E-Government Service Evaluation in Rwanda: A Design Perspective

To my husband

Örebro Studies in Informatics 17

ÖREBRO UNIVERSITY

SOLANGE MUKAMURENZI

E-Government Service Evaluation in Rwanda:
A Design Perspective

Cover photo: Solange in the midst of a tea plantation in the Land of a thousand hills.

Abstract

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Rwanda has embraced e-government. As the first step of implementation, services are being developed and provided online. As e-government matures over time, due to challenges and opportunities presented by developments in technology, legislation, economy, standards and user expectations, an important management challenge is to understand future challenges and to be prepared to address them. The present research addresses the problem of moving from e-government service quantity to service quality in Rwanda by using a design science research approach to answer the question: *How can e-government service evaluation be improved in Rwanda?*

This thesis provides an integrated view of e-government maturity. The empirical studies explain the challenges facing e-government implementation in Rwanda and involve service providers in investigating e-government service quality. Building on these, an evaluation process redesign is suggested and a prototype of a web-based evaluation approach called Rwanda Online Service Evaluation (ROSE) is developed in order to convey the proposed changes. It is also tested with managers and users in Rwanda. The evaluation process redesign consists of information, social and technology components.

The present research contributes to the e-government body of knowledge through study cases of a Least Developed Country (LDC), namely Rwanda. Theoretical contributions include an e-government maturity model and an e-government service development framework, which could also be used in other research. The findings and the developed prototype contribute to practice in terms of evaluating e-government services and may serve as an inspiration for other LDC.

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To end, I would like to express my gratitude to my family. Dear dad, thank you for inspiring and supporting me unconditionally. You have given me a firm foundation. Dear mom, thank you for being my heavenly guardian. The sounds of the songs you liked are the melody of my life. My precious brothers, sisters, and cousins thank you for being present in all ways possible. My beloved in-laws thank you for always encouraging me. My treasured nieces and nephews, thank you for putting smiles on my face with your songs, speeches, dances, pictures, and messages. Even now, I am smiling. To all of you, your prayers have been my strength. God bless you.

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List of Studies

Study 1
Mukamurenzi, S., Grönlund, Å. & Islam, M. S. (2016). Evaluating eGovernment Evaluation: Trend and Issues. In *Electronic Government and Electronic Participation*. Paper presented at 15th IFIP Electronic Government (EGOV) / 8th Electronic Participation (ePart) Conference, Univ Minho, Guimaraes, Portugal, September 5-8, 2016 (pp. 123-134). IOS Press.

Study 2
Mukamurenzi, S., Grönlund, Å., & Islam, M. S. (2019). Challenges in Implementing Citizen-centric e-Government Services in Rwanda. *Electronic Government, an International Journal*, *15*(3), 283–302.

Study 3
Mukamurenzi, S., Grönlund, Å., & Islam, M. S. (2019). Improving qualities of e-government services in Rwanda: A service provider perspective. *Electronic Journal of Information Systems in Developing Countries*. 85(5), e12089.

Study 4
Mukamurenzi, S., Grönlund, Å., & Islam, M. S. Designing eGovernment Service Evaluation in Rwanda.*(Submitted to a journal- under review)*

Abbreviations

BPMIS:	Building Permit Management Information System
CCP:	Content Context and Process
CoK:	City of Kigali
DSR:	Design Science Research
DSRM:	Design Science Research Methodology
EDPRS:	Economic Development and Poverty Reduction Strategy
G2B:	Government to Business
G2C:	Government to Citizen
G2G:	Government to Government
ICT:	Information and Communication Technologies
IS:	Information System
ISA:	Information Systems Artifact
IT:	Information Technology
ITU:	International Telecommunication Union
LDC:	Least Developed Countries
MIFOTRA:	Ministry of Public Service and Labour
MINECOFIN:	Ministry of Finance and Economic Planning
MINICT:	Ministry of ICT and Innovation
MITEC:	Ministry of Information Technology and Communications
NICI :	National Information and Communication Infrastructure
OBRS:	Online Business Registration System
OECD:	Organization for Economic Co-operation and Development
ORG:	Office of the Registrar General
RDB:	Rwanda Development Board
RGB:	Rwanda Governance Board
RISA:	Rwanda Information Society Authority
ROSE:	Rwanda Online Service Evaluation
SDMR:	Service Delivery Monitoring Report
SRMP:	Smart Rwanda Master Plan
SSA:	Sub-Saharan Africa
UN:	United Nations
UNDESA:	United Nations Department of Economic and Social Affairs

Terms and Definitions

E-government/digital government: "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, as well as expand communication channels for engagement and empowerment of people" (UNDESA, 2014, p. 2).

E-government service quality: "the extent to which services delivered via an e-government website assist citizens in completing their governmental transactions" (Tan, Benbasat, & Cenfetelli, 2010, p. 3). This definition includes any factor that may affect transactions or technical, informational, economic, social, and psychological aspects, among others.

E-service: a sequence of digital interactions, electronically mediated between a service provider and service receiver through a generally available user interface (Goldkuhl, 2007; Jansen & Ølnes, 2016).

Evaluation: a series of activities incorporating understanding, measurement, and assessment. It is either a conscious or tacit process which aims to establish the value of, or the contribution made by, a particular situation. It can also relate to the determination of the worth of an object (Remenyi, Sherwood-Smith, & White, 1997). Evaluation can refer to the process or the result of that process.

Implementation: put in action or execute a plan.

Information artifact: an instantiation of information, where the instantiation occurs through a human act either directly (as could happen through a person's verbal or written statement of a fact) or indirectly (as could happen through a person's running of a computer program to produce a quarterly report) (Lee et al., 2015, p. 8).

IS artifact: a system, itself consisting of subsystems that are (1) a technology artifact, (2) an information artifact, and (3) a social artifact, where the whole (the IS artifact) is greater than the sum of its parts (the three constituent artifacts as subsystems) and where the IT artifact (if one exists at all) does not necessarily predominate in considerations of design and where the IS itself is something that people create (i.e. an 'artifact') (Lee et al., 2015, p. 6).

Prototype: a mock-up of something built to test a concept, an idea, or a process.

Social artifact: an artifact that consists of, or incorporates, relationships or interactions between or among individuals through which an individual attempts to solve one of his or her problems, achieve one of his or her goals, or serve one of his or her purposes (Lee et al., 2015, p. 9).

Technology artifact: a human-created tool whose raison d'être is to be used to solve a problem, achieve a goal or serve a purpose that is human defined, human perceived or human felt. (Lee et al., 2015, p. 8).

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1. Introduction

Many developing countries have embraced e-government and are currently at an initial stage of implementation which is characterized by developing and delivering services online. One of the key facts about e-government is the increase in the number of services (Lindgren & Jansson, 2013).

> *Even though LDC [least developed countries] have improved their basic, or emerging, online presence—in most cases restricted to providing a limited amount of information and links online—they are making little or no progress in moving to the more advanced stages of e-government development, including the provision of e-services, e-participation and open government data. (UNDESA, 2014, p. 43)*

The problem facing e-government managers in LDC is how to move forward. There is a lack of context-based guidance to move from the developmental stage to the next. Once the services are online, managers need to know which actions to take in order to move forward, and how to do so.

The present research aims at satisfying that lack by informing practitioners on how to improve e-government services and providing them with a practical tool for service evaluations, developed taking into consideration what is possible and feasible. This thesis utilizes design science research (DSR) (Hevner, March, Park, & Ram, 2004) in a problem-solving process to study e-government implementation and its challenges in an LDC context. The research is guided by the DSR methodology in its six steps: problem identification and motivation, define the objectives for a solution, design and development, demonstration, evaluation, and communication (Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007). The present work suggests the use of service evaluation as an important next step and subsequently proposes a service evaluation process redesign, and provides an artifact to support this process.

This thesis is positioned in the field of e-government. E-government research is multidisciplinary and is conducted in a number of disciplines including political science, public administration, information systems (IS), and computer science. The present research is situated within the IS discipline.

The field of IS emerged in the 1960s, focusing on the use of technologies in organizations (Hirschheim & Klein, 2012). Its goal is to understand how

human-computer systems are developed, how they produce and process information, and how they influence the organizations in which they are used (Vaishnavi & Kuechler, 2008). Information systems research studies topics connected to information technologies (IT), IT infrastructures and IT-enabled business solutions (i.e. information systems), and the immediate antecedents and consequences of these information systems (Benbasat & Zmud, 2003). Those antecedents and consequences include managing, planning, designing, building, modifying, implementing, supporting, and/or assessing IT-based systems for practical purposes.

The use of IS in government provides an opportunity for IS researchers and practitioners to extend their contributions to the management of society by supporting operations, management and decision-making (Grönlund & Horan, 2005). Such a use in government organizations is referred to as electronic government (e-government). E-government has multiple synonyms, including digital government and ICT-enabled public administration, and has multiple definitions. It can be defined 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, as well as expand communication channels for engagement and empowerment of people" (UNDESA, 2014, p. 2). This definition was found to be appropriate for use in the present research as it is reflected in Rwanda's objectives relating to e-government, as they highlight service integration for operational efficiency, quality of service delivery, and the establishment of effective communication channels in order to increase their participation in governance (Government of Rwanda, 2015).

Over the last two decades, e-government has received attention by developing and least developed countries. It is expected that the right combination of e-government, institutional frameworks, policies, and capacity-building efforts facilitate sustainable development (UNDESA, 2012). As of 2014, all of the LDC had an online presence despite the fact that other stages of e-government development such as e-services, e-participation, and open government data still required efforts in order to advance (UNDESA, 2014).

E-government development in LDC is characterized mainly by a growth in the number of public services. LDC are a group of currently 47 countries generally characterized by low income, human resource weakness, and economic vulnerability, when compared to other groups such as 'developing' and 'developed' countries (UN, 2018). These countries expect to benefit

from e-government through a reduction of corruption, an increase of transparency and revenue, and cost reduction. Given the LDC's economic conditions, it is important to spend the little they have wisely, assess the outcome of their spending, and plan to exploit the e-government's full potential. However, Nkohkwo and Islam (2013) note the lack of e-government evaluation frameworks in Sub-Saharan Africa (SSA), a region dominated by LDC. Further, the lack of monitoring and evaluation as well as the failure to contextualize initiatives are identified as major causes for e-government project failures in developing countries (Hatsu & Ngassam, 2016).

Rwanda is an LDC in SSA which prioritizes the use of ICT with the goal of transforming itself into a middle-income knowledge-based society (Rwanda Vision 2020, 2012). That prioritization resulted in putting in place a series of five-year national ICT strategy and action plans to guide national ICT initiatives, starting in 2000. These plans translated into developing legal and regulatory frameworks, establishing institutions, and putting in place infrastructure, all of which form the foundation for e-government. The 2011-2015 national plan paid particular attention to e-government service delivery, and the current plan for the period of 2016-2020, commonly known as the Smart Rwanda Master Plan, aims at improving e-government infrastructure, developing standardized ICT service systems, integrating all government services to improve operational efficiency and service delivery, and increasing citizen participation. As a result of these plans, a variety of government organizations have been providing services online. They include an application for national ID cards, marital status certificates, business registration, and construction permits. The main initiative regarding service delivery to citizens is the "Irembo" portal, targeted to be a one-stop portal for e-government services. "Irembo" is a Kinyarwanda word that literally means gateway. Its initial target is to provide the 100 most requested services. This portal was launched in 2014 and as of July 2019 provided access to 98 services and 22 payment solutions. Rwanda is becoming familiar with the provision of online services and managers have to plan how to develop e-government further. The question is thus how to ascertain what the next step should be, in order to ensure that e-government achieves its intended objectives?

In general, Rwanda and other LDC aspire to leapfrog the development stages. This means that they plan to move through the development stages by learning from developed countries' experience to avoid mistakes of the past and move faster. For instance, the Rwandan government believes that "ICT can enable Rwanda to leapfrog the key stages of industrialization"

(Government of Rwanda, 2010, p. 5). Similarly for e-government, "LDCs can benefit from the good practices and lessons learned from other more established e-government practices, with the possibility to avoid possible costly pitfalls and to leapfrog in e-government development" (UNDESA, 2014. p. 37). However, Rwanda and other LDC have to pay attention to the differences and use lessons from other contexts accordingly. Schuppan (2009) suggests a context–oriented approach as the promising route to the success of e-government. For instance, countries' economic and human development conditions differ and grow differently; each country is unique and its e-government follows a different path. As such, e-government development has to be understood in its own context. E-government requirements in the present moment are also different from those of the past. For example, the necessary technology is more readily available for use today than when the developed countries started adopting e-government. This would suggest that technology concerns would currently be fewer than in the past. Besides technological challenges, there are other aspects of e-government to address. These include organizational structures and skills, new forms of leadership, transformative public and private partnerships, and a new degree of civic participation (UNDESA, 2015).

Leapfrogging in terms of e-government service delivery would then consist of learning from other countries' experience in improving qualities of services and service delivery. This experience includes informing oneself about international research and best practice about e-government services. Once informed managers set to achieve specific goals, it would be possible to devise the next step.

