government agency levels in each paper.

Table 5.2 Papers, cases and respondents overview

Papers	Case initiative	Respondents categories	Central/Local government level
Paper I	ECM	Unit managers	Both
		Technical system users	Both
		IT professionals	Both
Paper II	IREMBO	Unit/agency managers	Central government
		Service clerks	Local government
Paper III	IREMBO	Unit/agency managers	Both
		Service clerks	Local government
Paper IV	ECM and IREMBO	Unit/agency managers	Both

In Paper I, in the case of 'Enterprise Content Management', data was collected from July to December 2015 via face-face semi-structured interviews with 56 people – managers, users, and IT staff – in ten public organisations in Rwanda, eight in local government and two in central government. The selection of individuals was based on their involvement in the DTWMS project in their respective organisations. Questions for interviews are listed in Annex 1.

For Paper II, data collection started in July 2016 and ended January 2017. Nineteen face-to-face interviews were conducted from 6 central government agencies and from 4 district agencies. Questions for interviews appear in Annex 2.

Regarding Paper III, 16 semi-structured interviews were conducted from July to September 2017 from 3 central government agencies, one private agency, and 4 local governments' agencies with e-government professionals, organisation managers, and service clerks. Questions for interviews are listed in Annex 1 of paper III.

In Paper IV, a total of 13 semi-structured interviews were conducted from December 2017 to May 2018 on both the ECM and the one-stop e-government projects. The respondents were managers from eight agencies; three government agencies at the central government level and a private company. The other four agencies, at the local government level, were users of the respective government information systems in the two projects. Questions for interviews are listed in Annex 3.

Documents. Government documents, internal documents, and other online material were collected to complement the empirical data. These documents are related to e-government policy, strategies, laws, service digitalization, and evaluation. Internal documents are on service digitalization and evaluation. The documents were searched online either using information from respondents or using information from preliminary findings or as my own initiative in some cases when information was apparently required. A few sources were given to us by government employees. A list of documents analysed is shown in Table 5.3.

Table 5.3 Documents investigated

Paper	Document title/name	Document Category (Source)
Paper I	Document tracking and workflow management system-usage report	Internal document (RDB)
Paper II	Prime Minister's Order N°115/03 Of 08/04/2016 Determining the Structure of the Manual of Administrative Procedures in Public Service	Ministerial Orders (Office of the Prime Minister, 2016);
	ICT Laws	ICT laws (Ministry of Youth and ICT; n. d.)
	SMART Rwanda Master Plan 2015 ~ 2020	Policy and strategy (Ministry of Youth and ICT, 2015)
	National Information and Communication (NICI) Plan - 2015	
	Prime Minister's Order N°115/03 Of 08/04/2016 Determining the Structure of the Manual of Administrative Procedures in Public Service	Ministerial Orders (Office of the Prime Minister, 2016);
	Law n°86/2013 of 11/09/2013 establishing the general statutes for public service article 63	Office of the Prime Minister (2013);
	Implementation Framework for the Development and Deployment for Rwanda's Single Integrated E-government Platform	Public-Private Partnership/e-Gov Implementation (GoR, 2016).
	"Performance Contract" 2016-2017	Performance Contract (MINALOC, n. d.)
	RALGA members consulted on Local Government Organisational Structure Review	Organisation Structure (RALGA, 2013; MINALOC, 2013)
	Rwanda Civil Registration and Vital Statistics Systems	Report (National Institute of Statistics of Rwanda, 2016)

Table 5.3 Documents Analysed - Continued

Paper	Document title/name	Document Category (Source)
Paper III	Service Delivery Joint IMIHIGO FY 2017-2018	Performance (MINECOFIN, 2017)
	Implementation framework for the development and the deployment of Rwanda's Single Integrated E-government Platform	Project document (GoR, 2016).
	Citizen Report Card 2015	Report (RGB, 2016)
	Citizen Report Card 2016	Report (RGB, 2017)
	Ranking of Districts' IREMBO services	Internal Document
	Imihigo Evaluation FY 2016/2017: Final Report	Report (IPAR, 2017)
Paper IV	Service Delivery Joint IMIHIGO FY 2017-2018	(MINECOFIN, 2017)
	Development and Deployment of Rwanda's Single Integrated e-government Platform	(GOR, 2016)
	Eliminate bureaucracy from land registration	(Igihe Ltd., 2017)
	District benchmarking report	Internal document
	Document Tracking & Workflow Management System Report, April 2014	Internal document

Table 5.3 Documents Analysed - Continued

Paper	Document title/name	Document Category(Source)
Paper IV	Rwanda Civil Registration and Vital Statistics Systems	(National Institute of Statistics of Rwanda, 2016)
	Performance audit on the utilisation of document tracking and workflow management system	(Office of the Auditor-general, 2016)
	Records and archives management policy	(MINISPOC, 2012)
	Service charter at the district level	(MINALOC, 2015)
	Presidential Order N°25/01 of 09/07/2012 establishing the list of fees and other Charges levied by decentralised entities and determining their thresholds	(Republic of Rwanda, 2012)
	'Mutuelle' subscribers to use IDs to access healthcare	(The New Times, 2018a)
	Land transfers go online	(The New Times, 2018b)
	New ICT law embodies data privacy protection	(The New Times, 2018c)

Focus groups. In Paper III, four focus groups (Kitzinger, 1995) were conducted from July 10th to September 19th, 2017 with people from four government organisations. These focus groups were conducted in two districts both located in the Southern Province of Rwanda and then from two central government agencies; one at e-government strategy and policy level and the other at an e-government implementation level. Focus groups at central government level consisted of senior e-government managers and those at district level were made of decision- makers, medium, and low management and service clerks. Figure 5.1 and Figure 5. 2 are photos of focus groups in Rwanda government agencies. A list of questions for focus groups along with interviews is presented in Annex 1 of the paper.

Figure 5.1. Focus group at Nyanza District

Figure 5.2. Participants of the focus group at the Ministry of ICT at the meeting closure time

Observations. In paper III, two participant observations were made on April 7th and April 9th, 2018 to figure out how online survey for end-users was being conducted on the one-stop portal (i.e. at irembo.gov.rw). I have performed one observation while applying for a driver's license renewal and made another while applying for a marriage certificate.

In summary, types of investigations, data collection techniques, and case projects, organisational government level site visits and a timeline for each of the papers are shown in Table 5.4.

Table 5.4 Overview of the research activities

Details	Paper I	Paper II	Paper III	Paper IV	Paper V
Type of investigation	Empirical	Empirical	Empirical	Empirical	Theoretical
Data techniques	-Interviews	-Interviews -Documents	-Interviews -Focus groups -Documents -Observations	-Interviews -Documents	-Literature review
Case	ECM	IREMBO	IREMBO	IREMBO ECM	
Government levels of field sites	-CG* -LG*	-CG* -LG* -Private company	-CG* -LG* -Private company	-CG* -LG* -Private company	
Period	2015-2016	2016-2017	2017	2017-2018	2017-2018

Note: **CG:** Central Government, **LG:** Local Government

5.2.4 Data analysis

In this thesis, three data analysis methods were used. These are: content analysis, template analysis, and document analysis.

Content Analysis. To Bowen (2009), content analysis is viewed as a "process of organising information into categories related to the central questions of the research" (Bowen, 2009, p.32). Content analysis is a method that can be used with either qualitative or quantitative data (Elo & Kyngäs, 2008). In this thesis, qualitative data is mainly analysed even though a limited quantitative data in few instances is considered. Qualitative content

analysis is viewed as a method for subjective interpretation of text data through systematic coding and the identification of themes or patterns (Hsieh & Shannon, 2005). The qualitative content analysis method can be 'inductive' in cases where concepts are derived from data, as it can also be deductive in the cases when the analysis is done based on existing theoretical knowledge. Deductive content analysis is used often to verify if a hypothesis holds in a given context by conducting a test via data in that context (Elo & Kyngäs, 2008). Hsieh and Shannon's (2005) work indicates that qualitative content analysis can also be categorised as conventional, directed, or summative. In the case of conventional qualitative content analysis, themes inductively emerge from data and are suitably used when there is limited literature or theoretical understanding about a phenomenon. Regarding directed qualitative context analysis, initial or a priori themes are formed from existing literature. Summative qualitative context analysis, in contrast, quantifies the textual data in terms of the frequency of certain words or the particular content in the data. If the analysis is limited to the appearance of words used by respondents, it is categorised as 'manifest'; it would be classified as 'latent' if a further step is taken to interpret the content (Hsieh & Shannon, 2005). To Bengtsson (2016), manifest qualitative data analysis is generally a thematic data analysis approach limited to 'what has been said' whereas latent qualitative analysis is also thematic but goes further to 'what intended to be said' (p. 9).

Bengtsson's (2016) work contrasts qualitative content analysis methods with other thematic ones. In such work, what distinguishes qualitative content analysis from other thematic data analysis approaches, such as phenomenological and hermeneutical ones, is related to "how the researcher relates to the analysing process itself and adapts to the results" (p.12). In qualitative content analysis, the researcher takes a neutral perspective on the data collected and considers objectivity in the data even though he/she may can go beyond from manifest to latent analysis, however, in the latter approaches, the researcher "focuses on exploring how the informants make sense of experience and transform experiences into their consciousness. The researcher must then attempt to find the essence of the studied phenomenon" (p.12), where the researcher can potentially increase the level of subjectivity.

The content analysis method is used in different disciplines including e-government research. For instance, Zhou's (2004) and Joseph and Avdic's

(2016) works are examples of the use of the content analysis in e-government research.

In this thesis, qualitative content analysis was used to analyse empirical data for Paper I. Specifically deductive approach was chosen for the study in Paper I because of the nature of the research question to address and the existing literature on the topic. Both directed and summative approaches to qualitative content analysis (Hsieh & Shannon, 2005) were adopted for the study in Paper I to answer:

"How do critical success factors in ECM implementation in Rwanda relate to those in the literature?"

In order to address the question, dimensions in Horne and Hawamdeh's (2015) and Norton's (2015) theoretical frameworks were adopted as higher-level themes. Interview transcripts were first read to get a picture of it. This process was followed by annotating data into codes. The resultant first level codes were further analysed for relationships. Depending on those relationships, the first-level codes were further clustered into second-level codes. Eventually, those codes were further clustered and interpreted according to the higher-level themes from Horne and Hawamdeh's (2015). Because of the significant number of interviews for that study, a qualitative data analysis software dubbed 'Nvivo' was used in the process of coding the data. The analysis of data culminated into counting the frequency of themes from respondents. That frequency helped to rank factors; themes from Norton's dimensions (2015) were used to inspect how the ranking of empirical success factors differ from those in literature.

Template Analysis. Template analysis is a form of thematic data analysis in which qualitative data is coded into hierarchical themes, where the level of hierarchical structure can be high sometimes, depending on the phenomena being studied and the nature of the study. The particularity with such analysis method is the development of a coding template. The template is arrived at by forming a priori themes from a subset of data and even from the literature or theory, and the template is applied to further data which can dictate the refinement of themes (Brooks et al. 2015; Blair, 2015; King, 2004; King, 1998). In that way, template analysis follows sequential steps. For instance, according to Brooks et al. (2015), the template analysis method consists of

six steps: First, a researcher should familiarise him/herself with data to be analysed. Second, a preliminary coding should be done either from a subset of the data or by figuring out preliminary themes from the literature. Third, emerging themes would be clustered and inspected regarding how they related to each other. Fourth, an initial coding template should be defined. Fifth, the template will be applied to further data, and the themes would be refined where necessary. Sixth, the template would be applied to the full data set.

We learn from Braun and Clarke' (2006) work that thematic analysis has a potential to be applied to a range of approaches be it theoretical or epistemological; what matters is that researcher should explicitly stick to their epistemological assumptions. In that way, template analysis is not limited to a particular epistemology; it is a flexible thematic analysis method which permits itself to be adapted to needs of a specific study along with its underlying assumptions.

The main differences between template analysis and other thematic approaches such as interpretative phenomenological analysis (IPA) lie first in the use of a priori codes in the case of template analysis, and secondly, in a balance between analysis within and across cases and ; IPA demands in-depth analysis of individual cases before summing up all cases together. Furthermore, template analysis is suitable for studies with few or even much more participants while IPA is suitable for studies with up to 10 participants and better with fewer participants when they provide rich data (King, 2004). Brooks et al. (2004) indicate that template analysis is not suitable for studies conducted from social constructionism perspective as these require fine details of how "language constructs social reality in interaction"(p. 205). That situation is the case with studies concerning, for example, discursive psychology and conversation analysis (Brooks et al., 2004).

In this thesis, template analysis is used in Paper II, Paper III, and Paper IV. In paper II, a priori themes from the literature were formed. To come up with those themes both the Business Process Change (BPC) (Pateli & Philippidou, 2011) approach and Nurdin et al.'s taxonomy (2011) were used. The BPC approach and the taxonomy were chosen because they give many insights on organisational issues which are the subject of Paper II. Steps in Business Process Change approach were used to assess achievements and shortcomings in the implementation of Rwanda 'one-stop' e-gov-

ernment. Nurdin, Stockdale and Scheepers's (2011) taxonomy of organisational factors were used to identify challenges in each factor as far as the implementation of Rwanda one-stop is concerned.

Regarding Paper III, template analysis was used in order to figure out how and the extent to which implementation of one-stop e-government is monitored in Rwanda. A priori themes, e.g. 'Central government level' and 'Local Government level' were formed from contextual data. Empirical data was analysed in view of those themes. Furthermore, a priori themes were formed from existing literature. For this, an e-government project cycle model was adapted from Hatsu and Ngassam's model (2016) and Heikkilä, Vahtera and Reijonen's (2004) work. The resultant model consists of three stages: 1) Definition and planning, 2) Execution and deployment, and 3) Use and maintenance. Template themes were formed according to the names of the three stages. Furthermore, codes were formed under the third theme of 'Use and maintenance' following e-government quality dimensions (Halaris et al., 2007) and e-government benefits (Gouscos et al., 2007). Empirical data was analysed in view of those a priori themes.

Regarding Paper IV, four socio-technical dimensions i.e. People, Processes, Technology, and Organisational structure also viewed as organisational socio-technical aspects) were used as four themes. Furthermore, the resulting interaction of those aspects i.e. 'Secondary effects' (Bostrom & Heinen 1977) was used as the fifth theme. Those themes were derived from literature and used to understand the extent of the fit and secondary effects, in the implementation of services, between the technical and the social subsystems of organisations.

Document Analysis. To Pershing (2002), document analysis refers to the review of any document for gathering facts. Bowen (2009) views document analysis as a systematic way to review or evaluate documents in a printed and electronic format.

Document analysis can be used to gain background information, to supplement data, to inform the formulating of additional questions, to trace back past events, to track changes and development, and to verify the findings from different sources (Bowen, 2009). Document analysis can be used as a separate research method or as a part of other methods when studying the same phenomenon using multiple methods (Pershing, 2002). For instance in the former case, document analysis as a qualitative data analysis

method can be applied, for instance, in case studies to produce descriptions of a phenomenon (Stake, 1995; Yin, 1994). In the latter case, combining it with other methods is referred to as triangulation (Denzin, 1970). In that situation, data related to a phenomenon of study is collected and analysed using different complementary methods to develop rich insights and to reduce bias or to establish corroboration among the findings. Document analysis method can be used along with other methods in studies including, but not limited to, ethnographic studies, case studies, and studies using grounded theory (Bowen, 2009).