One of the ways to move e-government services forward would be to progressively assess what has been achieved vis-à-vis what is expected for a specific period of time, establish the gap that exists between the two, and then, guided by lessons from other contexts, plan the actions to be taken so as to close the gap. Assessing what has been achieved for a specific period of time calls for formative evaluations which would inform implementation and then, in the long run, lead to achieving the long-term grand vision of national e-government. In LDC where the focus has been on service delivery, such as in Rwanda, the assessment could start with service evaluation.

Research suggests that evaluating e-government is an important issue (Anwer, Esichaikul, Rehman, & Anjum, 2016; Gupta & Jana, 2003; Jones, Hackney, & Irani, 2007; Shan, Wang, Wang, Hao, & Hua, 2011). Evaluations may have different purposes. For instance, the purpose of evaluation may be efficacy or efficiency. For the former, e-government evaluation can

be defined as "a process of observing and measuring the ability of an e-government system to achieve its predetermined objectives" (Anwer et al., 2016). On the other hand, the latter understands e-government implementations to require large amounts of financial resources and therefore need to be assessed in order to determine the value and benefit derived (Anwer et al., 2016; Jones et al., 2007). Evaluation purposes can include accountability, intervention improvement, or basic knowledge advancement (Vedung, 1997) whereby organizations determine the status of their e-government development in terms of resources, objectives, and lessons.

However, some authors advance that public sector organizations do not undertake ICT evaluation and as a result those organization would not be able to ascertain the impact of e-government (Jones et al., 2007). One of the reasons for not conducting evaluations is the lack of effective measures to evaluate e-government quality (Papadomichelaki & Mentzas, 2012; Shan et al., 2011). Such a lack has led to a significant slowdown of country-level e-government (Kunstelj & Vintar, 2004; Shan et al., 2011), and could even lead to failures. Failures are mostly reported in the developing world where e-government projects fail to achieve part or all of their main goals (Gunawong & Gao, 2017). As researchers link e-government success to service use (Irani et al., 2012) and to service improvement based on evaluations (Gupta & Jana, 2003; Lagsten, 2011; Soares et al., 2019), conducting evaluations would contribute to informed decision making regarding how to move forward and to the reduction of failures.

Reasons for not conducting an evaluation may be linked to the complexities of evaluations due to the multiple perspectives involved and to the fact that e-government information and services are intangible resources, and it is thus difficult to quantify their value (Anwer et al., 2016; Gupta & Jana, 2003). Successful evaluations therefore require an appropriate approach and careful planning. They need to take into account what is being evaluated, how to obtain accurate results, the methodologies and tools used, the key indicators for use, and the key players, in addition to considering organizational, social, technological, and financial aspects of evaluation (Alshawi & Alalwany, 2009; Song & Letch, 2012). Given the citizen-focused objectives of governments, users are among the key players for consideration in evaluations. It has been suggested that their involvement enlightens providers on users' views and needs (Holgersson & Söderström, 2014) and inform service improvement (Omeni, Barnes, MacDonald, Crawford, & Rose, 2014).

1.1. Problem Statement and Motivation

E-government in LDC has been paying more attention to the quantity of services than to their quality. As in developing countries – including LDC – little is done to provide context-based practical guidance (Hassan, Shehab, & Peppard, 2011), it would be difficult to know how to guide the next development phases. This is the case in Rwanda, where the empirical evidence of this research is based.

In Rwanda, the use of ICT in government service delivery has been among the priorities of the national ICT strategic plan (Government of Rwanda, 2015). Efforts and resources are continually invested in developing and delivering services. However, there is no guidance on how to move from the present stage of e-government services, which focuses on service development and usability, to the stage of service quality.

In order to address this situation, the present research aims to suggest how e-government service evaluation can be improved to better inform service improvement in Rwanda. Hence, this research investigated e-government and service evaluation practice and suggests a process redesign to improve service evaluation in Rwanda, and possibly benefit e-government service development in other developing countries.

The motivations for conducting this research are twofold. First, the scarcity of research on e-government evaluation in SSA and in LDC in general, and Rwanda in particular, was a practical motivation. At the time when I began this project there was no research on e-government implementation nor on its evaluation in Rwanda. Thus, the status of affairs was not known despite the fact that, for almost two decades, the efforts and resources have been invested in e-government implementation with the aim of improving operational efficiency, quality of service delivery, and citizens' participation. Second, Rwanda aspires to become an ICT hub in Africa. It would be wrong to think that other African countries do not have similar ambitions. Since there are no means in place to track e-government achievements in terms of the set goals, it would be difficult, if not impossible, to identify where additional efforts are required.

This research thus investigates how e-government services can be evaluated, guided by a DSR approach in a problem-solving process. Design science research was chosen as it fits the present research's focus on advancing e-government service development and as it allows for the development of an artifact to improve service evaluation. Developing e-government service further is a common problem among organizations, as is the lack of guidance in service evaluation. Further, as "DSR assumes neither any specific

client nor joint collaboration between researchers and the client" (Iivari & Venable, 2009, p. 1642), this approach allowed me to investigate the problem in different organizations and suggest a solution appropriate for use by any of these organizations. The present research suggests an evaluation process redesign and develops an artifact for use to address the evaluation situation.

The theoretical contributions of the present research are an e-government maturity model and a framework for e-government service development that were developed as part of this research, and which can be used to analyze and explain e-government maturity and service development in other contexts. The developed prototype can guide practitioners in evaluating e-government services. It is also expected that the present research contributes to the body of knowledge of e-government and its evaluation by adding a case of an LDC, namely Rwanda.

1.2. Thesis Scope

The present research aims to suggest how e-government service evaluation can be improved so as to better inform service improvement in Rwanda. Theoretical concepts, methods and general knowledge from the IS field are applied to address the issues facing the implementation of e-government in an LDC context. As this research focuses on enhancing e-government through service evaluation, its focus is on the services delivered as a result of implementing e-government initiatives.

One of the manners in which to describe the e-government domain is through its four areas of applications (Luna-Reyes, Gil-Garcia, & Romero, 2012): 1) *e-services*: public services delivery through ICT; 2) *e-management*: the use of ICT improve and innovate government operations, internal efficiency, and efforts directed at government reform and administration; 3) *e-public policy*: referring to the creation of a legal and regulatory framework that facilitates electronic government initiatives and fosters an atmosphere conducive to the information society; and 4) *e-democracy:* the use of ICT to promote citizen participation in its many manifestations and encourage democratic relationships between government, citizens, and other social actors. The present work is situated in the e-services application as it investigates e-government service development and suggests service evaluation for improvement.

In this thesis, I distinguish between service users and citizens. The former are citizens who use services. While recognizing that services are developed with citizens as the beneficiaries, the dominance of intermediaries in the

service delivery process is remarkable in countries where literacy remains low. This research pays attention to the actual service users. In countries with low literacy levels, intermediaries are and will remain in the picture at least until the literacy problems are addressed.

This research contributes to addressing e-government problems by designing context-embedded evaluations. This work does not evaluate services, rather it investigates current practice and suggests how evaluations can be designed in order to inform the improvement actions, which the "design perspective" highlights.

The informants of this research include policymakers, managers, service developers, service providers, regulators, and service users. Data used in this research was collected between December 2014 and December 2018. The findings and suggestions from this thesis are beneficial to practitioners in Rwanda in particular and may also be relevant to other LDC.

1.3. Research Questions and Objectives

The main research question of this thesis is: *How can e-government service evaluation be improved in Rwanda?* This main research question is operationalized by the following five questions:

Question 1: What is the status of research on e-government evaluation?
For Study 1, which is a literature review, the objective is to set the scene for the research in general. This is necessary to gain an understanding of e-government evaluation and the aspects on which the literature focuses. Study 1 is to form the foundation of the thesis, as the subsequent studies will all study some aspects of e-government evaluation. The following questions are for studies whose empirical data is from Rwanda.

Question 2: What are the challenges in implementing e-government in Rwanda?
Study 2 provides an understanding of e-government in Rwanda, from the Rwandan context. Since the research cases are from Rwanda, it is important to learn about e-government in Rwanda. Study 2 investigates challenges in implementing, integrating and operationalizing e-government as experienced by local stakeholders. This study is central for guiding the next research steps and for specifying which aspects require further attention in the following studies.

Questions 3 and 4: What are the service providers' views of e-government service qualities in Rwanda? How do those views relate to the issues found in the literature?

After identifying the focus of evaluation in the previous steps, the objective of Study 3 is to understand the organizations' perspectives on the qualities of e-government services from the service providers' point of view, and then, if need be, inform their improvement. Study 3 builds a foundation for the remainder of the research.

Question 5: How can e-government services in Rwanda be evaluated?

Study 4 is about the "how" of evaluation. Its objective is to investigate how e-government services in Rwanda can be evaluated. In this study it is expected to work with local stakeholders such as service providers and service users and suggest an evaluation process feasible for use in Rwanda.

Answering these research questions resulted in the four studies which comprise this thesis. The research questions, objectives, and studies are mapped in Figure 1.1.

How can e-government service evaluation be improved in Rwanda?

Objective: Understanding issues related to e-government evaluation	**Objective:** Investigating challenges that Rwanda faces in implementing e-government	**Objective:** Exploring service providers' views of e-government service qualities in Rwanda with the purpose of informing improvement	**Objective:** Investigating how e-government services in Rwanda can be evaluated
RQ 1: What is the status of research on e-government evaluation?	*RQ 2: What are the challenges in implementing e-government in Rwanda?*	*RQ 3: What are the service providers' views of e-government service qualities in Rwanda?* *RQ 4: How do those views relate to the issues found in the literature?*	*RQ 5: How can e-government services in Rwanda be evaluated?*
Study 1	**Study 2**	**Study 3**	**Study 4**

Figure 1.1. Research map

1.4. Thesis Structure

In Chapter Two I present the research background and I introduce e-government, its challenges, evaluation, and user involvement as key concepts

used in this thesis. In Chapter Three I introduce Rwanda, the research context where the empirical data was collected, and describe the research cases. Chapter Four, the research design, details the theoretical framework and the research approach that guided this research, as well as the methods utilized. In Chapter Five I introduce an evaluation approach to support the improvement of e-government service evaluation. I also explain its constructs and how they interact in service evaluation process. In Chapter Six I present the research results from the four studies comprising this thesis, as well as how they contribute to answering the main research question, and I share the research limitations. Finally, in Chapter Seven I present the research conclusions and discuss their implications. I then share the research contributions and provide suggestions for further research.

2. Research Background

The present research is on e-government service evaluation in Rwanda. In this chapter I introduce e-government and then discuss its challenges and its evaluation with a focus on developing countries. Towards the end I also discuss user involvement in evaluation.

2.1. E-government

The term e-government emerged in the late 1990s (Grönlund & Horan, 2005). It has multiple synonyms, including digital government, electronic government, and ICT enabled public administration. It also has multiple definitions, each focusing on a variety of aspects. For instance, the Organization for Economic Co-operation and Development (OECD) categorized e-government definitions in three groups (OECD, 2003, p. 63):

1. E-government is defined as Internet (online) service delivery and other Internet-based activity such as e-consultation.
2. E-government is equated to the use of ICTs in government. While the focus is generally on the delivery of services and processing, the broadest definition encompasses all aspects of government activity.
3. E-government is defined as a capacity to transform public administration through the use of ICTs or indeed is used to describe a new form of government built around ICTs. This aspect is usually linked to Internet use.

The definitions span from narrowly focusing on service delivery (definition 1), to focusing on government activities (definition 2), and to focusing on the administration and its links with formal politics (definition 3) (Grönlund & Horan, 2005).

The World Bank's (WB) definition highlights the relations with stakeholders and links e-government to its benefits. It defines e-government as "the use of information and communication technologies (ICTs) to transform relations with citizens, businesses, and other arms of government to ensure less corruption, increased transparency, greater convenience, revenue growth, and cost reductions" (WB, 2015).

Other more inclusive definitions go beyond service delivery and administration. Dawes (2009), for instance, highlights democratic aspects and

stakeholder interaction by describing the e-government domain as constituting "not only services and administration but also democratic processes and the relationships among citizens, civil society, the private sector, and the state" (p. 260). The OECD defines e-government as "the use of ICTs, and particularly the Internet, as a tool to achieve better government" (OECD, 2003, p. 63).

All the definitions change in regard to e-government priority and progress for a specific country, though they all include the use of ICT to improve how governments complete their work.

The present research is on e-government in Rwanda. Rwanda's e-government objectives are to: 1) implement e-government by integrating all government services, to enhance operational efficiency and the quality of service delivery to citizens and businesses, and 2) establish effective communication channels to enable and empower both rural and urban communities as a means to increase citizens' participation in governance (Government of Rwanda, 2015, p. 24). These objectives relate to the UN's definition of e-government: "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, as well as expand communication channels for engagement and empowerment of people" (UNDESA, 2014, p. 2).

Focusing on e-government service evaluation, among the different traits of e-government definitions discussed above, this research focuses on service delivery and evaluation. The latter calls for interactions between government organizations and service beneficiaries including users and businesses.

Through e-government, governments interact with different categories of stakeholders. "E-government still includes electronic interactions of three types—i.e. government-to-government (G2G); government-to-business (G2B); and government-to-consumer (G2C)—a more holistic and multistakeholder approach is taking shape" (UNDESA, 2014, p. 2).