Preparations for document analysis require prior investigation of the accessibility of data. Beyond the accessibility of data, a researcher intending to use empirical data, in terms of documents would need to assess the authenticity and the usefulness of data considering the originality and the context and the intended audience of the documents (Bowen 2009). Hence, document analysis requires the finding and selection of data, and both the superficial and then the thorough examination of data and the synthesis of it, and the interpretation to make sense of the meaning of the data towards gaining an understanding, and developing empirical knowledge (Corbin & Strauss, 2008; Merriam, 1988; Bowen, 2009). To Bowen (2009), this process can be an iterative process, combining both content analysis and thematic analysis. However, when document analysis is used along with other methods in a study, documents can be analysed according to codes or themes defined using other methods (Bowen, 2009).

In this thesis, documents are online materials and internal documents related to the ECM and the one-stop e-government projects in Rwanda in one way or another. Those documents include those related to e-government policy in Rwanda, internal documents on the usage of the ECM and the one-stop information systems in Rwanda, internal documents on the implementation of one-stop e-government, the performance contracts and the performance evaluation related documents, the regulatory framework documents and the documents related to events on the ECM and the one-stop e-government.

In the thesis, documents analysis was used along with other methods in the individual studies, for instance in Paper I, Paper II, Paper III, and Paper IV. For example, in Paper I, internal documents on the use of the ECM system were analysed to guide the selection of agencies to study in research work, using content analysis as the main method. In the subsequent papers,

i.e. Paper II, Paper III, and Paper IV, documents analysis was also done along with other methods where empirical data includes interviews (in all the three papers), and focus groups and observations particularly in Paper III. In those three papers, data from documents was used as a complementary source and sometimes used for corroboration purposes (e.g. some documents in Paper II and Paper IV). In cases when the data from documents were being used as complementary sources in those three papers, the data from the documents were analysed for predefined themes arrived at using template analysis in those papers.

6. Summary of Papers

This chapter summarises the papers comprising this thesis work. Table 6.1 depicts the papers, the corresponding research questions, and the corresponding key findings.

Table 6.1. Papers, research questions, and key findings

Papers	Research questions	Key Findings
1. E-Government Implementation in Developing Countries: Enterprise Content Management in Rwanda	-How do success factors in ECM implementation in Rwanda relate to those in literature?" - What measures could be taken to improve the ECM implementation?	-Success factors for the ECM implementation in literature do relate with those in ECM case in Rwanda, but their rankings differ. - ECM implementation in Rwanda focused more on technological aspects. The implementation should also focus on organisational change, in terms of aspects including business process redesign and change management towards success
2. Organisational Challenges in the Implementation of 'one-Stop' e-Government in Rwanda	- What are the underlying organisational issues in the implementation of 'one-stop' e-government in Rwanda?	-Lack of re-design of service processes, - Lack of a clear plan on 'to-be' services processes, - Lack of a clear change management strategy, -Unclear organisational learning among government agencies and - Lack of operational goals in the local government while implementing a one-stop e-government project -The focus is on putting many services on the portal with scant attention to service re-design

Table 6.1. Papers, research questions and key findings (Continued)

Papers	Research questions	Key Findings
3. E-government implementation and monitoring: The case of Rwanda 'one-stop' E-government	- How is the process of implementing the Rwanda one-stop e-government monitored? -What are the potential areas for improving the monitoring of Rwanda one-stop e-government?	-Monitoring of one-stop e-government is partly formal at central government level and informal at the local government level. Moreover, the focus of the monitoring leans more towards the benefits of end users than those of the service providers.
4. E-Government Implementation Process in Rwanda: Exploring Changes in a Socio-Technical Perspective	-What is the extent of socio-technical changes and effects in the implementation of e-government services in Rwanda?	-A number of changes in processes, technology, and in people aspects were made in two case service projects. - Those changes went with secondary effects; there is a need of addressing those effects mainly in the social systems corresponding to both cases for a better fit between the technical systems and the social systems; a greater need is apparent in the ECM case project.
5. A Model for Process Improvement in the Implementation of e-Government services: Plan-Do-Evaluate-Resolve (PDER)	-What would be a model for process improvement in the implementation of e-government services?	A model consisting of four dimensions i.e. Plan-Do-Evaluate-Resolve with 7 stages with 23 activities altogether was elaborated

6.1 Paper I

Title: **E-Government Implementation in Developing Countries: Enterprise Content Management in Rwanda**

The paper is based on empirical data on the implementation of Enterprise Content Management systems in Rwanda government organisations. The paper addresses the research questions of *1) "How do success factors in ECM implementation in Rwanda relate to those in literature?"* and *2) What measures could be taken to improve the ECM implementation?*

Empirical findings reported that success factors on the ECM implementation in Rwanda and in literature are similar but strongly differ in the ranking; there is a strong focus on the ECM technical tool in Rwanda with less attention to organisational change issues. The findings show that user issues are the critical ones; a number of users do not see the advantage of the ECM system. Contrarily, the literature shows that the ECM implementation is a project change where the factors of a balanced team, business process re-engineering, change management, clear vision are among the top factors.

The focus on the technical tool can be explained by how a team of IT professionals and a project manager—at national level altogether in one central government agency— are responsible to adapt a procured ECM software system to the structure of government agencies at central and local government without a clear business process change plan and a corresponding change management plan. The same team is responsible for deploying the system in the agencies. Users are less involved as indicated in the results. The implementation team is not balanced.

Furthermore, the technical focus and less attention to organisation change issues are explained by unclear goals, challenges related to project management, project champions, business process re-design and top management support and balanced team which seemed to be the most urgent factors to be addressed in general at user organisations, as indicated in Paper I.

From a socio-technical perspective, the findings point to a loose of fit between the technical sub-system (tasks, technology) and social sub-system (people aspects and structures). The focus is more on the technical sub-system specifically on technological aspects because of underlying organisational processes which were not being re-designed for ECM implementation. Furthermore, a lack of attention was paid to people issues related to the quality of working life and skills (issues related to double work, complaints about a lack of training were also identified).

For a way forward towards addressing user concerns and gaining the real benefits of the implementation of ECM in Rwanda, organisation change issues related to business processes re-design and change management appeared are among the ones to be addressed. However, addressing those issues would first require to deal with issues of unclear goals, challenges related to project management, project champions, and management support.

6.2 Paper II

Title: Organisational Challenges in the Implementation of 'one-stop' e-Government in Rwanda

The findings in Paper I have led me to examine another case of service-oriented project (i.e. 'IREMBO' case). Paper II draws from empirical data in Rwanda agencies implementing one-stop e-government initiative (i.e. 'IREMBO'). This paper addresses the research question: *What are the underlying organisational issues in the implementation of 'one-stop' e-government in Rwanda?*

The paper aims to investigate organisational implementation issues in the implementation of 'one-stop' e-government in Rwanda, up to March 2017. The study identified various organisational issues in the implementation of one-stop e-government at the central and local government levels.

At the central government level, the investigation found a lack of service process re-design and lack of corresponding service process redesign plans. Paper-based services existing before the project implementation were merely being automated; digitalisation of services was being undertaken by superimposing technology over existing structure and processes. Furthermore, there was unclear plan for improving services processes through the implemented services. There was a lack of a clear change management strategy (in the medium- as well as the long-term) towards service process improvements. The focus was on the technical implementation of services; the priority of a contractor company was to put a list of services contracted online in a limited time and scant attention was paid to service re-design.

At the local government level, the findings indicated a lack of clear operational goals and a lack of systematic organisational learning in the local government agencies involved in the study. Goals existed at central government level but they proved not to be enough; clear operational goals at the local government level were missing to meet the national goals.

From a socio-technical perspective, the findings point to a risk of having an imbalance between the 'technical subsystem' (technology, tasks) and 'social subsystem' (people, structures) because the focus was on the digitization of services without re-designing processes in the service-providing organisations. Furthermore, lacking processes related to establishing clear goals and instituting mechanisms for organisational learning in the local

government was a sign of imbalance in the socio-technical system of organisations implementing one-stop e-government services in Rwanda.

6.3 Paper III

Title: **E-government Implementation and Monitoring: Case of Rwanda 'One-Stop' E-government**

Paper III is based on empirical data and it addresses the research questions:

1) *How is the process of implementing the Rwanda one-stop e-government monitored?*
2) *What are the potential areas for improving the monitoring of Rwanda one-stop e-government?*

The study builds on findings in Paper I and Paper II to prepare for elaborating a model that would help organisations to cope with the organisational issues identified in those papers. The findings of the paper unveil a gap at the central and the local government in terms of monitoring implementation of e-government services for improvement. It is identified that the monitoring of implementation and improvement process for the one-stop e-government is partly formal at the central government level and informal at the local government level. In addition, more attention was put more on the benefits to end-users. Scant attention was paid to the benefits of service providers. Potential areas of improvement were identified as increased attention to benefits of service providers and also to back-end process performance. Improvements would also take place if the central government amends monitoring at the stage of "definition and planning". Furthermore, the need was identified to devise formal, methodological approaches at the local government level and at all stages of the implementation.

6.4 Paper IV

Title: **E-Government Implementation Process in Rwanda: Exploring Changes in a Socio-Technical Perspective**

The paper draws from empirical data and addresses the research question:

What is the extent of socio-technical changes and effects in the implementation of e-government services in Rwanda?

The paper aims to investigate the extent of socio-technical changes and effects in the implementation of two e-government service-oriented initiatives (ECM and 'IREMBO') in Rwanda from the period from January 2017 to May 2018.

The findings show that significant changes in processes, technology, and in people aspects were carried out in both ECM and 'IREMBO' case projects. However, there are also important accompanying secondary effects. A larger gap was identified in the ECM case. In that case, changes were made in process-related aspects of implementing services in new agencies. Other changes were related to the re-design of the ECM system with new functionalities related to making provisions to share documents related to requisition of office supplies, requests for transport, and employee leave requests. Furthermore, technology-related plans to improve the ECM system were in place. However, issues related to lacking advantages of ECM and lack of satisfaction were identified from user agencies. Likewise, issues related to a lack of internal policies were found. There was also no indications of a re-design of the workflow among user agencies or related plans from the project management at the national level. Still the focus was on implementation of ECM technological tool as identified previously in Paper I. Because of those issues, this thesis identified the problem of a lack of fit between the technical sub-system and the social sub-system. In the case of one-stop e-government, the findings also indicated a lack of fit between technical and social sub-systems. In that case, significant changes were made in the processes related to implementing re-designed services including, for instance, the provision of online certificates for a set of services. In the social sub-system, the needs to adjust the organisation structure and harmonise the public service information were identified. Furthermore, establishing a conducive regulatory framework for systems integration were found to be necessary. Technical aspects to amend the project are about improving the ICT infrastructure for the one-stop e-government initiative in some agencies.

6.5 Paper V

Title: **A Model for Process Improvement in the Implementation of e-Government services: Plan-Do-Evaluate-Resolve (PDER)**

The paper is based on the literature review and addresses the research question: *What would be a model for process improvement in the implementation of e-government services?*

Discerning and making socio-technical changes in the implementation of e-government services might not come easy way in the public sector due to its inherent complex characteristics. Convincing government employees about changes cannot be easy without a systematic monitoring system towards addressing organisational implementation issues. The aim of the paper is elaborate a model which can help e-government practice to cope with those organisational issues.

In the paper, a model consisting of four dimensions i.e. Plan-Do-Evaluate-Resolve (PDER) was elaborated with 7 stages, comprising 23 activities altogether.

This process conceptual model is shown in Figure 6.1; the 23 activities are indicated in Paper 5.
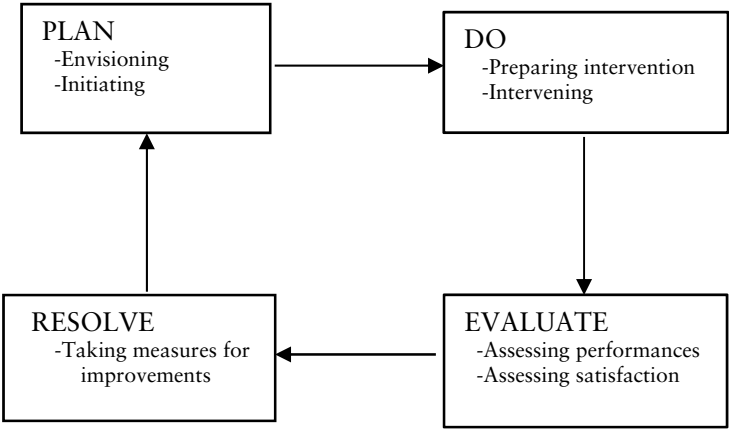
Figure 6.1 Plan-Do-Evaluate-Resolve model (PDER)

The model provides a comprehensive set of stage-wise activities to monitor the implementation of e-government services. Furthermore, the paper suggests how to use the model and describes a scoring system to help managers perform process monitoring. Through use of the model, it is expected that socio-technical changes and other related aspects would be discerned and implemented. Those changes would lead to the elaboration of continual solutions to improve services. In this case, the model serves as a catalyst for making changes in the public sector organisations implementing e-government services.

7. Conclusions and Final Remarks

This chapter summarizes and discusses the findings of this thesis. In relation to those findings, contribution and implications of this thesis are also discussed. Eventually, the thesis addresses its limitations and future directions for other research. Concluding remarks follow.

7.1 Major findings and discussion

In this thesis, issues related to the implementation of e-government services in two cases, ECM and IREMBO in Rwanda are investigated and addressed from a socio-technical perspective. Those issues are viewed in terms of 'socio-technical' systems comprised of aspects of people, structures (*i.e. forming social sub-system*), processes, and technology *(i.e. forming technical sub-system)* in organisations and interactions of these aspects when implementing e-government services in Rwanda. Likewise, solutions brought forth by the thesis incorporate socio-technical thinking.

Four objectives of this thesis were attained with the individual papers attached to this thesis. A summary of the findings of individual study papers is presented and briefly discussed in this sub-section. Those findings are clustered according to the four objectives operationalising the thesis research question:

> *"How can the implementation of e-government services be improved from an organisational perspective in the context of Rwanda?"*

Those objectives are recalled here:

1. To identify critical organisational issues about the implementation of e-government services in Rwanda.

2. To investigate processes and issues related to the monitoring of the implementation of e-government services in Rwanda.

3. To explore the socio-technical changes in the implementation of e-government services in Rwanda.

4. To identify solutions for improving the process of implementing e-government services.

Objective 1 related to *identifying critical organisational issues about the implementation of e-government services in Rwanda* was addressed in Paper I and Paper II. Empirical findings in both papers show that more attention is paid to the technical sub-system but with limited re-design of service processes and workflow in that sub-system in the implementation of the two service-oriented projects. The findings point to, in general, a scant attention to the social sub-system and limited organisational change. For instance, in the first of case of ECM, the focus is on the implementation of the technical tool with little attention to business process re-design, and change management. Furthermore, social issues related to employee issues such as perceiving little advantage to using the system and 'double work' (Paper I) are observed. There were no plans found related to tackling those social aspects except through technical solutions. In the second case of one-stop e-government, it was identified that there were no clear plans related to service process re-design and change management as observed in Paper II. Furthermore, in that paper, unclear organisational learning among government agencies and lack of operational goals in local government were found to be potential challenges. In terms of social system-related aspects, some willingness, at national level, to review a number of laws that would potentially constrain e-government was identified. However, there was no similar thing to re-design underlying processes of government organisations for better implementation of e-government services. For instance as of March 2016, the focus of the implementation of one-stop e-government was much more on completing putting a list of 100 services online—by superimposing technology over existing structure — in a limited time.

Objective 2 related to *investigating processes and issues related to the monitoring of the implementation of e-government services in Rwanda* was attained in Paper III. In order to operationalise such objective, the case of one-stop e-government for providing a bundle of online services, i.e. IREMBO was considered. In terms of improving the process of implementation of 'one-stop' e-government through monitoring, the thesis found a gap in how this is achieved at the central government and the local government levels. The monitoring of the process is partly formal at central government level and informal at the local government level, and the focus of the monitoring leans more towards the benefits of end users than those benefits for the service providers as observed in Paper III.

Objective 3 related to *exploring the socio-technical changes in the implementation of e-government services in Rwanda* was addressed through Paper IV.

From that paper, we learn that changes were made recently in technology, processes and in people aspects in both the ECM and the one-stop e-government cases. However, those changes took place along with secondary effects. A lack of fit between the technical and social sub-systems was found in both cases. However, a poorer fit was identified in the ECM case.

The findings, through Paper IV, pinpoint the need for paying attention to social aspects in both case projects but particularly in the ECM case. In that case, an effort would be mainly put into addressing issues related to workflow and organisational structure including a regulatory framework and internal policies. There is also a need for attention to be paid to people's issues when they interact with ECM technical system as this was observed earlier from empirical findings in Paper I. The thesis findings indicate that the focus was mainly put on the implementation of the technical system, specifically on technical tool, with less attention to 'social' aspects (e.g. people aspects, structure, policies, and regulatory framework).

Even though the Rwandan ECM project started in 2010, and the project was implemented in more than 100 agencies to a cost amounting to USD 2, 681,112 as of April 2016, a report indicated that the number of agencies using the system was sharply dropping to 30% (Office of the Auditor-general, 2016). This situation can be partly attributed to user challenges resulting mainly from lack of organisational change and a loose fit between the technical and social sub-systems of agencies in which the ECM system was implemented.

Regarding the case of one-stop e-government i.e. IREMBO, it was identified that less attention was paid to adjusting organisational structures and harmonizing information related to public services. It is only recently, in 2018, that the redesign of the service processes was done when providing online certificates for a few services, as observed in Paper IV.

The findings of Paper II and Paper III on IREMBO case unveils that activities on implementation of one-stop e-government are more concentrated and processed at the central government level than at the local government level. For instance at the local government level, the e-government implementation goals are unclear and monitoring practice is informal. More im-

plementation effort of one-stop e-government is still needed in the local governments in Rwanda. The status quo of the gap in the local government can be attributed to the current governance structure for e-government in Rwanda. The ICT officers in the local governments are viewed as those primarily responsible for issues related to e-government and ICT implementation in their districts agencies.

In both the cases of ECM and IREMBO, the focus of implementation has been more on technological aspect than addressing other associated organisational issues. The realization of intended benefits would significantly depend on addressing issues related to the social sub-systems and technical issues. Optimal outcomes would be expected once increased attention is paid to re-adjustment of organisational underlying processes, workflow, job re-design and structural reforms where need be. This calls for revising existing policies. The findings paint a picture of a need for organisational change with a particular focus on improving 'social' and process re-design aspects in the two cases, but more need particularly is required regarding the implementation of the first case i.e. the ECM.

Furthermore, active participation of the local government (LG) in the design and implementation of e-government services in Rwanda is crucial because the LG processes and provides the services. Having both the local and central government on board and harmonising e-government-related goals which should be at each level would impact better e-government services. Addressing the issues found in both cases would contribute to achieving better transactional services where needed, as e-government services advance from the cataloging stage to full integration.

Despite those potential issues to address, the thesis recognizes that some achievements were made, particularly in the case of one-stop e-government. A significant number of services were put online, though it was by superimposing ICT on existing organisational government structures. Some improvement was also made recently for re-designing few services. However, organisational change is still needed in both cases for better implementation of the services.

This thesis also recognises that implementation of both the ECM and IREMBO cases are done in contexts constrained by socio-economic factors described in Chapter 3. The status quo of implementation in both cases was achieved thanks to leadership support and the existence of optical fibre reaching all 30 districts of Rwanda. Specifically, in the case of one-stop e-

government, the achievements can be attributed to the existing public-private partnership in Rwanda where a private company, ROPL, digitalises services via a single government portal. ROPL has also partnered with different companies including mobile and internet service providers. The company has further engaged other private agents who help provide services to applicants with limited digital skills through service centres scattered nationwide to cope with digital divide. Furthermore, the roles played by foreign consultants from Singapore and Korea cannot be underestimated. Even though the foreign consultants would make interventions leading to positive outcomes, they can sometimes dominate the e-government system design in developing countries and contribute to a gap between the design and public sector reality (Heeks, 2003b). However, this thesis does not investigate the extent to which the influence of those consultants can be considered for overlooking existing organisational issues in these two cases in Rwanda.

The findings in this thesis are related to existing findings in other contexts. For instance, related ECM implementation challenges concerning ECM adaptation and change management in organisational settings were also found to be critical issues that needed attention in Norway, a decade and a half ago (Nordheim, Päivärinta, 2004; Päivärinta & Munkvold, 2005; Munkvold et al., 2006). Furthermore, related findings in another study conducted with 163 organisations in Europe, the USA, and Australia show that organisational process changes were required for implementation of enterprise systems and it takes some time to leverage organisational resources (Davenport, Harris & Cantrell, 2004). However, in the case of Rwanda, with the ECM implementation dating back for one decade, it is high time that more attention is paid to organisation change issues that considers 'social' and business processes aspects for a successful implementation.

Regarding one-stop e-government, related findings in a study on Ireland about a decade and a half ago, show that evolutionary re-design of government processes for one-stop e-government is achievable in a reasonable time frame. However, revolutionary initiatives requiring business process re-definition, for instance, abandoning existing systems for efficient processes and better services to beneficiaries was difficult to achieve as from experiences from 1990 to 2005. This proved difficult as the existing authorities had to remain (Hughes, Scott, and Golden, 2006). Four years later, other related findings again in Ireland indicated that further redesign of government processes for better e-government services was possible to the extent of closing

some offices, merging some agencies and re-deploying some staff (Kennedy, Coughlan, and Kelleher, 2010).

More examples of related findings exist about how organisational change requiring attention to both technical system aspects (e.g. technology and processes) and to 'social system' ones (e.g. organisational structure, policies and people aspects) has been important in other contexts. For instance, in European member states, the re-organisation of government processes and reforms in government organisational structure and in policies were undertaken to improve e-government services, a decade and a half ago (Strejcek & Theil 2003; Millard et al., 2004). Furthermore, it was also identified in India and Indonesia that implementation of technological systems without properly adapting organisational structure has resulted in failures of e-government projects (Nurdin et al., 2012). Moreover in Brunei e-government, an issue of lack of change management to cope with changes brought in by ICT implementation (e.g. changes in processes, organisational structure, mindset of people in organisations and policies) was identified. A dire need for a strategy to cope with the resistance to change was apparent (Kifle, Low & Cheng, 2009).

From the findings from other contexts and from those in this thesis, it can be observed that that tackling organisational issues is not an easy task and can take time in the public sector settings. However in such settings, it is important to be aware of existing and potential organisational implementation issues, to have related plans to mitigate challenges and to have appropriate tools that can be used in practice. E-government practitioners can sometimes fail to convince decision makers and their peer government employees about changes to make due paucity of appropriate tools generating concrete data. In relation to that, this thesis identified a corresponding solution in terms of a model for the purpose of discerning changes and better planning improvements in the implementation of e-government services. This is described as part of Objective 4. The thesis also come up with other solutions for improving the implementation as part of that objective as well.

Objective 4 related to *identifying solutions for improving the process of implementing e-government services* was addressed in Paper I, Paper III and in Paper V where it is the main objective.
Drawing from findings from paper I, the thesis shows that improving implementation of ECM system would entail process re-design (e.g. redesigning job and work processes), change management, improved management

commitment and support and training of staff which partly imply better project management.

In the case of one-stop e-government, some improvements would be realised once the local government (LG) adopts formal approaches in the monitoring of implementation of e-government services in its agencies. Improvements would also be made if, in the central government, formal monitoring is done at all stages of the process of the implementation and improvement of e-government services including the stage of 'definition and planning'. Furthermore, the amendments would be achieved in case of increased monitoring attention to back-end-process performance aspects. In addition, the monitoring practice should also focus on both the benefits of service providers and end users together. Those observations are from Paper III.

Discerning changes for improving the implementation of e-government services in public sector settings can be challenging. Making those changes is also another issue in those settings as observed in literature and in this thesis. For this, this thesis took a step further to come up with one of the solutions. The thesis elaborates a solution in terms of a model for improving the process of implementing e-government services in terms of monitoring. Such a model which incorporates socio-technical thinking, in some of its stages, was devised in Paper V to serve as a tool for helping e-government practitioners and managers to take informed decisions in the implementation of services. It consists of four dimensions i.e. Plan-Do-Evaluate-Resolve (PDER) with 7 stages, comprising 23 activities in total. The model is expected to be used for monitoring the process of implementation to help discern and confront organisational issues in the implementation.

A number of process and quality improvement methodologies including Business Process Re-engineering, Total Quality Management (TQM), Kaizen, Lean, Six Sigma and tools such as Plan-Do-Check-Act (PDCA)/Plan-Do-Study-Act (PDSA) and DMAIC are in place as indicated in section 2.3. Furthermore, the existing literature shows that other related frameworks for self-assessment such as European Foundation for Quality Management (EFQM), Continuous Assessment framework (CAF) and ISO 9004 are in place too (Jaeger, 2017; Radnor, 2010a). Most of those methodologies, tools, and frameworks can be used in the public sector (Radnor, 2010a). Moreover, process models such as *Business Process Change (BPC)* (Indihar and Jaklic, 2007; Pateli and Philippidou, 2011) and Heeks' process model

(2006) directly applicable in e-government are in place. However, the PDER model in this thesis, outperforms all the other approaches regarding implementation and improvement of e-government services. For instance, the PDER model is not exhaustive and resource demanding compared to TQM, EFQM, ISO 9004 and CAF. As opposed to these models, PDER model does not focus on total organisational quality issues but rather on the implementation of e-government services. PDER's underlying philosophy is based on incremental and continuous changes rather than one-time major changes like in the case BPR. The PDER model is suitable than BPC and Heek's (2006) process models as the model has precise activities at different stages in the model dimensions. Furthermore, the set of those activities incorporate socio-technical thinking and makes it a better a model for addressing organisational issues via monitoring implementation of e-government services for better planning towards improvements.

A successful implementation of the ECM and the one-stop e-government in Rwanda would require and significantly depend on the extent to which existing and potential organisational change related issues are handled. It is high time to espouse a clear organisational change policy in that context. Such organisational change policy can seek to balance attention to both social aspects (e.g. organisational structure, regulatory framework including policies and people aspects) and technical aspects (e.g. processes and technology). It is worth noting that increased attention to such balance is more apparent in the case of ECM implementation. Furthermore, the findings also point out a dire need for increased ownership at the local government level by establishing goals and striving to achieve them as well as putting in place formal approaches to monitor implementation of e-government services.

Plans related to digital transformation of government and improving e-government services in Rwanda, as observed in the government plan document "ICT sector strategy 2018-2024" include establishing a 'One Digital ID Program' for integrating services related to health, insurance, education and civil status, then redesigning 20% of all online services by 2021 as well as implementing digital signature technology (i.e. Public key Infrastructure) in 80% of Rwanda public sector organisations by the same year, and promoting cashless payment (MITEC, 2017). However, these plans would not be achieved or lead to fruition once organisational implementation issues

identified in this thesis are not addressed. I believe that the PDER model would assist in that journey and beyond.

Drawing from findings in this thesis, and from existing studies (e.g. Hughes, Scott, & Golden, 2006; Kennedy, Coughlan, & Kelleher, 2010), it is acknowledged in this thesis that making necessary changes for fully transactional services can take time and resources; for instance, the process change required for implementation of e-government services which engages business process re-definition is difficult in the public sector (Kennedy, Coughlan, & Kelleher; 2010). Organisational change is something that cannot be reached overnight; it can be dealt with incrementally in an evolutional manner. However, having in place elaborate plans and change management strategy, *as opposed to findings of this thesis in paper II,* and creating a framework in which those plans can be executed as time goes can be a step forward. Those plans would include mechanisms to be aware of the changes and priorities to make in the organisations before spending resources which are limited in least developed countries. The implementation of those changes would lead to judicious use of resources and not implement systems which are costly to replace in the future. Use of the PDER model can be of help in that case.

This thesis subscribes to views of achieving the required organisational change for the implementation of e-government services from a socio-technical perspective—the perspective of attaining optimal outcome by establishing a fit between the social and the technical systems of an organisational (Bostrom & Heinen 1977). By giving both the technical and social aspects equal importance, this thesis echoes views of scholars including Bostrom and Heinen (1977), Hughes, Scott, and Golden (2006), Kennedy, Coughlan, and Kelleher (2010), Nurdin, Stockdale, and Scheepers (2012) supporting the idea of re-organisation of organisational government processes and structural reforms for e-government implementation towards real benefits. In this way, it is against the views of Cordella (2007) and Cordella and Tempini (2015), the proponents of the idea of implementing ICT to support and reinforce existing bureaucratic conditions.

7.2 Contributions and implications

Contributions of research can either be empirical, theoretical and even practical. An empirical contribution is viewed as "a novel account of an empirical phenomenon that challenges existing assumptions about the world or reveals something previously undocumented" (Ågerfalk, 2014, p.594). In order to define what a theoretical contribution is, it is necessary to understand what a theory means. A theory can be viewed as concepts and their interrelationships that help either to analyse, or explain, or predict, or both explain and predict a phenomenon or even to direct on how to design and do an action (Gregor, 2006). Ågerfalk's (2014) work shows that a theoretical contribution is "something that advances our understanding of such concepts and interrelationships" (ibid, 594). Either an empirical contribution or a theoretical contribution can have practical implications and theoretical implications (Ågerfalk, 2014).

In the case of this thesis, it makes both empirical contribution and theoretical contribution. The thesis makes empirical contribution by unveiling challenging issues associated with the implementation of e-government services in Rwanda—issues which were undocumented in Rwanda and poorly documented in the LDC context. On the other hand, the theoretical contribution in this thesis is in terms of an elaborated process improvement model, i.e. PDER which is a methodological model on how implementation of e-government services can be monitored. This section presents those contributions and their corresponding implications for practice and research in the following subsection.

7.2.1 Empirical

Empirical contributions of this thesis draw from the findings from the four empirical studies of this thesis. The findings briefly indicate that the focus of implementation of e-government services in Rwanda has mainly been on service digitalisation which superimposes ICT over existing structures—with little attention to redesigning service processes, adjusting organisational structure and policies. It is only recently that a few services were redesigned but with limited structural adjustments. Furthermore, the process of monitoring implementation appears somehow lacking in the local government as it is informal.

From a socio-technical perspective, those findings generally paints a picture of loose fit between technical sub-systems (i.e. technology and processes)

and social sub-systems (i.e. people aspects and structure) comprising respective information systems in both cases i.e. implementation of enterprise content management and one-stop e-government in Rwanda. Those socio-technical insights were poorly documented scientifically in the context of LDCs. Literature shows that previously documented e-government implementation issues on that context are general issues pertaining to the context of developing countries. Those issues are categorised as infrastructural, financial, political, socio-economic, human and organizational (Nkohkwo & Islam, 2013; Weerakkody, Dwivedi & Kurunananda, 2009). Among those categories of issues, organisational challenges are for example, information management, ICT personnel, change management, human capital development, organisational learning, internal efficiency, non-contextualisation in e-government system design, private-public partnership, coordination of projects, evaluation framework, e-government vision (Nkohkwo & Islam, 2013).