2.2. E-government in Developing Countries

As e-government evolves, some models try to capture the development in stage models. Such stages include cataloguing, transactions, vertical integration, and horizontal integration (Layne & Lee, 2001); emerging, enhanced, interactive, and transactional stages (UNPAN, 2002); cultivation, extension, maturity revolution (Andersen & Henriksen, 2006), presenting, assimilating, reforming, morphing and e-governance (Andersen & Henriksen, 2006). These models focus on e-government output. Other types of models

include service delivery models, organizational change models, and better government models (Grönlund, 2010). These models indicate that e-government becomes increasingly complex in several dimensions. The growth of e-government's scope over time manifests itself through improved infrastructure and an increase in the number of services and users. The service focus also changes into more integrated services, and users' expectations change and increase accordingly.

Despite the diversity and complexity of e-government that can partly be explained by the different types of models, and despite the potential challenges, developing countries hope that e-government contributes to their economic development. As of 2018, all the developed and developing member states of the UN had implemented e-government, though they were at different stages of development (UNDESA, 2018).

The 2030 Agenda for Sustainable Development calls for action from all the countries to improve health and education, and to reduce inequality and spur economic growth (UN, n.d.); the use of technologies has been prioritized with the expectation that it will contribute to development in general. It is suggested that ICT and e-government support the move towards sustainable development (UNDESA, 2016) and to economic growth (Accenture, 2014; Grönlund, Andersson, & Hedström, 2006). Therefore, as countries strive to achieve the sustainable development goals and those in the lower categories attempt to climb the ladder towards a high-income economic category, e-government becomes one of the important aspects of the development agenda.

As a result, e-government in developing countries has attracted scholars who investigate different aspects including implementation in general (Kettani & Moulin, 2014; Weerakkody, El-Haddadeh, & Al-Shafi, 2011), e-government design (Mkude & Wimmer, 2013), adoption (Abdel-Fattah, 2014; Azam, Qiang, & Abdullah, 2013), diffusion (Abdel-Fattah, 2014; Weerakkody et al., 2011), user experience (Okunola & Rowley, 2013), and assessment of the digital divide (Ayanso, Cho, & Lertwachara, 2014). E-government in these countries is generally found to be in its early stages (Abdallah & Fan, 2012; Al-Aghbari, Abu-Ulbeh, Ibrahim, & Saeed, 2015; Makoza, 2013).

Similarly, LDC are committing efforts and resources to the development of e-government. These efforts are observed through the development of policies and through technological readiness (Abdallah & Fan, 2012; Waiswa & Okello-Obura, 2014), such as putting in place information and

service centers to increase access (Hoque & Sorwar, 2015). In Rwanda, research on e-government is also rising. It studies aspects including challenges (Twizeyimana, Larsson, & Grönlund, 2018), information privacy (Mutimukwe, Kolkowska, & Grönlund, 2017), and one-stop e-government implementation (Bakunzibake, Klein, & Islam, 2019).

2.3. E-government Challenges

As in developed countries, e-government in developing countries is growing (Gunawong & Gao, 2017) and is expected to contribute to the alleviation of poverty and improve living standards (Mutula & Mostert, 2010). However, as e-government develops it faces challenges which are recorded along with its implementation initiatives. While e-government initiatives may share similarities such as service models, service portal designs, security measures, and payment solutions, challenges may materialize differently in different countries.

Gil-Garcia and Pardo (2005) categorized e-government implementation challenges into information and data, information technology, organizational and managerial, legal and regulatory, and institutional and environmental issues; while Weerakkody et al. (2011) grouped them as organizational, political, social and economic. Though e-government development may be generally challenging, developing nations are more challenged. This is especially due to their general conditions of poverty (Choi, Park, Rho, & Zo, 2016).

2.3.1. E-government Challenges in Developing Countries

Challenges that impede the implementation of e-government in developing countries have been discussed by different scholars including Bwalya and Mutula (2016), Dada (2006), and Grönlund et al. (2006). The challenges include a lack of human skills, lack of technological infrastructure, a lack of legal infrastructure, a lack of reengineering administrative and service processes (Kassahun & Molla, 2013; Nkohkwo & Islam, 2013), a lack of awareness of e-government opportunities (Sæbø, 2012), limited integration of public services (Makoza, 2013), corruption and poor monitoring (Waiswa & Okello-Obura, 2014), access divide, social divide, perceived intensity of civil conflict, and perceived behavioral conflict (Khan, Moon, Swar, Zo, & Rho, 2012). In these countries, the limited adoption is found to be influenced by culture, cost, and other social dimensions or beliefs (Joseph & du Plessis, 2015), relative advantage (Sang, Lee, & Lee, 2010), perceived usefulness, perceived ease of use, and trust (Joseph & du Plessis,

2015; Sang et al., 2010). In general, e-government in developing nations is hampered by social, economic and political conditions of these countries.

Specific to Africa, e-government was reported to be slow and uneven with causes related to a lack of human capital and to infrastructure gaps, a lack of visionary strategies, and of practical implementation plans (UNDESA, 2014). Problems facing e-government development in Africa share similarities with those in developing countries. However, Asogwa (2015) noted political instability, corrupt practices, weak regulatory frameworks, and administrative priorities as common challenges for e-government implementation in African countries. The challenges identified in SSA are at the national level and relate to issues in the investment climate, market structure, infrastructural capacity, social contexts, and political and cultural resistance (Nyirenda & Cropf, 2010). The dominance of donor-funded ICT initiatives (Waiswa & Okello-Obura, 2014) is also a dominant factor in the implementation of e-government in Africa.

2.3.2. E-government Challenges in LDC

LDC are a group of countries generally characterized by low income, human resource weakness, and economic vulnerability, as compared to other groups, such as 'developing' and 'developed' nations (UN, 2018). Being the world's poorest countries, these have even higher expectations from e-government, such as making a contribution to their economic growth. Unfortunately, they are confronted with numerous challenges, the most common being the lack of technology infrastructure (UNDESA, 2018). For example, in Zambia scholars identified challenges including leadership, change management, human capital, funding, infrastructure, and environmental (Weerakkody, Dwivedi, Williams, Brooks, & Mwange, 2007). In Bangladesh, the challenges range from inadequate finance and IT infrastructure to a lack of skills and competencies, from the digital divide to poverty and illiteracy (Faroqi & Siddiquee, 2011). Information privacy and security, human resource training, change management, and accessibility were found to challenge e-government in Sudan (Li & Abdalla, 2014). In Uganda, the lack of regulatory and governance frameworks, capacity building and sustainability frameworks, and adaptation and customization frameworks for e-government implementations are highlighted as hampering e-government systems (Nakakawa & Namagembe, 2019). Twizeyimana et al. (2018) suggest six categories of challenges in Rwanda, including information infrastructure, social inclusion, governance, management, trust in the new system, and language. The same authors suggest that e-government challenges

are influenced by political support, the nature of the e-government project, implementation strategies, human and socio-economic development, existing information infrastructure, and operational capabilities.

Besides challenges, there are also other reasons that could lead to failure. Those reasons relate to how projects are conceived, such as having plans which are too ambitious and do not align with production capacity, resulting in gaps emerging between initiatives and reality (Anthopoulos, Reddick, Giannakidou, & Mavridis, 2016; Grönlund et al., 2006; Hasan, 2014; Heeks, 2003). Failure factors also include those related to leadership and stakeholders (Luk, 2009), incomplete implementation, low involvement of end-users, political interference, and corruption (Baguma & Lubega, 2013). In SSA identified causes of failure include bribery, corruption and extortion, bureaucratic structures, archaic cultural ideologies, loss of trust in government, poor service delivery, lack of awareness, lack of infrastructure, and energy deficiency (Agbozo, 2017). Most of the failures are reported in developing countries (Aladwani, 2016; Dada, 2006; Grönlund et al., 2006; Gunawong & Gao, 2017; Heeks, 2003; Mates, Lechner, Rieger, & Pěkná, 2013), while the literature on e-government strategies and implementations more often adopts the perspectives of developed nations than those of developing nations (Choi et al., 2016).

This account of challenges and failure factors in developing countries indicates that there is a need to take further steps and focus on addressing the challenges and failure factors. Over time, poor management would translate into failures and thus requires early attention. To succeed in their e-government endeavors, developing countries could, therefore, learn from developed countries that have advanced levels of e-governments. As the success of e-government development evolves with the organizational transformation of structures and processes (Nograšek & Vintar, 2014), developing nations could leapfrog in terms of organizational structures and skills, new forms of leadership, transformative public and private partnerships, and a new degree of civic participation (UNDESA, 2015). However, though e-government is a global phenomenon, transferring the experiences from developed countries to developing ones is not suitable. There is a need to consider contextual approaches to managing challenges. Failure to do so may as well result in e-government failure due to a lack of fit (Zhang, Guo, Chen, & Chau, 2009).

Ways to mitigate challenges or alleviate their effects and to guide e-government development include reaching out to different stakeholders to identify issues and devise ways of solving them. Reaching out to stakeholders can be done through evaluations, which Choi et al. (2016), for instance, recommend as a means to identify and manage problems towards achieving set goals for e-government.

2.4. E-government Evaluation

Evaluation can be defined as "a series of activities incorporating understanding, measurement, and assessment. It is either a conscious or tacit process which aims to establish the value of or the contribution made by a particular situation. It can also relate to the determination of the worth of an object" (Remenyi et al., 1997). "Evaluation" is used to refer to both the process and the result of that process. Evaluations guide the assessment of the actual outcomes of initiatives against the expected ones. In so doing, they play an important role in the success of organizations' investments in information systems (IS) (Song & Letch, 2012). In this thesis evaluation and assessment are used interchangeably.

Similarly, for e-government success is led by the usage of the services (Irani et al., 2012) and the improvement actions based on evaluations (Gupta & Jana, 2003; Lagsten, 2011). As countries aim to harness the benefits of e-government such as better policy outcomes, enhanced quality services, and greater engagement with citizens (OECD, 2003), evaluating implemented initiatives is a continuous management task which supports tracking the progress and regularly taking corrective measures towards the desired e-government objectives.

The literature on e-government evaluations focuses on a variety of aspects in various contexts, with the methodologies varying accordingly (Al-Nuaim, 2011; Castelnovo, 2013; Jukić, Vintar, & Benčina, 2013; Karunasena & Deng, 2012; Papadomichelaki & Mentzas, 2012; Stanimirovic, Jukic, Nograsek, & Vintar, 2012). One of the focuses of e-government evaluation is the quality of services. E-service quality, noted as rich in terms of definitions, models and measurement instruments, is also characterized as context-specific (Papadomichelaki & Mentzas, 2012). This implies that the quality of e-services evolve differently as they are influenced by national and organizational conditions. E-service is defined as a sequence of digital interactions, electronically mediated between a service provider and service receiver through a generally available user interface (Goldkuhl,

2007; Jansen & Ølnes, 2016). Qualities of e-government services can be evaluated based on both their outcome and delivery (Irani et al., 2012).

Conducting evaluations requires one to pay attention to a number of aspects including the evaluation timing, the evaluation object, the stakeholders, and the indicators throughout the process.

Evaluation timing. Evaluations are conducted at different times. They can thus be categorized as ex-ante, ex-post, and formative evaluations. Ex-ante evaluations resemble predictions of what may happen (Jukić et al., 2013), ex-post evaluations are summative and measure outcomes (Irani, 2010), while formative evaluations assess the development process by comparing implementation progress to the expected results, and guide improvement on a regular basis (Bertot, Jaeger, & McClure, 2008; Sorrentino & Passerini, 2012).

Evaluation object. In e-government evaluations, the objects being evaluated differ. They may focus on the front-end evaluating the e-government website, the service portal, and users' perceptions of the front-end (Kaisara & Pather, 2011; West, 2007). Evaluations can also focus on the back-end and assess the organizational and technological infrastructure (Janssen, 2010). Evaluations of e-government can be conducted for a specific project, department, sector, or the whole of government. Evaluations at the national level assess countries' own progress and would lead to ascertaining the progress towards set goals, explaining if the investments are worth their cost, comparing how initiatives are performing vis-à-vis others, and guiding future initiatives. Each category of object would be evaluated differently. For instance, evaluating a project that has a fixed time period would differ from evaluating e-government development at large, as e-government is continuous by nature. The evaluations may for instance focus on quantities or qualities such as the number of services and their character, or look for reasons why e-government evolves the way it does.

Stakeholders. Stakeholders are another aspect of interest for e-government evaluation. They have different objectives and expectations (Gupta & Jana, 2003; Rowley, 2011) and thus bring multiple perspectives which influence and simultaneously enrich evaluation. E-government stakeholders include service providers, users, investors, and private companies involved through the outsourcing of services. The stakeholders' number increases as the evaluation object increases in complexity, resulting in a decrease of the government's direct control which in turn leads to the direct involvement of other stakeholders. Each of the stakeholders may, for instance, play the role of initiator, evaluator, and/or user of evaluations.