In relation to the documented issues in the few existing STT studies in LDCs (see section 4.2), the literature shows that socio-economic issues and technology related ones are mainly the ones documented, for instance on Tanzania and Lesotho (Mahundu, 2016; Rammea & Grobbelaar, 2017). This thesis focuses and contributes towards addressing the need for a joint optimization of both technical aspects and social aspects at organisational and inter-organisational level for better implementation of e-government services. The empirical contribution of this thesis have both implications for practice and for research.

Implications for Practice. Implication for practice of an empirical contribution can be seen as an identified need to address a practical problem which was identified (Ågerfalk, 2014). Drawing from the empirical contribution of this thesis, the following are implications for practice in two Rwanda e-government service cases towards addressing existing challenges:

Case 1: implementation of enterprise content management. The thesis findings point to a need to pay balanced attention between 'technical system' related issues (e.g. processes and technological aspects) and 'social system' related issues (e.g. people aspects and organisational structure, regulatory frame policies). This would be achieved by mainly addressing the following issues:

- Streamlining the workflow in agencies and job re-design

- Instituting internal policies enabling ECM implementation in government agencies
- Executing existing plans on improving technical aspects.
- Improving project management and change management

Case 2: one-stop e-government. Implementation of one-stop e-government would be improved once at least the following elements are addressed:

- Adjusting organisational structure including regulatory framework
- Improving policies enabling the harmonization of public information related to services and enabling the integration of government information systems
- Elaborating clear plans for service process re-design for existing and new services
- Elaborating change management strategies and
- Putting in place clear organisational learning among government agencies and
- Setting up clear operational goals in the local government and striving to achieve them.
- Improving ICT infrastructure in some agencies

This thesis also contribute empirically by identifying issues related to monitoring implementation of one-stop e-government services in Rwanda. There are needs to:

- Instituting formal monitoring at all stages services implementation in the local government
- Introducing additional formal approaches, at the central government, to keeping track of information for the purposes of planning and improving implementation
- Elaborating formal approaches for a balance monitoring paying attention to the benefits of end users and those of the service providers

Furthermore, drawing from the implications on one case of one-stop e-government, this thesis paints a picture that there is also a need for increased engagement of the Rwanda local government in the implementation of e-government services.

All in all, empirical contributions in this thesis drawing from insights on Rwanda—which is an e-government top leader among African LDCs (United Nations, 2018) in the context where e-government is still at infancy stage—can not only inspire e-government practice in Rwanda but also the same practice in other similar contexts.

Implication for Research. Implication for research of an empirical contribution can be viewed as an identified need to further investigate a phenomenon (Ågerfalk, 2014). The empirical contribution made in this thesis lies in the empirical findings on Rwanda. Those findings were obtained taking a socio-technical perspective. The thesis identified that there is limited e-government research applying socio-technical theory (STT) on the context of LDCs. In this way, the empirical contribution of this thesis pinpoints a need for further research using STT on the context of LDCs to explore the status quo of organisational issues and challenges when implementing e-government services in that context.

It is worth to point out that LDCs will benefit from the knowledge that will be created using STT to improve implementation of e-government services in that context. The empirical contribution made in this thesis would add to the existing sparse knowledge and serve as a basis for further research using STT in that context.

7.2.2 Theoretical

Existing literature points to a paucity of comprehensive process models and tools that would help tackle challenges during e-government implementation including confronting organisational challenges in developing countries (Joshi & Islam, 2018). A number of process improvement methodologies and tools exist which are used in public services (e.g. CAF, EFQM, ISO, PDCA/ PDSA...). However, these can hardly tackle e-government organisational issues associated with implementation of e-government services. For instance, a process model such as Plan-Do-Check-Act (PDCA) (Taylor et al., 2013) is so generic and lacks appropriate content specific for improving the monitoring of implementation of e-government services. Models such as CAF, EFQM and ISO focus more on the total quality aspects of organisations and can be exhaustive when it comes to implementation of e-government services. They can be demanding in terms of resources in the implementation of e-government services in LDCs. In the context of

e-government, process life-cycle models such as Heek's (2006), Pateli and Philippidou's (2011), Hatsu and Ngassam's (2016) or even generic ones in information systems such as Heikkilä, Vahtera and Reijonen's (2004) are devised to indicate mere steps and phases; these lack specific activities per step or phase. The theoretical contribution of the thesis is an elaborated comprehensive model (Plan-Do-Evaluate-Resolve, PDER) for improving the monitoring of implementation of e-government services. The model embeds socio-technical thinking which is imperative in the implementation of e-government services.

Theoretical implications of PDER model. Theoretical implications of a theoretical contribution can be viewed as the scientific usefulness of such contribution, and the extent to which a theoretical contribution prompt further theoretical elaboration beyond a research context in consideration (Ågerfalk, 2014). In the case of this thesis, Plan-Do-Evaluate-Resolve (PDER) model as a theoretical contribution has implications for research in the sense that the model can be further amended and can serve as a basis to elaborate other models for advancing e-government research and practice.

Practical implications of PDER model. Apart from scientific usefulness of theoretical contribution, such contribution must also have utility for practice (Corley & Gioia, 2011). The PDER model elaborated in this thesis can aid to advance e-government practice in Rwanda by improving the process of implementing e-government service-oriented projects. The model would help practitioners to discern and confront implementations issues. The model would be used by managers and professionals in the process monitoring of the implementation and in planning towards improved implementation design and better services. Use of the model would enable its users to take actions on dynamic organisational issues. As the model is now, it can be adapted to be used in e-government practice in Rwanda and in other LDCs in the journey of integration stage towards full transactional and better services. The model can also be adapted to be used even in other countries in which there might be a need for monitoring implementation of e-government services.

7.3 Limitations and future research

This thesis took important steps to investigate issues in the implementation of e-government services taking the case of Rwanda, one of the Least Developed Countries. Furthermore, the thesis suggested how such implementation can be improved.

However, when it comes to written material on e-government implementation in different contexts, the thesis investigation was limited to material in English. It is recognised some publications and public reports are sometimes produced only in other languages. For instance, some material on some LDCs can be in French or Portuguese on even in other languages. Due to that, some information in other languages while conducting literature review might have been missed in this thesis. Those shortcomings are hereby acknowledged.

In relation to further research that draws from my work, such research would be resuming from what I started but could not complete towards helping to further advance the practice of e-government service implementation in Rwanda. That is co-designing with e-government practitioners in Rwanda a software-based solution emulating the model elaborated in this thesis work (i.e. PDER model); there is still a need to customize activities in the model to local preferences in Rwanda. I have started this with top e-movement managers including the Government Chief Information Officer and other government employees, but I could not complete in time so that it becomes part of this thesis. The same idea of co-designing — between researchers and practitioners — a software-based tool building on the model is believed to be fruitful to any context, particularly LDCs, in which organisational change is needed for better transactional services. In such organisational change, the model tool would help inform decisions in the implementation of the services. Undertaking the research of co-designing the model tool would follow Design Science research steps but starting from step three of 'Design and Development' (Peffers et al., 2007).

7.4 Concluding remarks

"One generation plants the trees; another gets the shade".
A Chinese proverb says

Let us look at that in terms of modern technologies! Can inventors of modern technologies do the job and adopters benefit from the inventions? Putting it in the context of e-government, can a LDC adopt ICTs and benefits?

Yes, it is possible but with conditions. These conditions include top leadership support, having in place basic infrastructure and espousing a public-private partnership policy like in the case of Rwanda. Other important elements such as tackling socio-economic issues, attaining a minimum level of human capacity development and a minimum capacity to finance e-government projects should be added on the list of necessary issues to consider. However, all those elements can be in place, and still the expected optimal outcome fails to materialise. This thesis recognises the importance of the aforementioned elements in the implementation of e-government services. However, addressing organisational issues is also crucial for a successful implementation of e-government services. For instance, paying attention to organisational aspects can help cope with organisational change issue towards better transactional services in LDCs. Taking an organisational perspective, this thesis draws on the theoretical premises that optimal results are gained if there is a fit between or joint optimisation of a technical subsystem and a social subsystem of a system. In that way, paying a balanced attention to technical aspects and social aspects in the implementation of e-government services is viewed as a requirement towards success in LDCs and such attention can lead to judicious use of resources with are limited. Technology can be imported and a way to address political and socio-economic issues can be sought in one or another but addressing organisational socio-technical issues required for implementation of e-government services cannot be imported and requires considering local conditions.

The thesis investigates issues in the implementation of e-government services in two case projects in Rwanda. The findings pinpoint a need for addressing prevailing issues related to a lack of fit between the technical system and the social system in the implementation of the enterprise content management (ECM) in Rwanda. Such implementation is still focused more on the implementation of the technical tool with less attention to other important organisational issues. On the other hand, the findings in the case of one-stop e-government implementation also indicates that the focus at early stage was much more on putting services online by superimposing technology over existing organisational structure and today some improvements have been made in the re-designing of few services. However, the most prevailing issues of re-designing a number of remaining services, adjusting organisational structure and regulatory framework as well as harmonizing public information related to services still remain. Furthermore, the findings

indicate that clear goals related to the implementation of e-government services and formal monitoring approaches are lacking in the Rwandan local government. There is still a need to address all those issues. Those findings are not peculiar only to Rwanda; the literature indicates that some related issues were also confronting e-government in other contexts including where e-government has been advancing along with institutional development. Addressing organisational issues can take time. Establishing plans to tackle those issues is part of what matters and not to delay the execution. In this thesis, implementation of e-government services is viewed as a practice of continual endeavour requiring continuous improvements. In this way, the thesis elaborates a process improvement model "PDER" for continuously improving the implementation of e-government services — the model which will help in monitoring and planning process. However, the model would require, first, to be customised to agency needs in Rwanda and in other similar contexts. It would be then turned into it an easy-to-use tool. In terms of insights drawn from empirical data on issues associated with implementation of e-government services in Rwanda, this thesis contribute to growing body of knowledge. Such empirical contribution has both implications for practice and for research. The thesis also has a theoretical contribution in terms of PDER model which also has implications for research and practice. In this way, I hereby believe that the contributions made in this thesis are resourceful for both e-government research and practice.

References

Ågerfalk, P., J. (2014). "Insufficient Theoretical Contribution: A Conclusive Rationale for Rejection?" European Journal of Information System (23:6), pp. 593-599.

ABPMP (2013). BPM CBOK Version 3 1st Edition. ISBN☐13: 978☐ 1490516592. Available at <http://ebpm.ir/wp-content/uploads/2017/10/ABPMP-CBOK-Guide_2013.pdf> [Accessed 12 September 2017]

Ahmady, G. A., Mehrpour, M. & Nikooravesh, A. (2016). Organizational structure. Procedia-Social and Behavioral Sciences, 230, 455-462.

Alonso, J., A., Cortez, A., L. & Klasen, S. (2014). LDC and other country groupings: How useful are current approaches to classify countries in a more heterogeneous developing world?, (21). Retrieved from http://www.un.org/en/development/desa/policy/cdp/cdp_background_papers/bp2014_21.pdf

Anderson, J.C., Rungtusanatham, M. & Schroeder, R., G. (1994). A theory of quality management underlying the Deming management method. *Academy of Management Review*, 19, 472–509.

Association for Information systems (n.d). Socio-technical theory Avalaible at https://is.theorizeit.org/wiki/Socio-technical_theory

A to Z Businessis Consultancy. (2011). Analysis of Lean Implementation in UK Business Schools and Universities.

Avgerou, C., Ciborra, C. & Land, F, .F. (2004), The Social Study of Information and Communications Technology: Innovation, Actors and Context, Oxford, OUP

Axelsson, K., & Melin, U. (2008). An inter-organisational perspective on challenges in one-stop government. *International Journal of Electronic Governance*, 1(3), 296–314.

Aydinli, Ö., F., Brinkkemper, S. & Ravesteyn, P. (2009). Business Process Improvement in Organizational Design of e-Government Services. In 2016 International Conference on Information Technology Systems and Innovation (ICITSI), 7, 123–134).

Bakunzibake, P., Grönlund, Å. & Klein G., O. (2016). "E-Government Implementation in Developing Countries: Enterprise Content Management in Rwanda". 15th IFIP Electronic Government (EGOV) / 8th Electronic Participation (ePart) Conference, Univ Minho,

Guimaraes, Portugal, September 5-8, 2016. Electronic Government and Electronic Participation, Amsterdam: IOS Press, 2016, 251-259

Bansler, J. (1989). Systems development research in scandinavia: Three theoretical schools. *Scandinavian Journal of Information Systems*, 1, 3–20.

Barraza, M., F., S. & Lingham, T. (2008). Kaizen within Kaizen Teams : Continuous and Process Improvements in a Spanish municipality. *The Asian Journal on Quality*, 9(1).

Barraza, M., F., S. & Pujol, J. R. (2010). Implementation of Lean-Kaizen in the human resource service process. A case Study in a Mexican public service organisation. *Journal of Manufacturing Technology Management*, 21(3), 388–410.

Barraza, M., F., S., Pujol, J., R., Tort, X., & Llabrés, M. (2009). Continuous process improvement in Spanish local government Conclusions and recommendations. *International Journal of Quality and Service Sciences*, 1(1), 96–112.

Baxter, P., & Jack, S. (2008). Qualitative case study methodology: Study design and Implementation for novice researchers. The Qualitative Report, 13(4), 544-559.

Beaumont, L. C., Bolton, L. E., McKay, A. & Hughes, H. P. N. (2014). Rethinking service design: A socio-technical approach to the development of business models. In D. Schaefer (Ed.), Product development in the socio-sphere, 121–141, Springer.

Benbasat, I., Goldstein, D., K. & Mead, M. (1987). The Case Research Strategy in Studies of Information Systems. *MIS Quarterly*, 11(3), 369-386.

Benbasat, I., & Zmud, R., W. (2003). The Identity crisis within the IS Discipline : Defining and Communicating the Discipline's Core Properties. *MIS Quarterly*, 27(2), 183–194.

Bengtsson, M. (2016). How to plan and perform a qualitative study using content analysis. *NursingPlus Open*, 2, 8e14.

Berners-Lee Tim (n. d.). The WorldWideWeb browser https://www.w3.org/People/Berners-Lee/WorldWideWeb.html [Accessed 12 Feb 2018]

Beynon-Davies, P. (2005). Constructing electronic government: The case of the UK Inland revenue. *International Journal of Information Management*, 25(1), 3-20.

Bititci, U., S. & Muir, D. (1997). Business Process Definition: A Bottom-Up Approach. *International Journal of Operations and Production Management*, 17(4), 365-374.

Blair, E. (2015). A reflexive exploration of two qualitative data coding techniques. *Journal of Methods and Measurement in the Social Sciences*, 6(1), 14-29.

Bostrom, R., & Heinen, J. (1977). MIS Problems and Failures: A Socio-Technical Perspective. *MIS Quarterly*, 1(3), 17-32.

Bowen, G., A., (2009). Document Analysis as a Qualitative Research Method, *Qualitative Research Journal*, 9(2), 27-40

Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3, 77–101.