Evaluation indicators. Evaluation indicators are also essential for evaluations. They indicate the specific aspects that the evaluation measures. Some

researchers found that indicators for outcome and impact are more interesting than the input and output (Stragier, Verdegem, & Verleye, 2010). However, input and output are easily measured and tend to dominate the evaluation models. The choice of indicators emanates from the evaluation objectives, evaluation objects, evaluation timing, stakeholders involved, and the evaluation depth. Considering all these aspects informs the choice of an evaluation methodology, which is discussed next.

There are a number of monitoring and evaluation methodologies and tools, in many different contexts. They differ from each other depending on a number of factors, though the main cause of difference lies in their objectives. The evaluation efforts include, for instance, the framework for assessing and improving enterprise architecture management (Government Accountability Office, 2010), the EU eGovernment Benchmark Framework 2012-2015 (Lörincz et al., 2012), the United Nations survey of the e-government of the 193 UN member states (UNDESA, 2018), the Brown University analysis of e-government websites from 198 countries (West, 2007), the Economist Intelligence Unit assessment of the e-readiness in 70 countries (The Economist Intelligence Unit, 2009), the Accenture evaluates e-government in ten countries (Accenture, 2014), Waseda-IAC e-Government ranking provides annual e-government rankings for 65 countries (Obi, 2016), and the Capgemini assesses the European e-government action plans (Capgemini, 2016). With the exception of the UN biennial e-government survey which assesses e-government in all its member states, these other examples show that in developed countries such as the European Union and the United States of America where e-government is advanced, its implementation is accompanied by evaluations. This also indicates the limited evaluation efforts in the developing countries, yet evaluations would contribute to informing e-government's further development.

Despite their importance in the advancement of e-government and for general national development, evaluations are recognized as complex practices for both developed and developing countries (Hanna & Qiang, 2005). As IS become a complex phenomenon, their evaluation also becomes difficult (Petter, Delone, & McLean, 2012) so does e-government evaluation (Anwer et al., 2016). Some of the reasons for the difficulties include the fact that e-government is a complex phenomenon in and of itself. It has many interlinked aspects such as economic, legal, social, technical, political and organizational (Alshawi & Alalwany, 2009; Mates et al., 2013; Weerak-

kody et al., 2011), which have to be understood and considered for evaluation. There are also difficulties in quantifying benefits (Alshawi & Alalwany, 2009). E-government development also requires a strategic approach that includes the entire public administration (Kunstelj & Vintar, 2004), adding to the difficulties of evaluation.

These difficulties are again observed as the evaluations tend to measure what is tangible and easy to measure, such as e-government input and output, instead of what is intangible, such as outcome and impact, for which experts and researchers express interest (Stragier et al., 2010). An example is the UN biennial e-government surveys (UNDESA, 2018) that calculate the e-government development index (EGDI) based on the telecommunications infrastructure index (TII), human capital index (HCI), and online service index (OSI). These three indexes indicate how ready or conducive an environment is for e-government development. In addition, most evaluations tend to point out what is lacking in developing e-government, but do not make recommendations for addressing this lack or for closing the identified gap between those countries who perform well and those that do not.

For developing nations that expect more in terms of development in general and in terms of e-government in particular, evaluation efforts need to be factored into their overall national programs. Evaluations would help to answer questions about e-government implementation. How do we understand e-government benefits and challenges? Are e-government expectations held by the government and other stakeholders met? Are countries and organizations providing resources required by e-government? To what extent are those resources used? Are these resources prioritized and spent in a timely manner? What are the problems that organizations face when developing and implementing e-government? What can be done to mitigate or avoid those problems?

In LDC the research conducted on e-government evaluation has resulted in positive contributions such as an assessment framework for e-government maturity, including information, technology, strategy, values, management systems and structure, leadership, and ICT skills in LDC, as developed by Abdallah and Fan (2012). This framework has been used as a reference to study different aspects of e-government in developing countries. Those aspects include citizens' attitudes towards e-government use (Aladwani, 2013) and the adoption of e-government services in developing countries (Ibrahim & Zakaria, 2015). Other scholars have also identified factors which influence citizen satisfaction in LDC such as Sudan, Afghanistan, and Tanzania (Ahmed, Alhadi, & Seliaman, 2015; Anwer et al., 2016; Sigwejo &

Pather, 2016). However, e-government evaluation literature is still limited as concerns these countries and thus cannot adequately guide practitioners (Hasan, 2014; Ssempebwa & Lubuulwa, 2011). Specific to Africa, Sigwejo and Pather (2016) note the need for effective measurement to assess delivery and quality of e-government services. As the e-government evaluation results provide the appropriate know-how (Mates et al., 2013), LDC could use them to learn from other countries' experiences when conducting their own evaluations.

As discussed earlier, stakeholders have different objectives and expectation from e-government, and also play different roles throughout the evaluation phases (Olsen & Lindøe, 2004). Brandon and Fukunaga (2014) suggest stakeholder involvement as a central aspect of effective evaluation. For instance, the service provider would be active in designing and using formative evaluations, while the service evaluator plays an active role in designing summative evaluations, and the service users are active in the actual assessment of the services. Users for whom services are developed are of interest to e-government in general and to service development and evaluation in particular. After a service is launched, user feedback should be integrated in evaluations (Bertot et. al, 2008). User involvement in e-government is discussed in the following section.

2.5. User Involvement in E-government

Information system evaluation "includes assessments by managers, IS professionals and users at all stages of IS development and operation" (Symons, 1991, p. 210). User involvement in IS design, implementation, and evaluation is imperative to achieve successful systems (Sørum, Medaglia, Andersen, Scott, & DeLone, 2012), and it is also important to the success of e-government (Holgersson & Söderström, 2014).

As e-government stakeholders have different interests, their involvement plays an important role in the success of e-government (Rowley, 2011). Particularly, users are indispensable in assessing how services meet their needs. They thus inform and influence evaluations based on their experience (Kaisara & Pather, 2011). User involvement contributes to capturing and addressing users' needs (Holgersson & Söderström, 2014).

Involving users provides them with the ability to exercise control and choice (Omeni et al., 2014) and to provide their views on the service experience. Those views are then used for service and user satisfaction improvement. Scholars recommend user involvement for benefits including user empowerment and contribution to service improvement (Omeni et al., 2014)

and discourage perceiving citizens as passive beneficiaries (Axelsson, Melin, & Lindgren, 2010). Failure to consider citizens in the early stages of development result in weaknesses in addressing citizen's needs (Holgersson & Söderström, 2014), while failure to consider their feedback regarding use results in a lack of improvement information (Garcia-Garcia, 2016).

Positive experience translating into user satisfaction (Reddick & Turner, 2012) is often taken as a surrogate measure of success (Gatian, 1994). Therefore, the success of e-government accompanies evaluating services from a user perspective. The information resulting from evaluations guides not only service improvement but also future service design.

However, user involvement can be challenging and costly (Axelsson et al., 2010; Garcia-Garcia, 2016), and there exists little knowledge and competence for user involvement in practice (Holgersson, Melin, Lindgren, & Axelsson, 2018), as well as a lack of formalized structures regarding user involvement (Følstad & Krogstie, 2004). Problems associated with user participation include not considering the context, ignoring the fact that participation is a change which requires financial and human resources, and inefficient participation (Heeks, 1999). To avoid these and other problems, Heeks (1999) suggests three questions to ask when considering participation: 1) What is the political and cultural context? 2) Who wants to introduce participation, and why? 3) Who is participation sought from? Do they want to, and can they, participate?

Karlsson, Holgersson, Söderström, and Hedström (2012) suggest that the choice of user participation approach for e-service considers why user participation is introduced and what the objective of participation is. They found challenges in selecting from among the various participation approaches such as participatory design, user-centered design, and user innovation. Those challenges include unclear user target segments, the nature of participation, and the lack of adequate skills for participation. Research suggests that user involvement considers aspects of participation type, degree, extent, formality, influence, depth, and results (Axelsson & Melin, 2008), and should be adjusted to the available resources such as time and money (Holgersson & Söderström, 2014).

Another important aspect of user involvement comes from the tension between user-centered design and e-government. While user-centered design calls for involving users in each stage of the process and addressing their needs, governments have their priorities in terms of visions, laws to abide by, and views on the relationships with stakeholders, and they have to design for exceptions as well as the mainstream (Kotamraju & Geest, 2012).

The differences in priorities require that the government decide to what extent users can be involved.

Internal users of systems in the government are the ones who are mainly involved in the systems and service design, while external users are involved in the form of user representation (Axelsson & Melin, 2008; Følstad & Krogstie, 2004; Holgersson, Söderström, Karlsson, & Hedström, 2010). However, when involved, external users are regarded as a valuable source of knowledge (Omeni et al., 2014) and this is considered an important contribution to the success of public e-service development.

Omeni et al. (2014) note that service users find it difficult to influence service providers and impact decision-making across all levels of service delivery. They also found that service providers consider citizen involvement as empowering users, while the latter understand their own involvement as the ability to exercise control and choice. They found advantages of user involvement to include informing service improvement despite the fact that there may be negative and unconstructive criticism and issues related to representativeness. User participation is an important component that leads citizens to use public e-services. However, participation may not be useful in cases where users are involved simply because it is required by regulations or when participation has no clear goals (Holgersson et al., 2018).

In general, researchers suggest that successful e-government implementation and effective evaluations involve both internal and external users and that user involvement is important, as it allows users to have control and choices. However, the success of involvement is subject to careful design and implementation, when the interplaying aspects are considered, including the ones discussed above.

3. Research Context

This chapter presents the study context, the setting in which the empirical evidence for this research was collected. As the research focuses on e-government service evaluation in Rwanda, I first introduce Rwanda in section 3.1, whereafter I explain e-government implementation and evaluation in section 3.2, and finally I describe the research cases in section 3.3.

3.1. About Rwanda

Rwanda is an East African country that has an area of 26,338 km^2. Her population was estimated at around 12 million in 2018 (CIA, 2018). Rwanda has four official languages: French, English, Kinyarwanda, and Swahili; Kinyarwanda is the national language. Rwanda is land-locked and has four neighboring countries, namely Burundi to the south, the Democratic Republic of the Congo to the west, the United Republic of Tanzania to the east, and Uganda to the north (Figure 3.1). Rwanda's administrative structure comprises the capital, the City of Kigali, and four provinces: Eastern Province, Northern Province, Southern Province, and Western Province. Rwanda has 30 districts, 416 sectors, 2,148 cells, and 14,837 villages (NISR, 2018). In addition to the capital city, Rwanda is developing six secondary cities to complement the capital city through service delivery by the agglomeration of economies such as business, by the relocation of some government institutions, and by establishing their city management (Bizimungu, 2018). Those are the cities of Musanze, Muhanga, Nyagatare, Huye, Rusizi, and Rubavu.

In 2017, Rwanda's GDP per capita was US$ 774 and her economic growth is driven by service and agriculture (MINECOFIN, 2018). In 2017, Rwanda had 70 mobile cellular phone subscriptions per 100 inhabitants, 20% Internet users, 27% active mobile broadband subscribers, and 9.3% households with Internet access (ITU, n.d.). In the most recent UN e-government survey, Rwanda is ranked at 120 out of 193 member states and is among six countries whose online service index moved up from the middle to the high category, together with Ghana, Egypt, Nigeria, Seychelles and Togo (UNDESA, 2018).

Rwanda is an LDC in SSA. LDC are countries that face a large risk of deeper poverty and of remaining in a situation of underdevelopment than other countries, and they are characterized by a vulnerability to external economic shocks, natural and man-made disasters, and communicable diseases (UNCTAD, 2018). There are 47 LDC with a total population of about

880 million people, which represents 12% of the world's population. There are 33 LDC in Africa, which is the most represented continent regarding LDC; there are nine in Asia, four in Oceania and one in the Americas (UN-DESA, 2018).

Figure 3.1. Map of Rwanda (Source: UN, Geospatial Information Section, 2018)

Rwanda aims to become a middle-income and knowledge-based economy and aspires to be Africa's ICT hub (Rwanda Vision 2020, 2012). Rwanda has thus chosen to prioritize science, technology, and ICT in order to achieve those goals (Rwanda Vision 2020, 2012). This choice is reflected in national strategies such as the Economic Development and Poverty Reduction Strategy 2007 - 2012 (EDPRS I), the EDPRS II 2013 - 2018, and the first National Strategy for Transformation (NST 1) 2017-2024 (MINECOFIN, 2017).

Originating from the national vision, the implementation of the ICT initiatives has been guided by the ICT Strategic and Action Plans (NICI), a series of five-year plans commencing in the year 2000, as well as the ICT sector strategic plan (ICT SSP 2013-2018). NICI I focused on putting in

place the foundational legal and regulatory framework. During this time, institutions such as the regulatory authority (Rwanda Utilities Regulatory Authority) and the national ICT agency (Rwanda Information Technology Authority) were put in place. NICI II focused on infrastructure rollout, mainly the fiber optic backbone linking Rwanda's 30 districts. The focus of NICI III was on services delivery (Government of Rwanda, 2015, p. 6). The fourth generation of NICI plans was adopted in 2015, and is known as the Smart Rwanda 2020 Master Plan (SRMP). This plan covers the years 2016 to 2020 and emphasizes the national digital transformation (MITEC, 2016).

According to the Smart Rwanda 2020 Master Plan (2015), e-government in Rwanda has two main objectives: 1) implement e-government by integrating all government services in order to enhance operational efficiency and the quality of service delivery to citizens and businesses, and 2) establish effective communication channels to enable and empower both rural and urban communities as a means to increase citizens' participation in governance (Government of Rwanda, 2015, p. 24).

E-government governance in Rwanda is the responsibility of the Ministry in charge of ICT. This ministry has had varying portfolios. At the time when this research project started, it was known as the Ministry of Youth and ICT (since the year 2011), then as the Ministry of Information Technology and Communication (MITEC) in 2017, and has been the Ministry of ICT and Innovation (MINICT) since October 2018. The coordination of the implementation of ICT initiatives at the national level has been entrusted to the Rwanda Information Society Authority (RISA) since the end of 2017, taking up the responsibilities of the former ICT department of the Rwanda Development Board. It is worthwhile to mention that, in general, ICT initiatives in Rwanda benefit from the top leadership's commitment and support.

3.2. E-government in Rwanda

Guided by the ICT strategic plans and the institutions in place, Rwanda has implemented a number of initiatives. One of them is the one-stop portal for e-government services, "Irembo" a Kinyarwanda word that literally means gateway. This portal was developed based on the agreement between the government of Rwanda and RwandaOnline Platform Limited, in order to promote a paperless and cashless government. RwandaOnline Platform Ltd has been renamed Irembo Ltd since June 2019. "Irembo" focuses on making available online government services to citizens and businesses. As of

July 2019, there were 98 services and 22 payment solutions; 30 of those services were also available through Unstructured Supplementary Service Data (USSD) codes. These services were developed since the launch of "Irembo" in June 2014 and are provided by 19 government organizations.

Another initiative is the One Laptop per Child (OLPC), a program that equips primary schools with laptops for pupils' use. Close to 245,000 laptops have been distributed in 1,461 primary schools. The Ministry of Youth and ICT (MyICT), in partnership with the World Economic Forum (WEF) and Digital Opportunity Trust (DOT), has launched "The Digital Ambassador Programme (DAP)" through which 5,000 young Rwandans will be trained and then extend their skills to 5 million Rwandans, allowing them to acquire the experience of using the Internet and e-government services. Providing access to WiFi in public areas and putting in place cashless payment systems for public transport, where payment is done using smart cards, are other examples of e-government initiatives (MITEC, 2016).

Though there are efforts to support e-government initiatives, Rwanda still faces a number of challenges. The socio-economic barriers faced by citizens translate into a lack of ability and capacity to use services and lead to the dominance of intermediaries in service use. These third parties get involved in delivering more than 80% of the services (Tumwebaze, 2018). For instance, as of July 2019, the "Irembo" agents playing the intermediary role were up to four thousand, nationally.

There are plans to address some of the challenges including, for instance, the national digital literacy program. This program aims at achieving digital literacy of at least 60% among adults by 2024, supplemented by the development of local content and the facilitation for citizens, including people with disabilities, to access digital devices and make use of online services (MINECOFIN, 2017).

In relation to evaluation, accountability evaluations in Rwanda are conducted annually for public institutions and agencies, following the call to maximize the value of services (MIFOTRA & MINECOFIN, 2015). Service delivery by public and private agencies is assessed by the Rwanda Governance Board (RGB). The RGB prepares the Rwanda Governance Scorecard which indicates the status and trends of the most important aspects of governance in Rwanda, including "rule of law, political rights and civil liberties, participation and inclusiveness, safety and security, human and social development, control of corruption, transparency and accountability, quality of service delivery, and economic and corporate governance" (RGB, 2018b). It also reports on citizens' satisfaction with service delivery in a

variety of sectors (RGB, 2018a) and, through the Service Delivery Monitoring Report (SDMR), the RGB assesses private, public and civil society organizations regarding their customer care environment, performance in core services, and online service. The most recent SDMR assessed 41 public organizations, 10 private organizations, and nine civil society organizations. In the 2018 SDMR report, the share of online services was found to be 44% of all public services (RGB, 2018c). Rwanda had anticipated citizen satisfaction to be at 85% by 2018 (Government of Rwanda, 2013) and at 90% by 2024, with all government services provided online as per the National Strategy for Transformation (MINECOFIN, 2017). As of 2018, citizen satisfaction was found to be at 79% (RGB, 2018c). This indicates a gap between the target and actual achievement in terms of satisfaction.

As explained above, Rwanda has accomplished a number of achievements in the e-government domain. The established legal and regulatory frameworks, the creation of e-government leadership organizations in charge of implementation and monitoring, and an increasing number of services can be listed amongst these accomplishments. However, the journey has merely begun and there is more to do, such as conducting evaluations of the implemented initiatives. Evaluations would assess how far Rwanda is in achieving the e-government goals and guide future steps towards the established goals.

3.3. Case Description

The unit of analysis for this thesis is "e-government service evaluation," which was investigated through e-government services as cases. I have explored the construction permit service provided by the City of Kigali (CoK), the business registration service provided by the Office of the Registrar General (ORG) at the Rwanda Development Board (RDB), and the services on "Irembo" the one-stop portal developed and maintained by Irembo Ltd. The construction permit service is provided through the Building Permit Management Information System (BPMIS; www.bpmis.gov.rw), and has been in use since 2013 for managing the applications for construction permits and other related tasks such inspections and applications for occupancy certificates in Gasabo, Kicukiro, and Nyarugenge, the three districts of the City of Kigali. The BPMIS homepage is shown in Figure 3.2. The Online Business Registration System (OBRS; org.rdb.rw/busregonline) facilitates online applications for business registration in Rwanda. The business registration digitization process started in 2010 and was fully online in 2015. The OBRS homepage is shown in Figure 3.3.
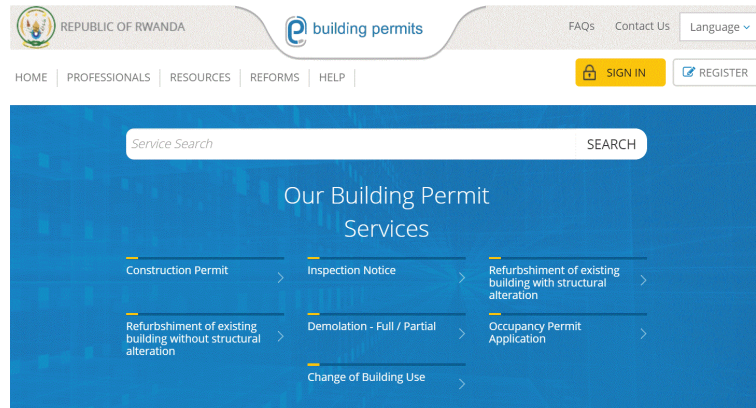
Figure 3.2. The BPMIS homepage
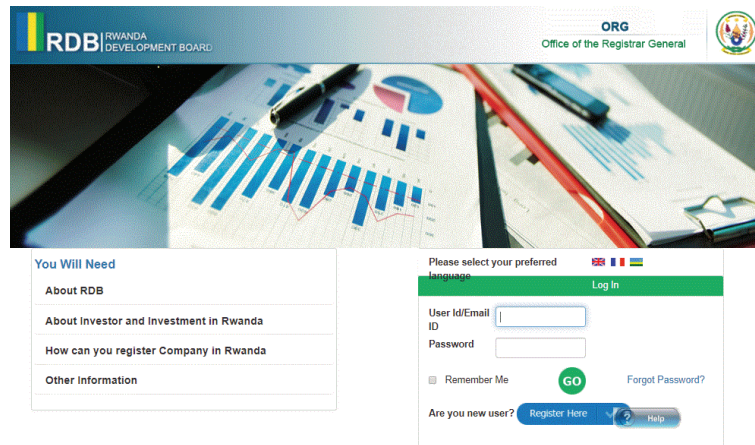
Figure 3.3. The OBRS homepage

Figure 3.4. The "Irembo" homepage

The other services considered in this research are developed by Irembo Ltd and are accessible through the one-stop portal, "Irembo" (https://irembo.gov.rw/). "Irembo" has been in place since June 2014. The "Irembo" homepage is shown in Figure 3.4.

The choice of the construction permit service was motivated by the fact that it was among the services pre-selected to be placed on the national portal. The business registration service is in the RDB, whose ICT department was in charge of implementing and coordinating e-government initiatives at the national level. The study of one of the RDB's services was aimed at better understanding their take on e-government from a practical point of view.

The systems for these two services are managed slightly differently. While applications through the OBRS are centrally operated at the ORG, the BPMIS applications are either assessed at the city level or at the district level, depending on the type of applications. Applications for single-family houses are processed by the districts while multiple family houses and specialized building such as schools and hospitals are processed by the City of Kigali.

At the start of this research, "Irembo" was yet to be developed. Later when services were made available for use on the portal, they were also considered in the present research. The "Irembo" services were considered

as Rwanda targets that "Irembo" becomes the one-stop portal for all e-government services.

To conduct this research, a total of six organizations were involved. There are the City of Kigali and the Office of the Registrar General, who provide services; Irembo Ltd who develop services; the Rwanda Information Society Authority (RISA) in charge of implementation and coordination of ICT policies and programs, the RGB in charge of monitoring service delivery and citizens' perception of service delivery, and the Ministry of ICT and Innovation (MINICT).

4. Research Design

This research is framed within the IS field and has followed the design science research (DSR) approach in order to design an artifact to improve the understanding of e-government service evaluation in Rwanda, as well as how evaluation can be improved. The artifact development is based on the Information Systems Artifact concept (Lee et al., 2015), consisting of an information artifact, a technology artifact, and a social artifact. In the present chapter, I describe the theoretical framework in section 4.1, explain the DSR approach and how it guided the research process in section 4.2, and detail the methods used in this research in section 4.3. I then explain my role as a researcher, reflect on the research methods and on the ethical guidelines.

4.1. Theoretical Framework

The IS field studies "a set of diverse topics associated with information technologies, IT infrastructures and IT-enabled business solutions (i.e. information systems), and the immediate antecedents and consequences of these information systems" (Benbasat & Zmud, 2003, p. 184). Those antecedents and consequences include managing, planning, designing, building, modifying, implementing, supporting, and/or assessing IT-based systems for practical purposes. Design is central to the IS field and its outputs are generally known as artifacts (March & Storey, 2008).

The IS artifact concept suggests that building technical systems and implementing them in the social environment where they are used are equally important, and that the environment is not fixed but is also designed when new IT systems are introduced. The IS artifact conceptualization by Lee et al. (2015) liberates IS design from the IT artifact-centric perspective and conceives IS artifacts as consisting of the information artifact, technology artifact, and social artifact enabling, interacting with and even transforming one another to solve a problem or achieve a goal for individuals, groups, organizations, societies or other social units. In this IS conceptualization "the whole comprising a system is greater than the sum of its parts" (Lee et al., 2015 p. 6).

The IS artifact concept is based on the artifact concept devised by Simon (1996). Simon explains natural sciences as related to "how things are" and design as related to "how things ought to be, with devising artifacts to attain goals" (Simon, 1996, p. 114). The science of the artificial makes visible the

border between natural science and social science. He distinguishes the artificial from the natural through four indicia which set the boundaries for sciences of the artificial (Simon, 1996, p. 5):

1. Artificial things are synthesized (though not always or usually with full forethought) by human beings.
2. Artificial things may imitate appearances in natural things while lacking, in one or many respects, the reality of the latter.
3. Artificial things can be characterized in terms of functions, goals, adaptation.
4. Artificial things are often discussed, particularly when they are being designed, in terms of imperatives as well as descriptives.

These indicia define artifacts to include, but not to be limited to, IT artifacts. Simon notes that the fulfillment of the artifact's goal requires a relation among the goal, the character of the artifact, and the environment of the artifact. This means that the relevance of the artifact depends on how the context is taken into consideration when constructing the artifact, which ultimately enables the artifact to achieve an intended purpose in that specific context.

As the artifact is built, the phenomenon under study becomes more understandable. The artifact is a tool with which to understand the social and information issues and thus lead to the refinement of the technical requirements of the artifact component. This indicates the importance of artifacts in understanding social life. The artifacts bring alternative ways of doing things and thus stimulate creativity in solving problems in specific contexts. Lee et al. (2015) perceive the different artifacts as "enabling, interacting with and even transforming one another where, in coming together as an IS, they ultimately serve to solve a problem or achieve a goal for individuals, groups, organizations, societies or other social units" (p. 6). As such, they suggest that design considers not only the IT artifact but the entire IS artifact, and hence liberate IS design from the IT artifact-centric view and expand the capability of design science methods in IS to consider IT as a part of IS.

The use of the ISA concept in the present work is motivated by the fact that while acknowledging the importance of the IT artifact and its design,

the social and information artifacts are also key to understanding e-government service evaluation in Rwanda. The ISA concept is helpful in analyzing the problems and in suggesting how they can be solved.