Brooks, J., McCluskey, S., Turley, E. &King, N. (2015). The Utility of Template Analysis in Qualitative Psychology Research. *Qualitative Research in Psychology*, 12 (2), 202-222

Brown A., G. (2016). E-Government in U.S. Cities: Enabling Engagement or Reinforcing Tradition. Public Administration, Graduate College of the University of Illinois at Chicago

Budlender, Debbie and Hewitt, Guy (2002). Gender Budgets Make More Cents: Country Studies and Good Practice, London: Commonwealth Secretariat

Bwalya, K., J., (2009). Factors affecting adoption of e-government in Zambia. *The Electronic Journal of Information Systems in Developing Countries*, 38(1), 1-13.

Caglio, A. (2003). Enterprise Resource Planning Systems and Accountants: Towards Hybridisation. *European Accounting Review*, 12, 123-153.

Caulley, D., N. (1983). Document analysis in program evaluation. *Evaluation and Program Planning*, 6, 19-29.

Chase, R., B., Aquilano, N. & Jacobs, R., F. (1998). *Production and Operations Management*. (8th Edition). Boston: McGraw-Hill.

Cherns, A. (1976). The Principles of Sociotechnical Design, Human Relations, 2(9), 783-792

Clegg, C., W., (2000). Sociotechnical Principles for Systems Design. *Applied Ergonomics*, 31, 463-477 Compendium of Japan's Approach of e-Government. (2005). Available at <http://unpan1.un.org/intradoc/groups/public/documents/other/unpan 022094.pdf>

Conti, T. (2017). Optimizing self-assessment. Total Quality Management, 8(2–3). http://doi.org/10.1080/0954412979640

Corbin, J. & Strauss, A. (2008). Basics of qualitative research: Techniques and procedures for developing grounded theory (3rd ed.). Thousand Oaks, CA: Sage.

Cordella, A. (2007). E-government: Towards the e-bureaucratic form? *Journal of Information Technology*, 22(3), 265-274.

Cordella, A. & Tempini, N. (2015). E-government and organizational change: reappraising the role of ICT and bureaucracy in public service delivery. *Government Information Quarterly,* 32(3), 279–286.

Corley K., G. and Gioia, D., E. (2011). Building theory about theory building: what constitutes a theoretical contribution? Academy of Management Review 36(1), 12–32.

Cronin, P., Ryan, F. & Coughlan, M. (2008). Undertaking a literature review: a step by-step approach. British Journal of Nursing, 17 (1), 38-43.

Dada, D. (2006). The failure of e-government in developing countries: A literature review. *The Electronic Journal of Information Systems in Developing Countries*, 26(1), 1-10.

Dahlgaard, J., Kristensen, K. and Kanji, G. (1998), *Fundamentals of Total Quality Management*, Chapman & Hall, London.

Damodaran, L., Nicholls, J., & Henney, A. (2005). The contribution of sociotechnical systems thinking to the effective adoption of e-government and the enhancement of democracy. *The Electronic Journal of e-Government*, 3(1), 1–12.

Davis, M., C., Challenger, R., Jayewardeneb, D., N., W., Clegg, C.W., (2014). Advancing socio-technical systems thinking: a call for bravery. Applied. *Ergonomics*, 42, 171-180

Davenport T., H., Harris J., G. & Cantrell S., (2004). Enterprise systems and ongoing process change", *Business Process Management Journal*, 10(1), 16-26

Davenport, T., H. (1993), Process Innovation: Reengineering Work through Information Technology, Harvard Business School Press, Boston, MA.

Dawes, S., S. (2009). Governance in the digital age: a research and action framework for an uncertain future. *Government Information Quarterly*, 26, 257–264.

Dawes, S., S., Vidiasova, L. and Parkhimovich, O. (2016), "Planning and designing open government data programs: an ecosystem approach", *Government Information Quarterly*, 33(1), 15-27.

Dean, J., W. and Bowen, D., E. (1994). Management theory and total quality: improving research and practice through theory development. *Academy of Management Review*, 19(3), 392-418.

Debela, T. (2009) Business Process Reengineering in Ethiopian public Organizations: The relationship between theory and practice, Journal of Business and Administrative Studies, 1, 2. Retrieved February 01, 2018 from https://www.ajol.info/index.php/jbas/article/view/57348

Deming W., E. (1986).Out of the crisis. Cambridge, MA: Massachusetts Institute of Technology Center for Advanced Engineering Study xiii, 1991, 507.

Denzin, N., K. (1970). The research act: A theoretical introduction to sociological methods. NewYork: Aldine.

DGIM. (2006). eGovernment Economics Project (eGEP) Measurement Framework Final Version.

Doherty N., F. & King M. (1998). The importance of organisational issues in systems development. *Information Technology and People* 11(2), 104–123.

Dumas, M., La Rosa M., Mendling J., Reijers H., A. (2013). *Fundamentals of business process management*. Springer, Berlin

Elo, S. & Kyngäs, H. 2008. The qualitative content analysis process. *Journal of Advanced Nursing*, 62 (1), 107–115.

European Commission (2017). Quality of Public Administration – A Toolbox for Practitioners. Available at http://ec.europa.eu/social/BlobServlet?docId=18561&langId=en [Accessed 21 June 2018]

European Commission (2015).A Digital Single Market Strategy for Europe. Available at <http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52015DC0192> [Accessed 13 February 2018]

Fatemi, M. & Behmanesh, M., R. (2012). New Public Management Approach and Accountability. *International Journal of Management, Economics and Social Sciences*, 1(2), 42– 49.

Flick, U. (2009): An Introduction to Qualitative Research. 4th edition. Thousand Oaks, CA: SAGE Publications.

Fixsen D., L., Naoom S., F., Blase K., A., Friedman R., M., Wallace F. (2005). Implementation Research: A Synthesis of the Literature. Tampa, FL: University of South Florida, Louis de la Parte Florida Mental Health Institute

Fragoso, J., T. (2015). Business Process Reengineering in Government Agencies : Lessons from an Experience in Mexico. *Journal of Service Science and Management*, 8, 382–392.

Fuenfschilling, L., & Truffer, B. (2016). The interplay of institutions, actors and technologies in socio-technical systems—an analysis of transformations in the Australian urban water sector. *Technological Forecasting and Social Change*, 103, 298–312.

Fuglerud, K. S. (2014). Inclusive design of ICT: The challenge of diversity, University of Oslo, Faculty of Humanitites

Gathungu, J. & Mungai, A., N. (2012). Contextual factors affecting e-government strategy implementation and its impact on public sector performance in Kenya. *Journal of Arts and Humanities (JAH)*,1(1), 143-157.

Gibreel, O. & Hong, A. (2017). A Holistic Analysis Approach to Social, Technical, and Socio-Technical Aspect of E-Government Development. *Sustainability*, 9, 2181

Giddens, A. (1984). The constitution of society: Outline of the theory of structuration. Cambridge: Polity Press. ISBN 0-520-05728-7.

Gill, P., Stewart, K., Treasure, E. & Chadwick, B. (2008) Methods of data collection in qualitative research: interviews and focus groups. *British Dental Journal*, 204(6), 291–295.

GoR (2016). Implementation framework for the development and the deployment of Rwanda's Single Integrated E-government Platform. Available at <http://www.minagri.gov.rw/fileadmin/user_upload/documents/Job_Vacances/MINAGRI/IREMBO_IMPLEMENTATION_FRAME_WORK.pdf>
[Accessed 10 April 2017]

GoR (2017a). Prime Minister's Order No 113/03 of 08/11/2017 Determining Mission and Functions, Organisational Structure, Job Profiles, Salaries and Fringe Benefits for Employees of The Ministry Of Information Technology and Communication. Available at

<http://minict.gov.rw/fileadmin/Documents/Mitec2018/Poli-cies___Publication/New_Ministerial_Orders/MITEC_official_ga-zette.pdf> [Accessed 09 February 2019]

GoR (2017b). Law N°02/2017 of 18/02/2017 Establishing Rwanda Information Society Authority and Determining Its Mission, Organisation and Functioning. Available at <http://minict.gov.rw/fileadmin/Documents/Mitec2018/Poli-cies___Publication/ICT_Laws/Law_establishing_RISA-3-25.pdf> [Accessed 09 February 2019]

GoR (n. d.). National ICT Strategy and Plan NICI – (2015) [pdf] Government of Rwanda. Available at: <http://www.rdb.rw/up-loads/tx_sbdownloader/NICI_III.pdf > [Accessed 13 August 2016]

Greenhalgh, T., Robert, G., Bate, P., Macfarlane, F. & Kyriakidou, O. (2005). Diffusion of Innovations in Service Organisations: A Systematic Literature Review. Malden, MA: Blackwell Publishing

Gregor, S. (2006). The Nature of Theory in Information Systems, *MIS Quarterly*, (3)30, 611-642.

Gregor, S. & Iivari, J. (2007). Designing for mutability in information systems artifacts. In Information systems foundations: theory, representation and reality (Eds Hart, D. and Gregor, S.). Australian National University Press, Canberra, Australia, 3-24.

Grönlund, Å. (2010). Ten Years of E-Government : The "End of History " and. In IFIP International Federation for Information Processing 2010 (pp. 13–24).

Grönlund, Å. & Horan, T. A. (2004). Introducing e-GOV : History, Definitions, and Issues. *Communications of the Association for Information Systems*, 15(June), 713–729.

Guha, S., Grover, V., Kettinger, W., & Teng, J. T. C. (1997). Business process change and organisational performance: Exploring an antecedent model. *Journal of Management Information Systems*, 14 (1), 119–154

Guimarães, M., C. (2012). Lean Thinking in Healthcare Services – Learning from Case Studies. PhD Thesis in Management, Specialization in Strategy and Entrepreneurship, ISCTE Business School – Instituto Universitário de Lisboa, Portugal

Gunawong, P., and Gao, P. (2017). Understanding e-government failure in the developing country context: a process-oriented study. *Information Technology for Development*, 23(1), 153-178.

Guo, X., Lu, J. (2007). Intelligent e-government services with personalized recommendation techniques. *International Journal of Intelligence Systems*, 22, 401–417.

Gyaase, P., O., K. (2014). Re-engineering Governance; e-Government as a Tool for Decentralization; Ghana as a Case Study. (1 Ed.) Department of Electronic Systems, Aalborg University.

Hafkin, B., N., J. (2009). E-government in Africa : An Overview of Progress Made and Challenges Ahead, (February), 17–19.

Global e-Schools and Communities Initiative (2017). Assessment of Knowledge Society Development in Rwanda. Available at http://gesci.org/fileadmin/user_upload/Assessment_of_Knowledge_Society_Development_in_Rwanda.pdf

Haines J., D., Sharif, N., M. (2006). A framework for managing the sophistication of the components of technology for global competition. *Competitiveness Review: An International Business Journal*, 16 (2), 106-121

Hammer, M. & Champy, J. (1993). Reengineering the corporation: A manifesto for business revolution (Vol. 36, pp. 90-91). Greenwich: Elsevier Inc.

Hatsu, S., Ngassam, E., K. (2016). A framework for the monitoring and evaluation of e-governance projects in developing countries. 2016 IST-Africa Week Conference, Durban, 11 - 13 May 2016.

Harrison, B. (2005). Information and communication technology policy in Rwanda. Available at https://ocw.mit.edu/courses/global-studies-and-languages/21g-034-media-education-and-the-marketplace-fall-2005/projects/MIT21G_034F05_ictrwanda.pdf

Heeks, R. (2002). Information Systems and Developing Countries: Failure, success and local improvisations. *The Information Society*,18(2), 101–112.

Heeks, R. (2003a). Most eGovernment-for-development projects fail: how can risks be reduced? Institute for Development Policy and Management, University of Manchester. Manchester.

Heeks, R., B. (2003b). eGovernment in Africa: Promise and practice. *Information Polity*, 7(2–3), 97–114.

Heeks, R. (2006). Implementing and Managing eGovernment: An International Text. London: Sage Publications.

Heikkilä, J., Vahtera, H. & Reijonen, P. (2004). Taking organizational implementation seriously: the case of IOS implementation. In J. Damsgaard and H. Z. Henriksen (Eds.), Networked Information Technologies: Diffusion and Adoption (pp. 181-198). Dordrecht: Kluwer Academic Publishers.

Hellsten, U. and Klefsjö, B. (2000). TQM as a management system consisting of values, techniques and tools. *TQM Magazine*, 12 (4), 238-44.

Hesson, M. (2007). Business process reengineering in UAE public sector. *Business Process Management Journal*, 13(5), 707-727.

Hevner, A., R., March, S., T., & Park, J. (2004). Design Science in Information Systems Research. *MIS Quarterly*, 28(1), 75–105.

Hoque, M., R. & Sorwar, G., (2015). ICT-based E-Government Services for Rural Development: A Study of Union Information Service Centres (UISCs) in Bangladesh. *Electronic Journal of Information Systems in Development Countries*, 71(8), 1-19

Horne, S. B., Hawamdeh, S. (2015). Factors impacting the implementation of enterprise content management systems. *Journal of Information & Knowledge Management*, 14(1), 1550008-1-1550008-11

Hsieh H., F. & Shannon S. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15, 1277–1288.

Hughes, M., Scott, M. & Golden, W. (2006). The role of business process redesign in creating e-government in Ireland. *Business Process Management Journal*, 12(1), 76-87.

Hussein, A. et al. (2014). Organizational design: need for a socio-technical inclusive system design approach to meet 21st century workforce challenges. IN: Advances in Human Factors and Ergonomics 2014. 20 Volume Set: Proceedings of the 5th AHFE Conference 19-23 July 2014, Jagiellonian University, Krakow, Poland. Advances in Social and Organizational Factors, pp. 8503-8213.

Hunnius, S. & Schuppan, T. (2013) Competency Requirements for Transformational E-Government. 46th Hawaii International Conference on System Sciences (HICSS), 2013.

Igihe Ltd (2017). Eliminate bureaucracy from land registration—Biruta advises new minister. Retrieved from <http://www.en.igihe.com/news/eliminate-bureaucracy-from-land-registration.html>
[Accessed 27 May 2018]

Indihar Stemberger, M., & Jaklic, J. (2007). Towards E-Government by business process change—A methodology for public sector. *International Journal of Information Management*, 27(4), 221-232.

IPAR (2017). Imihigo Evaluation Fy 2016/2017: Final Report. Available at <http://www.nyamagabe.gov.rw/fileadmin/templates/document/Planning_docs/Final_imihigo_evaluation_Report_2016-2017.pdf> [Accessed 02 February 2018]

Irani, Z., Love, P., E., D. & Montazemi, A. (2007). E-government: past, present and future. *European Journal of Information Systems*, 16, 103-105.

Islam, M., S., & Grönlund, Å. (2010). Agriculture Market Information Services (AMIS) in the Least Developed Countries (LDCs): Nature, Scopes, and Challenges, 109–120.

ITU. (2016). Measuring the Information Society Report 2016. Available at <https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2016/MISR2016-w4.pdf>
[Accessed 03 March 2017]

ITU (2018). The state of broadband: Broadband Catalysing Sustainable Development. Available at <https://www.itu.int/dms_pub/itu-s/opb/pol/S-POL-BROADBAND.19-2018-PDF-E.pdf> [Accessed 10 February 2019]

Jacobides, M., G. (2007). The inherent limits of organizational structure and the unfulfilled role of hierarchy: Lessons from a near-war. *Organization Science*, 18 (3), 455-477.

Jaeger A. (2017). Achieving business excellence through self-assessment for personal and professional excellence. *Total Quality Management & Business Excellence*, DOI: 10.1080/14783363.2017.1288564

Janenova, S. & Yesdauletov, I. (2017). Innovative Public Service Reforms: What Kazakhstan Can Learn From Canada? *International Journal of Civil Service Reform and Practice*, 2(1), 1-11.

Joseph, S., & Avdic, A. (2016). Where do the Nordic Nations' Strategies Take e-Government? *Electronic Journal of E-Government*, 14(1), 3–17.

Joshi, P. & Islam, S. (2018). E-Government Maturity Model for Sustainable E-Government Services from the Perspective of Developing Countries. *Sustainability*, 10(6), 1-28.

Jurisch, C., M., Ikas, C., Wolf, P. & Krcmar, H. (2013). Key differences of private and public sector business process change. *E-Service Journal: A Journal of Electronic Services in the Public and Private Sectors*, 9(1), 3-27.

Jurisch, C. M., Palka, W., Wolf, P., & Krcmar, H. (2014). Which capabilities matter for successful business process change? *Business Process Management Journal*, 20(1), 47–67.

Kakimba, Mansur (2007). Rwanda: Kagame Wins Africa ICT Award Again. The New Times. Retrieved 2016-06-17.

Kaplan, B., & Maxwell, J., A. (2006). Qualitative research methods for evaluating computer information systems. In J. G. Anderson & C. E. Aydin (Eds.), Evaluating the organizational impact of healthcare information systems, 2nd Edition (pp. pp.30-55). New York, NY: Springer

Khan, G.F., Moon, J., Park, H.W., Swar, B. and Rho, J. (2011). A socio-technical perspective on e-government issues in developing countries: a scientometrics approach. *Scientometrics*, 87 (2), 267-286

Kempe Ronald Hope Sr & Bornwell C. Chikulo (2000). Decentralization, the New Public Management, and The Changing Role of The Public Sector In Africa, *Public Management an International Journal of Research and Theory*, 2(1), 25-42

Kennedy, A., Coughlan, J., & Kelleher, C. (2010). Business Process Change in E-Government Projects : The Case of the Irish land registry. *International Journal of Electronic Government Research*, 6(1), 9-21.

Kettinger W. J., Teng J. T. C., and Guha S. (1997). Business Process Change: A Study of Methodologies, Techniques, and Tools. *MIS Quarterly*, 21(1), 55-80

Kifle, H., Low, P. and Cheng, K., (2009). e-Government Implementation and Leadership–the Brunei Case Study. *Electronic Journal of e-Government*, 7(3), 271–282.

Kimenyi, M., S. & Moyo, N. (2011). Leapfrogging Development through Technology Adoption. In Foresight Africa: The Continent's Greatest Challenges and Opportunities, Africa Growth Initiative, the Brookings Institution.

King, N. (1998). Template analysis. G. Symon, C. Cassell, eds. Qualitative Methods and Analysis in Organizational Research: A Practical Guide. Sage, Thousand Oaks, CA. 118–134.

King, N. (2004). Using templates in the thematic analysis of texts. In C. Cassell & G. Symon (Eds.), Essential guide to qualitative methods in organizational research (pp. 256-270). London: Sage.

Kitson, A., Harvey, G., & McCormack, B. (1998). Enabling the implementation of evidence-based practice: A conceptual framework. *Quality in Health Care*, 7, 149–158.

Kitzinger J. (1995). Qualitative research. Introducing focus groups. *British Medical Journal*, 311, 299–302.

Klein, H. &Myers, M. (1999).A Set of Principles for Conducting and Evaluating Interpretive Field Studies, MIS Quarterly, 23 (1), 67-93.

Kontolaimos, G. (2013). Process Improvement in the Greek Public Agencies. Nottingham Trent University.

Kovačič, A., Jaklič, J., Indihar Štemberger, M., & Groznik, A. (2004). Prenova in informatizacija poslovanja. *Ljubljana : Ekonomska fakulteta*.

Larbi, G.A.(1999).The New Public Management Approach and Crisis States, United Nations Research Institute for Social Development (UNRISD) Discussion Paper 112, September 1999. Geneva: UNRISD.

Laws, K., and McLeod, R. (2004). Case Study and Grounded Theory: Sharing some alternative qualitative research methodologies with Systems professionals. In (Eds. M. Kennedy, G.W. Winch, R.S. Langer, J. I Rowe, and J. M. Yanni).

Layne, K., & Lee, J. (2001). Developing fully functional E-government : A four stage model. *Government Information Quarterly*, 18, 122–136.

Lee, R. G., & Dale, B. G. (1998). Business process management: a review and evaluation. *Business Process Management Journal*, 4(3), 214–225.

Lee, T., Hon, C., T., & Cheung, D. (2009). XML Schema Design and Management for e-Government Data Interoperability. *Electronic Journal of E-Government*, 7(4), 381–390.

Lee, A., S., Thomas, M. & Baskerville, R., L. (2015). Going back to basics in design science: from the information technology artifact to the information systems artifact. *Information Systems Journal*, 25, 5–21.

Leitch, S. & Warren, J., M. (2010). ETHICS: The Past, Present and Future of Socio-Technical Systems Design. In Tatnall, A. (eds.) History of Computing. Learning from the Past. Berlin: Springer Berlin Heidelberg, pp.189-197.

Leitner C. (2006). eGovernment: "People and Skills in Europe's Administration", Proceedings of the 39th Hawaii International Conference on System Sciences (HICSS-39), *IEEE Computer Society Press*, 77-86.

Levy, A. (2011). Evolution of local e-government in Central Pennsylvania: History of design and development of the State College Borough website. University Park, PA: Pennsylvania State University.

Levy A. (2015). Advancing Local E-Government through Town-Gown Collaboration in the Web 2.0 Environment: A Comparative Case Study of Six Small Municipalities in Pennsylvania. The Pennsylvania State University,The Graduate School, College of Information Sciences and Technology

Lewis, I., M. (1985). Social Anthropology in Perspective. Cambridge University Press, Cambridge

Li, Z. (2009). How E-government affects the organizational structure of Chinese government. AI & Soc 23: 123–130. <https://doi.org/10.1007/s00146-007-0167-5>

Local Governance Initiative and Network, Asia, (n.d). One-Stop Shops as a Mode of Public Service Delivery, Experience Collation. Available at http://www.loginasia.org/ga4-assets/Knowledge-Products/OSS_Experience_Collation.pdf [Accessed 03 May 2018]

Luna-Reyes, L., F., Gil-Garcia, J., R. & Romero, G. (2012).Towards a multidimensional model for evaluating electronic government: proposing a more comprehensive and integrative perspective. *Government Information Quarterly*, 29(3), 324-334.

Mahundu, F., G. (2016). E-Governance: A Sociological Case Study of the Central Admission System in Tanzania. *The Electronic Journal of Information Systems in Developing Countries*, 79(6), 1–11.

Maleyeff, J. (2007). Improving service delivery in government with lean six sigma. IBM Center for the Business of Government.Available at: <http://www.businessofgovernment.org/report/improving-service-de-livery-government-lean-six-sigma>
[Accessed 13 May 2018]

Marijn Janssen (2010). Measuring and Benchmarking the Back-end of E-Government: A Participative Self-assessment Approach. Maria A. Wimmer; Jean-Loup Chappelet; Marijn Janssen; Hans J. Scholl. Electronic Government, 6228, Springer, pp.156-167, 2010, Lecture Notes in Computer Science, 978-3-642-14798-2. <10.1007/978-3-642-14799-9 14>. <Hal-01056589>

Marquis, B., H. (2009). How to Roll the Deming Wheel. The Workable, Practical Guide to Do IT Yourself, 5(28), 5–7.

Martin, R., L. & Montagna, J.M. (2006), 'Business Process Reengineering Role in Electronic Government', IFIP International Federation for Information Processing, Volume 214, The Past and Future of Information Systems: 1976 - 2006 and Beyond, eds. D. Avison, S. Elliot, J. Krogstie & J. Pries-Heje, *Springer*, Boston, pp. 77 - 88.

Mathew, G., Sulphey, M. M., & Rajasekar, S. (2017). Scope of Business Process Reengineering in Public Sector Undertakings. *Asian Social Science*, 11(26), 129–141.

Mathis, R., L. and Jackson, J., H. (2010), Human Resource Management, 13th ed., South-Western, Mason, OH.

Merriam, S., B. (1988). Case study research in education: A qualitative approach. San Francisco: Jossey-Bass.

Meijer, A., & Zouridis, S. (2004). E-government as institutional transformation. In M. Khosrow-Pour (Ed.), Innovations through information technology. pp. 565-568. Hershey, PA: Idea Group.

Mekuriya, W., T. (2009). Challenges and Practices of E-Government in Ethiopia : The Case of Federal Civil Service Organizations. Addis Ababa University.

Melao, N., Pidd, M., A. (2000). Conceptual Framework for Understanding Business Processes and Business Process Modelling. *Information Systems Journal*, 10,105-129.

Meyers, D., C., Durlak, J., A. & Wandersman, A. (2012). The quality implementation framework: a synthesis of critical steps in the implementation process. *American Journal of Community Psychology*, 50 (3-4), 462-480.

Myers, M. D., Avison, D. (2002). An introduction to qualitative research in information systems, in Myers M, Avison D (Eds, 2002), in Qualitative research in information systems: A reader, Sage, London

Myers, M., D. (1997). Qualitative Research in Information Systems, MIS Quarterly (21:2), June 1997, pp. 241-242. MISQ Discovery, archival version, June 1997, http://www.misq.org/supplements/. Association for Information Systems (AISWorld) Section on Qualitative Research in Information Systems, updated version, last modified: September 4, 2018 www.qual.auckland.ac.nz

Millard, J., Iversen, J. S., Kubicek, H., Westholm, H., & Cimander, R. (2004). Reorganisation of government back-offices for better electronic public services – European good practices (back-office reorganisation), 1(January).

Mills, J., Bonner, A. & Francis, K. (2006). The development of constructivist grounded theory. *International Journal of Qualitative Methods*, 5(1), 25–35.

MINALOC (2013). Institutional Review of Local Governments. Available at: <https://xa.yimg.com/kq/groups/80733344/842198692/name/Organigramme> [Accessed 18 December 2016].

MINALOC (2015). Service Charter. Available at
< http://www.kicukiro.gov.rw/index.php?id=163>
[Accessed 27 December 2017]

MINALOC (n. d.). Amasezerano y'Imihigo 2016-2017 Itsinda rishinzwe guteza imbere imitangire ya serivisi. Available at
<http://www.minecofin.gov.rw/fileadmin/templates/documents/NDPR/Imihigo/2016-17/Joint/SERVICE_DELIVERY.pdf >
[Accessed 12 December 2016].

MINECOFIN (2017). Amasezeraho y'imihigo 2017-2018
<http://www.minecofin.gov.rw/fileadmin/templates/documents/NDPR/Imihigo/2017-18/Joint/Service_Delivery.pdf>
[Accessed 13 January 2018]

MINECOFIN (2018). Key Statistics on Rwanda. Available at

<http://www.minecofin.gov.rw/fileadmin/user_upload/Key_statis-
tics_on_Rwanda_Oct_23rd.pdf>
[Access 09 February 2018]

MINEFOFIN (2019). Ministry of Finance and Economic planning,
MINECOFIN (official website). Available at <http://www.mineco-
fin.gov.rw/>[Accessed 10 February 2019]

MINIJUST (2016). Law governing persons and family. Available at
http://www.minijust.gov.rw/fileadmin/Documents/MoJ_Docu-
ment/Civil_Code_Summary12.9.2016.pdf [Accessed 23 February
2017]

MINISPOC (2012). Records and archives management policy.
Available at <http://www.minispoc.gov.rw/fileadmin/templates/Docu-
ments/doc/Records_and_archives_management_policy.pdf>
[Accessed on 16 February 2018]

Ministry of Information Technology & Communications (n. d.). ICT law.
Available at < http://www.mitec.gov.rw/fileadmin/Docu-
ments/Policies_and_Rugulations/ICT_laws/ICT_LAW.pdf
[Accessed 23 February 2017]

Ministry of Youth and ICT (2015). Smart Rwanda 2015-2020 Master
Plan. Available at: <http://www.minecofin.gov.rw/fileadmin/tem-
plates/documents/sector_strate-
gic_plan/ICT_SSP__SMART_Rwanda_Master_Plan_.pdf>
[Accessed 12 August 2016].

MITEC (2017). ICT sector strategic plan 2018-2024. Available at
<https://www.risa.rw/fileadmin/user_upload/Others%20docu-
ments/ICT%20SECTOR%20STRATEGIC%20PLAN%202018-
2024.pdf>
[Accessed 22 October 2018]

Monteiro, M., F., J., R., Pacheco, C., C., L., Dinis-Carvalho, J. & Paiva,
F. C. (2015). Implementing Lean Office : A Successful Case in Public
Sector. *FME Transactions*, 43, 303–310.

Mumford, E., (1995), Effective Systems Design and Requirements Analy-
sis: The ETHICS Approach, London, Macmillan

Mumford, E., (2003), Redesigning Human Systems, Hershey, IRM Press

Mumford, E. (2006). The story of socio-technical design: Reflections on
its successes, failures and potential. *Information Systems Journal*,
16(4), 317–342.

Mumford, E. & Beekman, G. (1994) Tools for change & Progress, CSG Publications, The Netherlands, ISBN 90-75198-01-9.

Munkvold, B., E., Päivärinta, T., Hodne, A. K., & Stangeland, E. (2006). Contemporary Issues of Enterprise Content Management: The Case of Statoil, *Scandinavian Journal of Information Systems*, 18 (2), 69-100.

Mumporeze, N., & Prieler, M. (2017). Gender digital divide in Rwanda : A qualitative analysis of socioeconomic factors. *Telematics and Informatics*, 34(7), 1285–1293. http://doi.org/10.1016/j.tele.2017.05.014

Munyengabe, S., Haiyan, H., & Yiyi, Z. (2016). Information communication technology policy and public primary schools' efficiency in Rwanda. *South African Journal of Education*, 38(1), 1-10.

MYICT (2015a). ICT Sector Profile - 2015, (December). http://www.myict.gov.rw/fileadmin/Documents/ICT_Sector_Profile_2015/ICT_Sector_Profile_2015.pdf

MYICT (2015b). Smart Rwanda 2020 Master Plan, (October).

MYICT (2015c). National ICT Strategy and Plan NICI 2016. http://www.rdb.rw/uploads/tx_sbdownloader/NICI_III.pdf [Accessed 15 July 2017]

Nadeau, S. (2017) Lean, Six Sigma and Lean Six Sigma in Higher Education: A Review of Experiences around the World. *American Journal of Industrial and Business Management*, 7, pp. 591-603.

National Institute of Statistics of Rwanda (2016). The Republic of Rwanda Rwanda Civil Registration and Vital Comprehensive Assessment Final Report Volume I National Institute of Statistics of Rwanda. Available at: <https://www.unicef.org/rwanda/RWA_resources_crvscafinal.pdf> [Accessed 21 March 2017]

Nilsen, P. (2015). Making sense of implementation theories, models and frameworks. *Implement Science*, 10, 53. DOI 10.1186/s13012-015-0242-0

Norton, A., L. (2015).Enterprise resource planning II - A review of critical success factors. *International Journal of Computer Science and Information Security*, 13(11), 5-14.

Nkohkwo, Q., N. & Islam, M., S. (2013). Challenges to the successful implementation of eGovernment initiatives in sub-saharan africa: A literature review. *Electronic Journal of e-Government (EJEG)*, 11(1), 253-267.

Nograšek, J. (2011). Change Management as a Critical Success Factor in e-Government Implementation. *Business System Research*, 2(2),1-56.