Many e-government initiatives are being implemented, though there are still areas that need attention, such as evaluation. The ISA concept presents an opportunity to understand e-government evaluation issues and create an understanding of how those issues my may be addressed. The evaluation improvement consists of improving the social artifact by involving different actors in the interaction regarding services, and to thus generate the information required for improving services through the use of the technology artifact. Currently, e-government service evaluations are not conducted. This research suggests that an effective social artifact for evaluations requires the inclusion of service users and providers, who are key stakeholders in e-government. Users provide their feedback on services and providers use that information for service improvement in the interactions revolving around services. The need for information channel, storage capacity, and processing power is satisfied through the technology artifact. In this manner, all the ISA components interact to address the lack of information caused by the absence of evaluations of e-government services.

This research therefor considers the use of the ISA concept as contributing to solving the evaluation's practical problems in organizational contexts.

4.2. Design Science Research

The design science research (DSR) (Hevner, March, Park, & Ram, 2004) frequently used in the IS research field is the overall approach of the present research. Design science expands the boundaries of human and organizational capabilities by creating new and innovative artifacts (Hevner, March, Park, & Ram, 2004). The theoretical foundations of DSR are based on Simon (1996)'s work, in which he describes the world as much more of a man-made or artificial one than a natural one. The artifacts help in the understanding of a situation, a problem, and opportunities, and provides guidance towards solutions that one would not have thought of without an approach such as DSR. The use of DSR leads to creating artifacts whose prototypes make organizations as well as the future world tangible beyond the ways in which plans, goals, and speaking do.

Design science research's defining feature is learning through building artifacts (Vaishnavi, Kuechler, & Petter, 2004), artifacts built through DSR

are rarely fully-grown systems used in practice. Instead, artifacts are innovations that define ideas, practices, technical capabilities, and products (Hevner et al., 2004). This means that as the artifact is built, the phenomenon under study becomes more understandable. Differing from what is undertaken when drawing up plans, for example, in DSR the understanding of the situation at hand is made more tangible through the developed artifact. The artifact is a tool to understand the social and information issues that guide the technical requirements of the technical system. As the researcher, developer, and users gain more understanding, the requirements are revised, leading to the refinement of the technical system. The refinement of the prototype is part of improving understanding. The better the understanding of what the system should do, the more sophisticated requirements become.

While waterfall models have strict planning and adhere to the plan step by step when building systems, and the agile models emphasizes fast system development, DSR emphasizes understanding and confronts the problems involved with more substantial changes with regard to information handling and social organization.

There are a number of influential scholarly work that has been guiding the DSR in IS field. These include Hevner et al. (2004) who describe DSR performance and provide corresponding guidelines. Vaishnavi and Kuechler (2008) describe the DSR process in terms of five steps, namely, awareness of the problem, suggestion, development, evaluation, and conclusion. Peffers et al. (2007) explain the DSR process in terms of six activities: problem identification and motivation, define the objectives for a solution, design and development, demonstration, evaluation, and communication. This thesis followed this latter methodology as it provides more detailed steps to follow, including the distinct step of "demonstration" which is important in the present research as it involves multiple organizations. The DSR methodology (Peffers et al., 2007) followed is presented in Figure 4.1 and its activities are explained next.

> *Activity 1: Problem identification and motivation.* Define the specific research problem and justify the value of a solution.
>
> *Activity 2: Define the objectives for a solution.* Infer the objectives of a solution from the problem definition and knowledge of what is possible and feasible.

Activity 3: Design and development. Create an artifact. Determine the artifact's functionality and its architecture and then create the actual artifact.

Activity 4: Demonstration. Demonstrate the use of the artifact to solve one or more instances of the problem.

Activity 5: Evaluation. Observe and measure how well the artifact supports a solution to the problem. This activity involves comparing the objectives of a solution to actual observed results from use of the artifact in the demonstration.

Activity 6. Communication. Communicate the problem and its importance, the artifact, its utility and novelty, the rigor of its design, and its effectiveness to researchers and other relevant audiences such as practicing professionals, when appropriate.
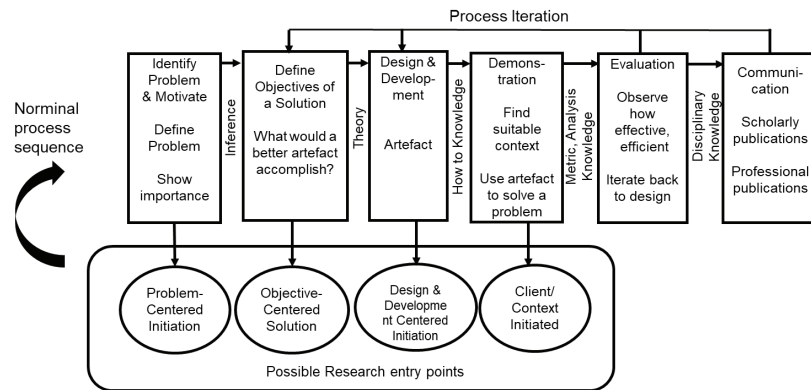
Figure 4.1. DSRM process model (Peffers et al., 2007)

As shown in Figure 4.1, research guided by DSRM has four possible entry points: for a problem-centered initiation, an objective-centered solution, design and development-centered initiation, or client/context initiated. Though the whole DSR process requires that one starts from the problem-centered initiation point and proceed through all the steps, some research can build on previous research and start from another entry point to complete the whole process. If an entry point is other than the problem-centered one, the DSR process will only be complete when the research has gone through all the activities. The DSR has three closely linked research cycles: the relevance cycle, the rigor cycle, and the design cycle. These cycles are dependent on each other in conducting research guided by the DSR (Hevner 2007). The links of the cycles are presented in Figure 4.2.
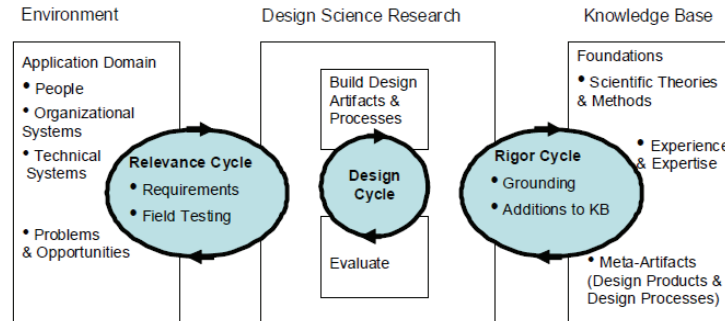
Figure 4.2. Design science research cycles (Hevner, 2007)

The *relevance cycle* initiates the design science research in an application context to provide the requirements for research and to define the acceptance of the research results. The *rigor cycle* relates to the researcher's ability to select and apply suitable theories and methods to construct and evaluate the artifact. Finally, the *design cycle* iterates between building, evaluating, and refining the artifact based on the feedback. The design cycle is at the heart of design science though is dependent on the relevance and rigor cycles.

4.2.1. The choice of DSR

This research required a process that would lead to an improved understanding of e-government phenomena in Rwanda, guide the exploration of the realities of e-government implementation, and then direct a problem-solving process to support evaluation activities.

The DSR approach was found to be appropriate in the present research for three main reasons. Firstly, DSR allows the understanding of the problem domain and its solution through the developed artifacts. In addition, the artifact helps to clarify the ideas in order to study, design and implement information systems for a specific purpose. In this research, which aims at contributing to e-government service evaluation in Rwanda, the DSR approach was chosen to guide both the investigation of the problem and the suggestion of a solution relevant to the application domain, namely, organizations in Rwanda. Secondly, the proof of the usefulness of artifacts central to DSR is also important for the evaluation artifact. While in action research, for example, the focus is the organizational context and the active

search for problem solution for the specific organization, DSR does not assume any specific client or joint collaboration between researchers and the client (Iivari & Venable, 2009). DSR was thus suitable for the present research intended to use an IS artifact to understand and convey the ideas of how e-government services can be evaluated, not in one specific organization but in many different organizations. Thirdly, the DSR's iterative process was essential for a progressive understanding of the problem domain for improved requirements and solution refinement.

4.2.2. My Research in Accordance with DSR

The present thesis considers design as "the act of creating an explicitly applicable solution to a problem" (Peffers et al., 2007, p. 47) and follows DSR in trying to improve e-government service evaluation in Rwanda. It does this by suggesting an evaluation artifact aimed at improving the communication between service providers and service users, for the purpose of better informing service providers about how service users perceive the services. The artifact comprises the developed technology artifact, the social artifact consisting of people such as service users, employees in the organizations involved in e-government service delivery and in evaluation in Rwanda, and the information artifact consisting of interactions and communication among the varied actors of the social artifact. My research, in relation to Peffers et al. (2007)'s DSRM activities introduced above, is explained next.

Problem identification and motivation. The initial part of the present research was a literature review on e-government evaluation and an empirical study on Rwanda investigating e-government implementation and its challenges. Studies 1 and 2 have led to establishing the status of research on e-government evaluation in the literature and provide an understanding of e-government in Rwanda respectively. Study 2 led to establishing that though there are a growing number of e-government initiatives, and the government set national targets, there was a lack of evaluations to assess the achievements of the goals. Studies 1 and 2 were the basis from which to explain the situation and initiate the search for a solution. In particular, Study 2 was fundamental to unpack the realities that could not be found in the literature, as the research on e-government in Rwanda was scarce. Conducting Study 2 was also an opportunity to meet with the organizations and discuss the suggestion of a solution to their evaluation problems. At this juncture, the

need for conducting service evaluations was clearer than when the research started, and was refined in the subsequent activity.

Define the objectives for a solution. To further understand the problem context and describe what the solution would entail, in this phase the third study was conducted. In Study 3, the e-government service providers played a key role in explaining their priorities for service delivery, which were the basis of the initial description of the artifact and how it is expected to solve the problem. The involvement of the organizations was important to register their expectations, which represent the objectives of the solution. Bringing organizations on board was also required, as they are the ones in charge of service delivery and improvement and would, therefore, play the central role in service evaluation.

Design, development, and demonstration. Based on the previous phases, as well as on the Information Systems Artifact concept (Lee et al., 2015), Study 4 consisted of designing, developing, and demonstrating the artifact; a prototype of a web-based evaluation, the Rwanda Online Service Evaluation (ROSE). As Peffers et al. (2007, p. 55) put it "a design research artifact can be any designed object in which a research contribution is embedded in the design". The prototype was designed and developed based on the findings of Studies 1 to 3. The idea for how it should be used was then demonstrated to six organizations involved in service delivery, policy formulation, and service monitoring in Rwanda.

Evaluation. Perceptions and fit in organizations are important for the successful development and implementation of an IS (Hevner et al., 2004). The evaluation of the artifact can be completed through any research strategy including experiments, case studies, action research (Johannesson & Perjons, 2014), or other strategies which compare the artifact functionality with the solution objectives (Peffers et al., 2007). The artifact developed as part of this research was tested using the Content Context Process (CCP) framework. The CCP framework, used on information systems evaluation by Symons (1991) and extended by Stockdale & Standing (2006), was used to test the usefulness and usability of the evaluation prototype with its potential users, including seven senior managers and a sample of 60 users from the citizenry. The use of the CCP framework helped to address the why, what, who, when, and how questions of the evaluations. The assessment of

perceptions and fit was completed through the use of interviews and a survey. Interviews were conducted with senior managers from all the organizations involved in the research. They expressed their opinions on the evaluation approach and how it related to their evaluation needs. Similarly, as part of the test, a sample of service users has used the prototype for evaluating the services they used and then shared their views on its usability and usefulness through an online survey. The comments from the users and managers were positive and also provided suggestions for improvements. Most importantly, the managers had ideas on how ROSE could be implemented in order to meet the evaluation needs of their respective organizations.

Communication. Throughout the research process, my research has been shared with researches in international workshops and conferences as well as through journal publications. In Rwanda, different stakeholders were also involved in the problem identification activity as well as throughout all the DSRM activities. Besides the data collection activities, while in the field I held meetings with stakeholders in Rwanda as a means for continuous exchange and communicating research results. I have also shared my research at the University of Rwanda at the occasion of the digital transformation workshop in February 2018. A sample of the meetings during which I presented and discussed with managers and practitioners is shown in Table 4.1.

Table 4.1. A sample of presentation sessions in Rwanda

Organization	Presentation Date
CoK	August 25th, 2017
MINICT 2016/2017	August 1st, 2017
ORG at RDB	November 1st, 2018
RGB	March 21st, 2018
RISA	March 13th, 2018
The then RwandaOnline Platform Ltd, now Irembo Ltd.	August 3rd, 2017

This research's entry point was problem-centered initiation. The research process has gone through all the DSRM's activities and has resulted in four

studies. The research activities carried out in this research relate to the relevance cycle, rigor cycle, and design cycle of DSR, as described by Hevner (2007). The *relevance cycle* is formed through the initial studies. Informed by Study 1 of the emphasis of e-government evaluations, Studies 2 and 3 explored e-government and its challenges in Rwanda, respectively, and guided the research into understanding the research application domain. These studies informed the research of the e-government reality in Rwanda. From Study 2, challenges were organized into categories related to information application and systems, business management, human factors, infrastructure, and policy formulation. These aspects were found to be important for consideration in designing and conducting e-government evaluations in the Rwandan context. Organizations' take on e-government was further explored in Study 3. Some of the challenges, such as technology-related ones, could be solved by importing the necessary technologies, however the social and organizational requirements had to be contextual. By including organizations involved in e-government service delivery, Study 3 has informed this research of the organizational problems and realities in relation to the quality of service. Both Studies 2 and 3, based on Study 1's input, have initiated DSR for conducting the research on e-government services evaluation in Rwanda, and they thus form the *relevance cycle*.