Nograšek J., Vintar M. (2014).E-government and organisational transformation of government: Black box revisited? *Government Information Quarterly*, 31(1), 108-118.

Nograšek, J., Vintar, M. (2011).Technology as the Key Driver of Organizational Transformation in the eGovernment Period: Towards a New Formal Framework, Electronic Government - Proceedings of the 10th IFIP WG 8.5 International Conference, EGOV 2011, Delft, August/September 2011, 453-464

Nordheim, S. & Päivärinta, T. (2004). Customization of enterprise content management systems: an exploratory case study.
In: Proceedings of the 37th Hawaii international conference on system sciences (HICSS), Big Island

Nurdin, N., Stockdale, R. & Scheepers, H., (2012). Organisational adaptation to sustain information technology: The case of e-government in developing countries. *Electronic Journal of e-government*, 10(1), 70.

Nurdin, N., Stockdale, R. & Scheepers, H. (2011). Understanding organisational barriers influencing local electronic government adoption and implementation: The electronic government implementation framework. *Journal of Theoretical and Applied Electronic Commerce Research*, [e-journal] 6(3), 13-27.

Office of the Auditor general (2016). Performance audit on utilization of document tracking and workflow management system. Available at <http://www.oag.gov.rw/fileadmin/user_upload/Performance_Reports/UTILIZATION_OF_DOCUMENT_TRACKING_AND_WORKFLOW_MANAGEMENT_SYSTEM-_EMBONI___REVIEW_OF_RDB_IT_GENERAL_CONTROLS.pdf> [Accessed on 19 September 2018]

Office of the Prime Minister (2013). Law N°86/2013 of 11/09/2013 Establishing the General Statutes for Public Service-MIFOTRA Available at: <http://www.mifotra.gov.rw/fileadmin/user_upload/Laws/Sitati_nshya.pdf > [Accessed 26 December 2016].

Office of the Prime Minister (2016). Prime Minister's Order Nº115/03 of 08/04/2016 determining the Structure of the Manual of Administrative Procedures in Public Service-MIFOTRA. Available at:

<http://www.mifotra.gov.rw/fileadmin/user_upload/me-
dia/ITEKA_RYA_MINISITIRI_W_INTEBE_RIGENA_IMIT-
ERERE_Y_INYANDIKO_IKUBIYEMO_AMABWIR-
IZA_NGENGAMIKORERE_BU_BUTEGETSI_BWA_LETA.pdf>
[Accessed 17 September 2016].

Ogden, T., & Fixsen, D. L. (2014). Implementation science: A brief over-
view and a look ahead. *Zeitschrift Für Psychologie*, 222, 4–11.

Okoli, C., & Schabram, K. (2010). A guide to conducting a systematic lit-
erature review of information systems research, Sprouts: Working Pa-
pers Information Systems 10 (26), 1–46.

Omoteso, K., Patel, A. & Scott, P. (2007). Information and Communica-
tion Technology and Organisations: A Meta-Level Perspective. *The
International Journal of Technology, Knowledge and Society*, 3, 19-
27.

Orlikowski, W., J. (1992).The Duality of Technology: Rethinking the
Concept of Technology in Organizations. *Organization Science*, 3(3),
398-427

Päivärinta, T. & Munkvold, B., E. (2005) Enterprise content management:
an integrated perspective on information management. In Proceedings
of the 38th Hawaii International Conference on System Sciences
(SPRAGUERH Jr, Ed.), CD-ROM, IEEE, Los Alamitos

Papadomichelaki, X. & Mentzas, G. (2012). e-GovQual: A multiple-item
scale for assessing e-Government service quality. *Government Infor-
mation Quarterly*, 29, 98–109.

Papantoniou, A., Hattab, E., Afrati, F., Kayafas, E. & Loumos, V. (2001).
Change management, a critical success factor for e-government, pre-
sented at the 12th International Workshop on Database and Expert
Systems Applications, 402-406.

Parahoo, K. (2006). Nursing Research – principles, process and issues.
2nd edition. Palgrave, Houndsmill

Parys, M. & Thijs, N. (2003). Business process reengineering; or how to
enable bottom-up participation in top-down reform program. Paper
presented at the annual meeting of the European Group of Public Ad-
ministration, Oeiras, 3-6 September

Pateli, A., & Philippidou, S. (2011). Applying business process change
(BPC) to implement multi-agency collaboration: The case of the

Greek public administration. *Journal of Theoretical and Applied Electronic Commerce Research*, 6(1), 127-142.

Paul, A. & Paul, V. (2014). A Framework for E-Government Interoperability in Indian Perspective. *International Journal of Computer Information Systems and Industrial Management Applications*, 6, 582-591.

Peffers, K., Tuunanen, T., Rothenberger, M., and Chatterjee, S. (2007). A Design Science Research Methodology for Information Systems Research. *Journal of Management Information Systems*, 24(3), 45-77.

Periasamy, K., P., & Sia, S. (2007). Challenges in delivering cross-agency. *Journal of Information Technology*, 22, 420–431.

Peronja, I. (2015). Performance effects of the business process change in large enterprises : the case of Croatia. *Journal of contemporary management*, 20(1), 1–22.

Pershing, J., L. (2002). Using document analysis in analyzing and evaluating performance. *Performance Improvement*, 41(1), 36–42.

Polpinij, J., Ghose, A. & Dam, H. K. (2015). Mining business rules from business process model repositories. *Business Process Management Journal*, 21(4), 820–836.

Presthus, W. & Munkvold, B., E. (2016). How to frame your contribution to knowledge? A guide for junior researchers in information systems. Paper presented at NOKOBIT, Bergen, 28-30 November.

Pugh, D. S., Hickson, D. J., Hinings, C. R., and Turner C. (1968). Dimensions of Organizational Structure. *Administrative Science Quarterly*, 13 (1), 65-105

Rabin, B., A. & Brownson, R., C. (2012). Developing the Terminology for Dissemination and Implementation Research. In: Brownson RC, Colditz GA, Proctor EK, editors. Dissemination and Implementation Research in Health. New York: Oxford University Press, p. 23–51.

Radnor, Z. J., Holweg, M. and Waring, J. (2012). Lean in Healthcare: The Unfilled Promise? *Social Science and Medicine*, 74 (3), 364–71.

Radnor, Z. (2010a). Review of Business Process Improvement Methodologies in Public Services. Available at: <https://www.researchgate.net/profile/Zoe_Radnor/publication/266868980_Review_of_Business_Process_Improvement_Methodologies_in_Public_Services/links/54e274930cf2966637969c7e.pdf> [Accessed 27 January 2017]

Radnor, Z. (2010b). Transferring Lean into government. *Journal of Manufacturing Technology Management*, 21(3), 411–428.

Radnor, Z. & Osborne, S. P. (2013). Lean: A failed theory for public services? Public Management Review, 15(2), 265–287.

RALGA (2013). RALGA members consulted on Local Governmentorganisational structure review. Available at: <http://www.ralgar-wanda.org/in-dex.php?id=36&tx_ttnews%5Btt_news%5D=26&cHash=985cedd50cddcd5d16a7eb265fd7cce8> [Accessed 21 January 2017].

Rammea, L. & Grobbelaar, S., S. (2017). The Evaluation of e-Government Implementation: A case study of the Lesotho Company Registry System. IEEE Africon 2017 Proceedings

Randma-Liiv, T. & Kickert, W. (2017). The Impact of the Fiscal Crisis on Public Administration Reforms: Comparison of 14 European Countries. *Journal of Comparative Policy Analysis: Research and Practice* 19(2), 155-172.

Rapoport, R., N. (1970). Three Dilemmas in Action Research, *Human Relations*, 23 (6), 499-513.

Rashid, O., A. (2013). Business Process Improvement Methodologies : An Overview. *Journal of Information Systems Research and Innovation,* 5, 45–53.

Rawas, M. (2013). An empirical examination of the im pact of ICT on the functioning of the Lebanese Ministry of Finance. DeMontfort University, Leicester, UK. Leicester School of Business

Republic of Korea (2017). The Republic of Korea's Country Partnership Strategy for the Republic of Rwanda 2016-2020. Available at: <https://www.koica.go.kr/sites/rwa_en/down/Korea%20CPS%20for%20Rwanda%202016-2020_20170330_%EA%B3%B5%EA%B0%9C%EC%9A%A9.pdf > [Accessed 10 February 2019]

Republic of Rwanda (2000). Rwanda Vision 2020, Ministry of Finance and Economic Planning, Kigali.

Republic of Rwanda (2012). Presidential Order N°25/01 of 09/07/2012 establishing the list of fees and other Charges levied by decentralized entities and determining their thresholds. Available at <http://www.bugesera.gov.rw/fileadmin/user_upload/New_Fees_Presidential_Order_Official_Gazette_no_Special_of_27_07_2012.pdf>

[Accessed 12 January 2018]

RGB (2016). Citizen Report Card 2015. Available at
    <http://rgb.rw/publications/citizen-report-card/crc-2015-english/>
    [Accessed 12 September 2017]

RGB (2017). Citizen Report Card 2016. Available at
    <http://rgb.rw/publications/citizen-report-card/crc-2016-kinyar-
    wanda/> [Accessed 29 March 2018]

RISA (2018). Local Area Networks in Sectors. Available at
    <http://www.risa.rw/projects/ict-infrastructure/> [accessed 10 Octo-
    ber 2018]

RISA (n. d.). RISA (official website). Available at
    <https://www.risa.rw/index.php?id=2> [Accessed 12 February 2019]

Robertson, P. J., & Seneviratne, S. J. (1995). Outcomes of planned organi-
    zational change in the public sector: A meta-analytic comparison to
    the private sector. *Public Administration Review*, 55(6), 547-558.

Roeser, T., & Kern, E. (2015). Surveys in business process management –
    a literature review. *Business Process Management Journal*, 21(3),
    692–718.

Rogers, E. M. (2003). Diffusion of innovations. New York, NY: Free
    Press.

Ron, D. (2015). Using technology to improve public services and demo-
    cratic participation, (September). http://doi.org/10.2861/150280

ROPL (2018). How Rwandans Applied For Government Services.
    RwandaOnline Newsletter-Issue 3. Available at
    <https://drive.google.com/file/d/0BxMGl-
    TAn5pbMVFBDSlh2TklKeHRVYkpfelZtdTlxOEFTOTZN/view>
    [Accessed 27 October 2018]

ROPL (n. d.). IREMBO. [Online] Available at < https://irembo.gov.rw/rol-
    portal/web/rol> [Accessed 11 March 2018].

Rorissa, A., & Demissie, D. (2010). An analysis of African e-Government
    service websites. *Government Information Quarterly*, 27(2), 161–
    169.

Ruhode, E. (2013). Integrated Architecture Framework for E-Government:
    A Socio-Technical Assessment of E-Government Policy Documents.
    In E. Halpin, D. Griffin, C. Rankin, L. Dissanayake, & N. Mahtab

(Eds.), Digital Public Administration and E-Government in Developing Nations: Policy and Practice (pp. 74-96). Hershey, PA: IGI Global. doi:10.4018/978-1-4666-3691-0.ch004

RwandaOnline (n. d.). IREMBO- official website <https://irembo.gov.rw/rolportal/web/rol> [Accessed 12 February 2018]

Saad, B., & Bakry, H. (2004). Development of e-government: a STOPE view. International Journal of Network Management, 14, 339–350. http://doi.org/10.1002/nem.529

Saja A., Jiju, A., Norin, A., & Abhijeet, G. (2017). Implementation of Lean Six Sigma in Saudi Arabian organisations : Findings from a survey. *International Journal of Quality & Reliability Management*, 34(4), 508–529.

Scholl, H., J. (2004). Current practices in e-government-induced business process change (BPC). Proceedings of the 2004 annual national conference on Digital government research (p. 10). Digital Government Society of North America.

Scholl, H. (2005), Current practices in e-government induced business process change (BPC): an empirical study of current practices", *International Journal of Electronic Government*, 1 (2), 27-49.

Scholl, H. J., J. (2003). "E-Government: A special case of business process change", in Proceedings of the 36th Hawaii International Conference on System Science – 2003. IEEE.

Sci Dev Net (2006). Rwanda's president creates a new science ministry. Available at <https://www.scidev.net/global/r-d/news/rwandas-president-creates-a-new-science-ministry.html> [Accessed 05 February 2019]

Shin, D. (2010). A socio-technical framework for cyber-infrastructure design: implication for Korean cyber-infrastructure vision. Technol. Forecasting Social Change 77 (5), 783–795

Sida (2008). Growth and Poverty in Rwanda: Evaluating the EDPRS 2008–2012. Available at <http://www.sida.se/contentassets/7e8daa972898487fb3b031fb096db7cf/20083-growth-and-poverty-in-rwanda-evaluating-the-edprs-2008-2012_1356.pdf> [Accessed 09 February 2019]

Simon, H. (1996). The Sciences of the Artificial. MIT Press,Cambridge, Massachusetts.

SISN (n. d.). Implementation Science: Definitions and a Framework. Available at
<https://www.implementnutrition.org/wp-content/uploads/2017/07/Brief-on-SISN-IS-Framework.pdf>
[Accessed 23 September 2018]

SmartAfrica-Rwanda (n.d). Rwanda's ICT Capability Maturity Level Analysis. Available at
http://smartafrica.org/IMG/pdf/smart_rwanda_master_planv2.5_annex1.pdf

SmartCities. (n.d.). Improving business processes and delivering better. Available at
<http://www.smartcities.info/files/Improving%20Business%20Processes%20and%20Delivering%20Better%20E-Ser%20vices%20-%20Smart%20Cities.pdf> [Accessed 13 January 2018]

Snyder, K. (2004). Lean Six Sigma in the public sector: Applying proven methodologies to improve quality, remove waste, and uncover hidden opportunities in state and local government. Xerox Global Services, Inc. White Paper

Sokovic, M., Pavletic, D. & Pipan, K. K. (2010). Quality Improvement Methodologies – PDCA Cycle, RADAR Matrix , DMAIC and DFSS. *Journal of Achievements in Materials and Manufacturing Engineering*, 43(1), 476–483.

Stake, R., E. (1995). The art of case study research. Thousand Oaks, CA: Sage.

Study, C., & Tengah, C. (2016). Business Process Improvement of District Government Innovation Service. In 2016 International Conference on Information Technology Systems and Innovation (ICITSI). Bandung – Bali.

Suárez-barraza, M., F. (2013). Process Innovation in Local Governments : an empirical study of its continuous improvement efforts. *Review of Business Management*, 15(47), 204–220.

Suárez-Barraza, M., F., & Miguel-dávila, J. Á. (2014). Assessing the design,management and improvement of Kaizen projects in local governments. *Business Process Management Journal*, 20(3), 392–411.

Suarez-Barraza M., F., Tricia Smith & Su Mi Dahlgaard□Park, (2009). Lean□kaizen public service: an empirical approach in Spanish local governments, *The TQM Journal*, 21 (2), 143-167

Subramoniam, S., & Twinky, D. (2015). Government Process Re-engineering of an E-governance Implementation for Motor Vehicle Registration in India. *Indore Management Journal*, 6(2), 39–46.

Sungau, J., Ndunguru, P. C., & Kimeme, J. (2013). Business process re-engineering: the technique to improve delivering speed of service industry in tanzania. *Independent Journal of Management & Production*, 4(1), 208–227.

Silverman D. (2013). Doing qualitative research (4th ed.). SAGE publications

Sinclair, T., A., P. (2001). Implementation Theory and Practice: Uncovering Policy and Administration Linkages in the 1990's. *International Journal of Public Administration*, 24 (1), 77–94.

Strejcek, G., & Theil, M. (2003). Technology push, legislation pull? E-government in theEuropean union. *Decision Support Systems*, 34(3), 305–313.

Taylor, M. J., Mcnicholas, C., Nicolay, C., Darzi, A., Bell, D., & Reed, J. E. (2013). Systematic review of the application of the plan – do – study – act method to improve quality in healthcare. BMJ Quality & Safety, (September), 1–9. http://doi.org/10.1136/bmjqs-2013-001862

The New Times (2017). RURA: Regulating for safety, fairness and efficiency. Available at https://www.newtimes.co.rw/section/read/211487 [Accessed 12 May 2018]

The New Times (2018a). Mutuelle subscribers to use IDs to access healthcare. Available at <https://www.newtimes.co.rw/section/read/230824> [Accessed 12 May 2018]

The New Times (2018b). Land transfers go online. Available at <http://www.newtimes.co.rw/news/land-transfers-go-online> [Accessed 02 May 2018]

The New Times (2018c). New ICT law embodies data privacy protection. Available at < https://www.newtimes.co.rw/section/read/207958> [Accessed 17 May 2018]

The New Times (2018d). Govt lays out mechanism to achieve Vision 2050. Available at <https://www.newtimes.co.rw/news/govt-lays-out-mechanism-achieve-vision-2050> [Accessed 09 February 2019]

Thong, J. Y. L., Yap, C.-S., & Seah, K. L. (2000). Business process reengineering in the public sector: the case of the Housing Development

Board in Singapore. Journal of Management Information Systems, 17(1), 245–270.

Titu, M. A., Oprean, C., &Grecu, D. (2010). Applying the Kaizen Method and the 5S Technique in the Activity of Post-Sale Services in the Knowledge-Based Organization. In Proceedings of the International Multi Conference of Engineers and Computer Scientists (Vol. 3).

Trist, E. L., & Bamforth, K. (1951). Some social and psychological consequences of the long-wall method of coal getting. *Human Relations*, 4, 3–39.

Trist, E. L. (1956). Comparative study of some aspects of mining systems in a Northern coalfield. Publication No. 434 London: Tavistock Institute of Human Relations.

Twizeyimana, J.D., Larsson, H. & Grönlund, Å. (2018). E-government in Rwanda: Implementation, Challenges and Reflections. *Electronic Journal of e-Government*, 16(1), 19-31

Ubaldi B. (2009). Establishing a legal and regulatory framework for e-government. The Art of eServices ITAPA 2009 International Congress 3-4 November 2009. Bratislava, the Slovak Republic

UNCTAD (2017). LDC - What is a least developed country? Available at: <http://unctad.org/en/pages/PressRelease.aspx?OriginalVersionID=438> [Accessed 21 July 2017]

United Nations (2011). The African e-Leadership Workshop http://unpan1.un.org/intradoc/groups/public/documents/un/unpan046483.pdf

United Nations (2012). United Nations E-Government Survey 2012 https://publicadministration.un.org/egovkb/Portals/egovkb/Documents/un/2012-Survey/unpan048065.pdf

United Nations. (2014). United Nations E-government Survey 2014. Available at <https://publicadministration.un.org/egovkb/Portals/egovkb/Documents/un/2014-Survey/E-Gov_Complete_Survey-2014.pdf> [Accessed 13 February 2018]

United Nations (2016a). UN E-Government Survey 2016 <https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2016> [Accessed 13 September 2017]

United Nations. (2016b). the Least Developed Countries Report 2016.

United Nations (n. d). LDC Identification Criteria & Indicators.
    <https://www.un.org/development/desa/dpad/least-developed-coun-
    try-category/ldc-criteria.html>
    [Accessed on 13 January 2018]
United Nations (2018). United Nations E-Government Survey 2018.
    Available at: <https://publicadministration.un.org/egovkb/Por-
    tals/egovkb/Documents/un/2018-Survey/E-Government%20Sur-
    vey%202018_FINAL%20for%20web.pdf> [Accessed 11 January
    2019]
United Nations Public Administration Network (2017). Available at:
    <http://www.unpan.org/Library/MajorPublications/UNEGovern-
    mentSurvey/PublicEGovernanceSurveyintheNews/tabid/651/mctl/Ar-
    ticleView/ModuleId/1555/articleId/53243/Default.aspx>
    [Accessed 17 July 2018]
Vakola, M. (1999). Business Process Re-Engineering and Organisational
    Change: Evaluation of Implementation Strategies.
    University of Salford.
van Veenstra, A., Janssen, M., & Tan, Y.-H. (2010). Towards an Under-
    standing of E-Government Induced Change - Drawing on Organiza-
    tion and Structuration Theories. EGOV 2010, LNCS 6228
    (pp. 1-12). Wimmer, M. A.; et al. (eds).
von Scheel, H., von Rosing, M., Fonseca, M. (2014). "Phase 1: Process
    Concept Evolution". In von Rosing, M.; Scheer, A.-W.; von Scheel,
    H. The Complete Business Process Handbook: Body of Knowledge
    from Process Modeling to BPM.
Walker, G., H., Stanton, N., A., Salmon, P., M. & Jenkins P. D. (2008). A
    review of sociotechnical systems theory: a classic concept for new
    command and control paradigms, *Theoretical Issues in Ergonomics
    Science*, 9(6), 479-499
Walsham, G. (1993). Interpreting information system in organizations.
    Chichester: John Wiley and Sons
Walsham, G. (1995), "Interpretive case studies in IS research: nature and
    method", *European Journal of Information Systems*, 4, 74-81.
Wayi, N. (2014). The use and effectiveness of system development meth-
    odologies during the development of community based systems in
    South Africa. Computer Science at the Potchefstroom Campus of the
    North-West University

Webster, J. & Watson, R., T. (2002), "Analyzing the Past to Prepare for the Future: Writing a Literature Review", *MIS Quarterly*, 26 (2), xiii-xxiii.

Weerakkody, V., Dwivedi, Y. K., and Kurunananda, A. (2009). Implementing e-government in Sri Lanka: Lessons from the UK. *Information Technology for Development*, 15(3), pp. 171-192

Weerakkody, V., El-Haddadeh, R., and Al-Shafi, S. (2011). Exploring the complexities of e-government implementation and diffusion in a developing country: Some lessons from the State of Qatar. *Journal of Enterprise Information Management*, 24(2), 172–196.

Weerakkody, V., El-Haddadeh, R., Sabol, T., Ghoneim, A., & Dzupka, P. (2012). E-government implementation strategies in developed and transition economies: A comparative study. *International Journal of Information Management*, 32(1), 66-74.

Welch, E., W. (2012). The rise of participative technologies in government (2012). In M.A. Shareef, N. Archer, Y. K. Dwivedi, A. Mishra, & S. K. Pandey (Eds.), Intransformational government through eGov practice: Socio-economic, cultural, andtechnological issues (pp. 347–367). Bingley, United Kingdom: Emerald Publishers.

Wimmer, M. (2002a). A European perspective towards online one-stop government: the eGov project. *Electronic Commerce Research and Applications*, 1, 92-103

World Bank. (2011). Implementation Completion and Results Report, 2.

World Bank (2013). e-Rwanda Project (2013). Available at <http://documents.worldbank.org/curated/en/491851474497141969/Rwanda-Erwanda-Project>. [Accessed 12 February 2017]

World Bank (2018). Rwanda. Available at <http://pubdocs.worldbank.org/en/366631492188168425/mpo-rwa.pdf>
[Accessed 10 February 2019]

Yin, R., K. (1984). Case study research: Design and methods. Newbury Park, CA. Sage.

Yin, R., K. (1994). Case Study Research, Design and Methods, 2nd ed., Newbury Park, CA, Sage Publications

Yin R., K. (2003) Case study research: design and methods vol. 5. Thousand Oaks, Calif: Sage Publications.

Zainal, Z. (2007).Case study as a research method. *Kemanusiaan Journal*, 9, 1–6.

Zhang, H., Tang, Z., & Jayakar, K. (2018). A socio-technical analysis of China's cybersecurity policy: Towards delivering trusted e-government services. *Telecommunications Policy*, 42, 409-420

Zhou, X. (2004). E-government in China: A content analysis of national and provincial web sites. *Journal of Computer Mediated Communication*, 9

Zmud, R., W. & Cox, J. F. (1979). The implementation process: A change approach. *MIS Quarterly*, 35-43.

Zuiderwijk, A., Janssen, M., Choenni, S., Meijer, R., & Sheikh A., R. (2013). Sociotechnical impediments of open data. *Electronic Journal of e-Government*, 10, 156–172.

Annexes

Annex 1: Interview questions for Paper I (for managers, IT professionals and users)

Annex 2: Interviews questions for Paper II (for managers and service clerks)

Annex 3: Interview questions for Paper IV (for project coordinators and managers)

Annex 1: Interview questions for Paper I (for managers, IT professionals and users)

General questions on Position, Role and Tenure

1. What is your position in the institution?
2. What is your role in the institution?
3. For how long you have been in the institution?
4. For how long have you been in the institution playing this role?

A. Project Coordinator

Questions about the project
5. What are goals of the project of document tracking system?
6. What are the activities being undertaken in relation document tracking project?
7. Who are the involved parties?
   a. What were parties involved in the identification of requirements and needs?
   b. Who are the involved parties in the design and implementation?
   c. Who are involved on the side of business processes that the system will serve?
8. What is the existing training strategy?

9. How has the project been implemented?
   a. What has facilitated the implementation of Document Tracking System? (tools, guidelines...)
10. To what extent have the goals been achieved?
    a. What are indicators on achievement of the goals?
    b. What types of assessments have been conducted to know how far you are in achieving goals?

B. Managers at District/RDB/Ministry level

11. What are goals of the project of document tracking system?
12. What are the activities being undertaken in relation to document tracking project?
13. To what extent have the goals been achieved in implementing the Document Tracking System?
    a. What are indicators on achievement of the goals?
    b. What types of assessments have been conducted to know how far you are in achieving goals?

14. How well does the system meet the requirements of your organization?
    a. Are there system functionalities missing however needed in your organization?
    b. How, if in any way, have the work processes of your organization been changed? (What changed in work process or roles of staff after the system has been implemented?)
    c. What do you want to achieve in relation to the project in the near future? (next 1-3 years)
    d. What are the strategic actions you plan to take in order achieve these things?

15. How the project is important to citizens and other involved entities?
    a. What are actual benefits of the implementation?

16. What are the key challenges being faced in implementing the project?

17. What is your role in improving the implementation of Document Tracking System?
18. What are the key challenges being faced in implementing the Document Tracking project?
    a. What are challenging issues in relation to
       a1. Infrastructure?
       a2. Work processes?

C. Actual users

19. To what extent you feel satisfied in using the Document Tracking System?
    b. How is searching information when using the system?
    c. How is easy collaborating with your other staff?
    d. What are the challenging issues in relation to system quality and use?

20. How well does the system meet the requirements of your organization?
    a. Are there system functionalities missing however needed in your daily activities?

21. What is your role in improving the Document Tracking System?

    a. How do you participate in improving/giving feedback or determining user and system requirements?

22. What are the key challenges being faced in relation Document Tracking system in your agency?

Annex 2: Interviews questions for Paper II (for managers and service clerks)

General questions for managers

1. What is your role in the project of 'one-stop' e-government?
2. What are stakeholders in the implementation of 'one-stop' e-government?
3. When was 'one-stop' e-government implemented?
4. What are services offered and to be offered via 'one-stop' e-government?
5. What was has been achieved so far in the project of 'one-stop' e-government?
6. What are the project implementation plans?

A. **Specific questions for managers**

7. What are the activities undertaken in different stages in the implementation process cycle of Rwanda one-stop e-government? (e.g. at the stages of Envision, Initiate, Diagnose, Redesign, Reconstruct, Evaluate, Institutionalise Change)
8. What are the achievements in IREMBO project, in terms of
    a. Service processes
    b. Services?
    c. Technology and Infrastructure?
    d. People aspects?
    e. Organizational structure?
    f. Laws and policies?

9. What are the changes that have taken place?
    a. in service processes
    b. in technology
    c. in people aspects
    d. in organizational structure
    e. in Laws and policies
    while implementing one-stop e-government project?

8.1 If a change occurred, why the change have taken place?
- d. Who is involved in making the change?
- e. What were issues encountered while making the changes?

1. What are plans for
   a. Improving service processes?
   b. Making changes in Technology?
   c. Dealing with people issues (skills, attitudes)?
   d. Adjusting organizational structure?
   e. Reviewing laws and policies?
2. What are the challenges being faced in the project implementation?

3. What do you think have been achieved so far?

B. Specific questions for service clerks

4. What are the services you are involved in?
5. What are changes in work processes that took place since the time when 'IREMBO' was launched?
6. What are the problems being faced while providing services?
7. What do you think has improved while providing services via 'one-stop' e-government?

Annex 3: Interview Questions on ECM and IREMBO projects for Paper IV
    (for project coordinators and managers in agencies)

Interviewee characteristics
1. What is your role in relation to the project?
2. For how long have you been playing that role?

Processes and Tasks
3. What was being done in the project since January 2017 up to today?
    a. What were the main activities of the implementation team since that time?
    b. What are services implemented since that period?
    c. Which services have been re-designed? How they have been re-designed?
4. What are the challenges faced in the project since January 2017 up to today?
5. What has not gone well in relation to DTWMS/ IREMBO in your agency since January 2017 up to today?

6. What is being planned for future?
    a.   What are activities being planned for future?
    b.   What are the services to be redesigned?

Organizational Structure
7. How did implementation of DTWMS/ IREMBO shape government agencies/ your agency since 2017?
8. How responsibilities of staff changed due to DTWMS/ IREMBO system since January 2017 in government agencies/ your agency?
9. How service providers of particular service (DTWMS/IREMBO) changed government agencies/ your agency since January 2017?
10. Which changes have taken place in the work environment because of ECM/IREMBO in your agency since January 2017?
11. How the workflow in your agency/ government agencies changes because of DTWMS/IREMBO since January 2017?
12. What are the plans related to making changes in the workplace in your agency/ government agencies due to DTWMS/ IREMBO?

Technology

13. What have been changes in technology /ICT infrastructure in DTWMS/ IREMBO project since January 2017?
14. What have been changes in technology /ICT infrastructure in your agency because of DTWMS system/ IREMBO services since January 2017
15. What are the changes in technology /ICT infrastructure to be made in your agency/ government because of DTWMS/ IREMBO?

People

16. How aspects of people for example skills, attitude and values about DTWMS/ IREMBO have been handled since January 2017 in your agency/ government agencies?
17. How have change management been addressed since January 2017?
18. What have been the changes in handling or addressing people issues in relation to DTWMS since January 2017?
19. What is being planned about people issues for a successful DTWMS/IREMBO project in your agency/ in government agencies?
20. What have been the challenges since January 2017?

Legal framework and policies

21. What have been the enacted laws since January 2017 because of DTWMS/IREMBO?
22. What have been the policies in place since January 2017 because of DTWMS/IREMBO?
23. What are the instructions /guidelines in place since January 2017 be-cause of DTWMS/IREMBO? In which form these instructions/guide-lines are communicated?
24. What are laws/policies been planned because of DTWMS/IREMBO?

Other questions

25. What are the documents giving details on:
    a. Organisational structure of your agency?
    b. Operational procedures of your agency?
    c. Information on services provided by your agency to the public?

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