Study 4, based on the realities learned from Studies 2 and 3, informed the design and development of an artifact. In the same study, the evaluation of the artifact was undertaken, in the form of testing the artifact in its application domain. After testing the artifact, a revised version of the artifact was made available for organizations' use. The organization responsible for developing and maintaining the one-stop service portal was using the artifact to assess its services at the time of writing this thesis. Study 4 relates to the *design cycle* of DSR.

The present research studies e-government phenomena in its real context. This has guided the choice of qualitative methods for empirical studies. The theoretical foundation explained in section 4.1, including the methods used as detailed in section 4.3, form the *rigor cycle* of DSR.

The present research process started with a literature review of e-government evaluation, whereafter three studies with empirical evidence from Rwanda were conducted. The methods used for the respective studies are detailed next.

4.3. Methods

Lips (2007) noted the need for conducting studies that use qualitative evidence to understand the use of ICT in government and public administration. This research does that. It is qualitative and has used case studies to study e-government evaluation for organizations in Rwanda. A case study strategy "examines a phenomenon in its natural setting, employing multiple methods of data collection to gather information from one or a few entities (people, groups, or organizations)" (Benbasat, Goldstein, & Mead, 1987, p. 370). Case studies are among the most used strategies in qualitative research (Jabar, Sidi, Ghani, & Ibrahim, 2009). They can study a small number of instances (Johannesson & Perjons, 2014) though they often emphasize one instance of a phenomenon and study it in-depth with the use of multiple methods (Benbasat et al., 1987; Johannesson & Perjons, 2014). The use of case studies has also allowed for the involvement of various actors. Engaging those actors enriched my understanding of the research environment, and also contributed to the ownership of the process by those actors; they were receptive of my further queries throughout the subsequent research steps. Interpretive studies "generally attempt to understand phenomena through the meanings that people assign to them" (Myers, 1997, p. 5) and use fieldwork as a basis. Studies 2, 3, and 4 have made use of fieldwork and I built my understanding through interpreting the information gathered from the informants. In Study 2 I investigated e-government implementation in Rwanda, informed by participants in e-government implementation on tactical, strategic and operational levels. Study 3 is founded on the service providers' meanings of qualities of services. Lastly, in Study 4 I worked with users and providers to understand the use of ROSE for evaluating services.

Klein and Myers (1999) suggested seven principles for conducting interpretive field research. These principles are: 1) the fundamental principle of the hermeneutic circle, which is fundamental to all other principles. It highlights the importance of understanding both the parts as well as the whole as the research progresses; 2) the principle of contextualization relating to clarifying the social and historical background of the research setting; 3) the principle of interaction between the researchers and the subjects, noting that an improved understanding is built through interaction; 4) the principle of abstraction and generalization recommends that the contextual meanings of findings be assessed in view of theoretical and general concepts; 5) the principle of dialogical reasoning suggests being open to potential contradictions

between theoretical assumptions and the findings; 6) the principle of multiple interpretations requires researchers to be open to potential differences within the same accounts; and 7) the principle of suspicion proposes that participants' and researchers' own accounts be questioned for possible biases and distortions. These seven principles are not to be fulfilled or followed mechanically; they are rather guidelines that can be used in conducting and evaluating interpretive field studies. The evaluation of the present research at the hand of these principles is provided in section 4.5.

The present research uses qualitative interpretive case studies to learn about e-government and contribute to solving evaluation problems in Rwanda. Fieldwork was also conducted in order to observe the happenings and interact with the practitioners, managers, and citizens. The interactions with the varied stakeholders included informal communications, interviews, and observations of some of their daily activities. The use of qualitative methods in empirical studies fit well with the DSR, which guided the overall research process. The qualitative methods are used in the *relevance cycle*, to inform the *design cycle* whose output, the artifact, is also tested through qualitative methods. The specific data collection and analysis methods used are presented next.

4.3.1. Data Collection and Analysis
The choice of methods for the empirical studies conducted was motivated by the objective of each study, with the aim of answering the corresponding research question. Study 1 is a literature review that answered the question: *What is the status of research on e-government evaluation?* The subsequent Studies 2 and 3 are Rwanda-based case studies that provide answers to the questions: *What are the challenges in implementing e-government in Rwanda? What are the service providers' views of e-government service qualities in Rwanda? How do those views relate to the issues found in the literature?* Studies 2 and 3 investigate e-government implementation and activities related to evaluation in selected organizations in Rwanda. The fieldwork that was conducted provided opportunities to learn about e-government and its evaluation through research participants' views, collected by means of interviews and the study of documents. The participants included policy makers, managers, service developers, service providers, regulators, and service users. During the fieldwork data was collected through interviews and organizational documents, in order to inform the research topic. Lastly, for Study 4, which answers the question: *How can e-government*

services be evaluated in Rwanda? The developed evaluation prototype was tested through interviews and an online survey. Data collection methods used in the studies included in this thesis are summarized in Table 4.2 and then explained thereafter.

Table 4.2. Summary of data collection methods

SN	Study	Data collection method			
		Litera-ture review	Inter-views	Docu-ment study	Survey Ques-tion-naire
1	Evaluating eGovernment Evaluation: Trend and Is-sues	x			
2	Challenges in Imple-menting Citizen-centric e-Government Services in Rwanda		x	x	
3	Improving Qualities of e-Government Services in Rwanda: A Service Pro-vider Perspective		x	x	
4	Designing eGovernment service evaluation in Rwanda		x	x	x

4.3.2. Literature Review

In Study 1 I used a literature review to set the scene for the research in general, by exploring e-government evaluation. This literature review serves as a foundation to the overall research (Okoli & Schabram, 2010). The literature review was conducted in 2015 and included peer-reviewed articles published in English from 2010 to 2015 in journals considered core for e-government publications as well as well-reputed conference proceedings. The models of e-government were also reviewed. The review followed the guidelines as set out by Webster and Watson (2002), and focused on overviewing and understanding research on *e-government evaluation*. The search string used combined the keywords "*e-government*" and "*evaluate,*" or "*assess,*"

or *"monitor,"* or *"measure,"* or *"value"*. The searches were conducted through EGOV Reference Library and Scopus, and yielded 834 articles. From the review of the titles and abstracts, 42 articles were found to be relevant and after removing duplicates and snowballing, 26 articles and seven reports were used. After identifying the publications that met the criteria, the concept-centric approach was used in order to analyze the literature. This consisted of structuring the literature based on similar concepts and then discussing the synthesized literature based on those identified concepts, all the while being guided by Webster and Watson (2002). The classification of the literature according to concepts is provided in Appendix 1.

4.3.3. Interviews

Interviews are the main data source for interpretive case studies and used for the researcher to interpret the informants' views of the subject under study (Benbasat et al., 1987; Walsham, 2006). Interviews have thus been the main source of evidence for the research studies in the present thesis.

For Study 2 one-on-one interviews were conducted, following a semi-structured questionnaire (see Appendix 2). The respondents were individuals who were involved with e-government in Rwanda. They were in four categories, including policymakers from a government ministry, managers and project leaders from the Rwanda Information Society Authority, and system users. The users were divided into two groups: the users of the business registration system and the staff of the City of Kigali charged with handling digital services in the Kigali Construction Permit System. The users of the business registration system included the helpdesk staff (public intermediaries) as well as consultants (private intermediaries). Private intermediaries dominate the use of services as they are the ones who assist citizens who do not have the capacity or ability to use services. In total there were 32 interviews. Twenty-two of the interviews were conducted in Kigali at the premises of the organizations: the Ministry of ICT, Rwanda Information Society Authority, Office of the City of Kigali, and Office of the Registrar General. The interviews with the ten private intermediaries also took place at their offices. One was in Kigali and the remaining took place in the six secondary cities located in districts outside Kigali. Those districts are Musanze, Muhanga, Nyagatare, Huye Rusizi, and Rubavu. These cities were chosen as they have improved electricity and internet access, making them locations where e-government services are used and thus possible data collection sites besides Kigali, the capital city. The improved infrastructure re-

sulted from the fact that Rwanda selected those districts to host the secondary cities and be centers for public administration, in addition to Kigali. Rwanda committed to supporting the development and expansion of secondary cities through the agglomeration of economies, the relocation of some government institutions, and carrying out city management plans (Bizimungu, 2018). The first set of interviews were on the strategic and tactical levels (the Ministry of ICT and the Rwanda Information Society Authority respectively), and took place between December 2014 and January 2015. These were complemented by the second set of interviews on the operational level, which involved the users, in December 2015. Each of the interviews took between 45 and 60 minutes. All the interviews were recorded and information about the participants is provided in Table 4.3.

Data collected from interviews were recorded and transcribed. The analysis of the interviews' transcripts followed a conventional content analysis. In this analysis, coding categories are derived directly from the text data (Hsieh & Shannon, 2005). Reading through the transcripts, the analysis process involved labeling the sections of text indicating what the challenges are. Then, the labels or codes that have similarities were grouped into the same categories; these were the challenge categories. The analysis was undertaken using NVivo, a qualitative data analysis software package. This analysis process led to organizing and interpreting the interviewees' input into e-government implementation challenges, reported in Study 2.

Table 4.3. Interview participants for Study 2

Participant Occupation			Number
Policymaker			2
Manager			5
Project leader			7
System users	Backend users		4
	Frontend users	Public intermediaries	4
		Private intermediaries	10
Total			**32**

Study 3 aimed to gather service providers' views of qualities of e-government services. In this study, purposive sampling was used to select participants (Bazeley, 2013). Informants were chosen among organizations that were involved in e-government service delivery, had participated in the previous study, and had agreed to continue participating in the research. There were two organizations providing services, the City of Kigali and the Office of the Registrar General, and RISA is in charge of implementation and coordination of ICT policies and programs at the national level. In total 14 semi-structured interviews were conducted. The interview guide is provided in Appendix 3. Each interview lasted between 45 and 78 minutes, with the exception of one interview that lasted 95 minutes. This interview, at the interviewee's request, was not recorded: only notes were taken and then revised with the informant in order to ensure accuracy. The interviews were conducted from August to September of 2017 at the organizations' premises in Kigali. Table 4.4 provides summarized information about the participants in Study 3. Data were analyzed following the conventional content analysis, through which themes emanate from the text data (Hsieh & Shannon, 2005). I identified and coded the themes directly from the interview transcripts. This allowed me to compare the findings from the interviews with the ones from the literature and to interpret them for similarities and differences while taking the context into consideration.

Table 4.4. Interview participants for Study 3

Participant's position	Number
Application reviewer	3
Inspection officer	1
Evaluation officer	1
System support officer	2
Application reviewer	2
Business registration officer	2
Manager	3
Total	**14**

Based on the findings from the previous studies, an e-government service evaluation process redesign was suggested for use in Rwanda. Study 4 made use of both interviews and an online survey to test the usability and usefulness of the developed system's prototype. Both the one-on-one interviews and the surveys were guided by a questionnaire developed through following the content, context, and process (CCP) framework (Stockdale & Standing, 2006; Symons, 1991). The study aimed at understanding the views of how the suggested solution contributes to solving the evaluation problems. The interviews were conducted after a demonstration of the suggested solution to the participants.

The interviews targeted the senior managers in the organizations in charge of service development, service delivery, service regulation, and monitoring. This utilized a purposive sampling (Bazeley, 2013). In total there were six organizations, with one participant from five organizations and two senior managers from the sixth organization. The interviews took place in October 2018 in Kigali; six of them were conducted at the organizations' premises and one was conducted out of the office to avoid interruptions. They were recorded with the informants' consent. The interview protocol is presented in Appendix 4. The number of participants as well the category of the organizations where they work are provided in Table 4.5.

Table 4.5. Interview participants for Study 4

Organization category	Number of participants
Service provider	3
Service developer	1
Regulation and monitoring	3
Total	**7**

4.3.4. Online questionnaire

Surveys allow for the collection of views from many users (Johannesson & Perjons, 2014) and in Study 4 an online survey questionnaire was used, for a sample of users to test the service evaluation prototype and provide their views regarding its usability and to make improvement recommendations. The questionnaire used had both closed and open questions; a questionnaire with closed questions, provided in Appendix 5, was used to evaluate services. The open questions asked the respondents to provide their suggestions regarding additional aspects to assess, suggestions of the improvements they wish to see, and any other comments they may have. The participants were from the College of Science and Technology at the University of Rwanda. This college was selected as it teaches subjects that are related to the research inquiry, where respondents were asked to provide views from their experience of using e-government services. The request to participate was sent to 107 potential participants by email, using the mailing list provided by the program coordinators. The email messages contained a link to the questionnaire, which was made accessible for a period of two months from October 2018. Ultimately, there were 60 participants (56%). The respondents' demographic information is provided in Table 4.6.

Table 4.6. Interview details for Study 4

Occupation	Number	Gender	Number	Internet access frequency	Number
Student	26	Female	14	Never	0
Teacher/ Lecturer	17	Male	35	A few times a year	0
Public Servant	7	**Computer use experience**	**Number**	A few times a month	1
				A few times a week	6
Age	**Number**	Never	0	Everyday	44
Below 18 years	0	Less than one year	0	**Service access**	**Number**
18 to 35 years	36	1 to 2 years	0	I accessed myself	33
36 to 50 years	14	Above 2 less than 4 years	3	I accessed through someone else	12
Above 50 years	0	Above 4 years	47	Through the government office	5
Total number of participants					60*

* Due to the length of the questionnaire (40 questions in total), it was not mandatory for respondents to provide their personal characteristics. As a result, the data of the characteristics in Table 4.6 amount to less than 60.

Adhering to the research aim, the survey also used purposive sampling (Bazeley, 2013). The choice of purposive sampling was motivated by the fact that the study had the objective of reaching out to a sample of citizens who had used e-government services and would thus be able to provide feedback on the services they used as well as on the suggested evaluation process. In addition, participants had to be able to take the online survey. A university population contains such types of users and was thus used.

In Study 4 the interviews were first transcribed. Thereafter a conceptual analysis of the content of the transcripts, together with the answers to the online questionnaire, was undertaken. The coding of the content followed a directed approach (Hsieh & Shannon, 2005). In a directed approach the coding is guided by a theory, a framework, or a concept. In the present study, the coding of interview transcripts and the survey responses was guided by the content, context, and process (CCP) framework (Stockdale & Standing, 2006; Symons, 1991). This framework guided the analysis in answering the why, what, who, when and how questions regarding evaluations, and to understand the usefulness and usability of the suggested evaluation ideas as expressed by the informants. The analysis was open to new codes that would arise from the data not captured by the CCP framework; the latter was found to be inclusive of all the collected data. The coding and analysis were done using NVivo. The analysis results informed the study in relation to the usefulness and usability of the evaluation prototype in Rwanda, from the organizations' and citizens' perspectives.

4.3.5. Documents

Documents were another source of data. This research mainly used government publications from the government of Rwanda, organizations' internal documents, and the communications – particularly emails – to inform the research. The documents were mainly found online in the repositories of government organizations, provided by the informants, or searched for when indicated by the informants. The documents selected were those foundational for e-government in Rwanda. They include:

- Rwanda Vision 2020 (2000) and its revised version (2012)
- National ICT Strategy and Plan NICI III (2011-2015)
- Smart Rwanda 2020 Master Plans (2016-2020)
- Result Based Performance Management (RBM) Policy for Rwanda Public Service
- The law establishing the Rwanda Information Society Authority (RISA), 2017
- The law establishing the Rwanda Governance Board (RGB), 2016
- RGB, Citizen Report Card (2017 - 2018)
- RGB, Rwanda Governance Scorecard (2018)
- RGB, Service Delivery Monitoring Report (2018)

The analysis of the documents identified information about the organizations involved in research, especially their responsibilities, e-government initiatives, policies, and guidelines for service delivery procedures. The RGB reports used are the governance, service delivery, and citizens' satisfaction evaluation reports. As there was no literature on e-government and its evaluation in Rwanda, the government's documents provided me with a better understanding of Rwanda's plans for e-government, as well as what has been achieved through the various e-government initiatives.

4.4. My Role as a Researcher

In interpretive studies, the researcher can have different roles, as an outside researcher or an involved researcher (Walsham, 2006). In this research, I have assumed the role of the outside researcher. My knowledge of Rwanda, the organizations, and individual cultural aspects, coupled with my personal experience of using public services as a citizen, were an added advantage to understanding e-government in Rwanda as well as what the informants expressed. The empirical work in this thesis is comprised of interpretive case studies and I relied principally on data collected from the informants while undertaking the fieldwork. My initial role for the empirical work was to select the organizations to work with, in the search for how e-government services can be evaluated in Rwanda. Based on my knowledge of the context, I chose key organizations which I know play important roles in e-government development, service delivery, and evaluation.

This outside researcher role has the benefit of not being considered as having a direct stake, which leads informants to provide honest views (Walsham, 1995). For five years of my research, I was occasionally present in the organizations for approximately three and a half months every year.

During that time, I had opportunities to observe daily activities in the organizations and was able to plan and meet with the informants from those organizations. I, however, was not involved in their daily duties and regular meetings which other staff attended on a regular basis. My involvement was guided by the memorandum of understanding (MOU) signed between Örebro University, the University of Rwanda, and Rwanda Development Board which concerned the cooperation of research for mutual benefits. My role as a researcher, as stipulated in the MOU, was to work together with RDB-ICT staff on selected projects with the purpose of achieving mutual benefits by integrating researchers and practitioners in ongoing projects concerning the use of ICT for the development of Rwanda. As a result, some of the contacts for this research were initiated through the

recommendations of the then RDB-ICT department whose responsibilities were transferred to RISA in 2017.

Working closely with organizations was important, and was made possible by using the DSR approach. It allowed me to gain an understanding of the problem domain. It was also necessary to work with the organizations in order to define and refine the artifact objectives. To avoid bias, data were collected and analyzed objectively, following clear rules and methods as explained in section 4.3. At each field visit, I made contact with those in charge of e-government, practitioners, and managers in varied organizations. I also spent time with the informants I had previously met, to inform them of the progress of the research and to share with them the outcome of the data I had collected. The initial meetings with the informants were for the planning of data collection. Meetings at different organizations were also opportunities to learn about the progress of the organizations' e-government initiatives. As advised by Walsham (2006), when I was not in the field I maintained contact with informants. This was done especially through electronic communications, particularly e-mails. Some of the pictures taken on the occasion of the meetings are provided below.

From top: Photos 1 and 2 with the Registrar General and some of the staff at Rwanda Development Board (November 1st, 2018). Photo 3 at the Rwanda Governance Board stand on the Civil Society open day (March 2nd, 2018). Photo 4 at the Ministry of Information Technology and Communication (August 1st, 2017)

4.5. Method Reflections

In this section I reflect on the methods I used. The reflection on the methods is guided by Klein and Myers (1999)'s principles to conduct interpretive research field studies. These same principles are also useful for the evaluation of those studies. A summarized reflection on the principles, their meaning, and how they were applied are presented in Table 4.7.

Table 4.7. My research in relation to Klein and Myers (1999)'s principles

Principles	Descriptions	My research
The fundamental principle of the hermeneutic circle	Suggests that all human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form.	This principle was considered by continuously learning from the cases at individual, organizational, and national levels. The understanding of cases improved and was improved by learnings from the whole overview of e-government. They have all provided me with an inclusive picture of the whole.
The principle of contextualization	Requires critical reflection of the social and historical background of the research setting, so that the intended audience can see how the current situation under investigation emerged.	The research context was explained through its background when the e-government implementation plans were adopted to the contemporary situation of e-government evaluation. In addition to Chapter 3, which presents the research context, the empirical studies provide information about the research setting, clarifying the social and historical settings of e-government implementation and evaluation.
The principle of interaction between the researchers and subjects	Requires critical reflection on how the research materials (or "data") were socially constructed through the interaction between the researchers and participants.	Through the interactions I had with my informants, interviews, or others, I entreated the informants to freely express themselves. Besides the interviews, I also presented the results of the previous data collected for their feedback. The organization I had the initial contact with was also involved in selecting and introducing me to other organizations with which I worked.

The principle of abstraction and generalization	Requires relating the idiographic details revealed by the data interpretation through the application of principles one and two to the theoretical, general concepts that describe the nature of human understanding and social action.	I used the information systems artifact concept to analyze and explain e-government evaluation and the content context process framework has guided the artifact evaluation.
Principle of dialogical reasoning	Requires sensitivity to possible contradictions between the theoretical preconceptions guiding the research design and actual findings ("the story which the data tell") with subsequent cycles of revision.	While conducting the present research, I have been attentive to possible ideas that would rise from the data rather than rigidly following the theoretical assumptions.
The principle of multiple interpretations	Requires sensitivity to possible differences in interpretations among the participants, as are typically expressed in multiple narratives or stories of the same sequence of events under study. Similar to multiple witness accounts even if all relate it as they saw it.	During the fieldwork, I communicated with a variety of people, from senior managers to helpdesk staff, from companies to individual consultants and citizens, to enrich the overall view of from different sources.
The principle of suspicion	Requires sensitivity to possible "biases" and systematic "distortions" in the narratives collected from the participants.	By using various data collection techniques (interviews, online survey, and documents) and from different sources (individuals, public and private organizations), I was open to differences in interpretations including my own.

4.6. Ethical Considerations

This research was conducted with considerations of ethical guidelines advocated by the Swedish Research Council (SRC) or Vetenskapsrådet. The SRC explains good research in terms of the nature of the research itself and

the researcher's personal conduct. Research conducted ethically has a balance between various interests, such as the quest for knowledge, the integrity of the research subjects, and their protection against harm or risk (SRC, 2019). Ethical principles have guided the present research, participation of the informants and their protection. Whenever the employees from the organization were reached out to, I first sought permission from the organizations. I requested permissions from all the organizations including the Ministry of ICT and Innovation (MINICT), Irembo Ltd., RDB, RISA, RGB, the City of Kigali, and ORG. Further, the participation of individual informants, including staff from those organizations, private consultants, and citizens, was voluntary. Prior to collecting data, the informants were given explanations about the research and what the information will be used for. Interviews were recorded with the consent of informants. There was one instance when an informant did not want their interview to be recorded and this was respected. I also ensured anonymity and confidentiality in both keeping and using the collected materials.

5. The ROSE approach to evaluation

The Rwanda Online Service Evaluation (ROSE) approach was suggested as a contribution to the improvement of e-government service evaluation in Rwanda. ROSE is comprised of social, informational and technological components interacting in such a manner so as to support the proposed evaluation process. This chapter presents ROSE design considerations and details its constructs and test.

5.1. Design Considerations

This research aims to devise a way of improving e-government services evaluation, to then better inform providers in service improvement. It suggests conducting e-government service evaluations and involving users in those evaluations as a means to provide decision makers with better information. In order words, this research suggests a service evaluation process redesign through which organizations would interact with users and learn what users think of services. This would complement the government efforts invested in e-government service delivery by informing service improvement. The process redesign is facilitated by ROSE approach.

Prior to this research, there were no systematic ways for e-government service stakeholders especially service users and providers to meaningfully interact. As a result, there was no information about the qualities of services as experienced by users. In addition, the service evaluation conducted in Rwanda thus far requires a face to face meeting between the user and the data collector, as is the case in service surveys conducted by the RGB. Specific to online services, there were no criteria to use in the service evaluation. In the 2018 service delivery monitoring report, only the share of online services was assessed and was found to be 44% of the total services provided in the public sector (RGB, 2018c).

The design of the evaluation approach is based on the findings of Studies 1 to 3. Study 1, reviewing the status of research on e-government evaluation, explains evaluation through five factors: evaluation object, stakeholders, evaluation timing, the degree of integration, and scope. The latter refers to the complexity of the evaluation objects and the degree of integration encompassing technical and organizational integration. While designing ROSE, those five key factors were taken into consideration: the evaluation objects are the e-government services in Rwanda, evaluation stakeholders were to include service users and various organizations, and both formative and summative evaluations were to be accommodated. Regarding the scope

and degree of integration, as those who use services themselves are still limited in number and service provision and evaluation involves the use of various technologies by a number of organizations, a web-based interface was chosen as fitting the evaluation process. This resulted in the reaching out to those who are able to use services – those who are online – and providing the possibility of involving more than one organization, as would be required for a specific evaluation.

Studies 2 and 3 investigate e-government implementation in Rwanda and organizations' perspectives on qualities of e-government services respectively. Study 2 identified challenges that hamper e-government implementation. Those challenges include a lack of change management strategy, limited cooperation, language and literacy barriers, incomplete automation, difficulties with system integration, and lack of intermediaries' management mechanisms. These challenges affect e-government service delivery as well as their use. As little is done for providers to access service information and to ascertain what the users think of the services, based on the findings, the design of ROSE considered reaching out to service users, so as to get actual feedback on services and different challenges that users may be facing.

Departing from the findings of Study 2 and again considering the importance of involving stakeholders as discussed in Study 1, Study 3 focuses on service providers to investigate their views regarding the qualities of services. In Study 3, it was found that providers' views focus on some quality dimensions related to context-specific issues, but do not include other general quality dimensions. An example is the providers' focus on service accessibility, which is significant in the case of Rwanda where language and literacy problems characterize a large portion of the population. In addition to accessibility, other dimensions found to be in the focus of providers include availability, awareness, responsiveness, information quality, information security, ease of use, support, and cost. The general quality dimensions found to be missing and thus suggested for consideration include privacy, benefits, website quality, and customization. All 13 dimensions were taken into consideration in designing the ROSE. The ROSE design also considered service providers as key in service evaluation, and as other stakeholders influence e-government as well, it was also possible to include them in evaluations.

Study 4 builds on the previous studies and proposes a process redesign to evaluate services. The users provide information on the usability and usefulness of services and then the technology component of ROSE processes this and makes it available to providers. The information could then be used

to improve services. The process redesign is based on 1) the need for providers to have information about qualities of services and 2) the fact that users are the ones who know, from their experience, how the services work. The design of ROSE has contributed to clarifying this research idea of improved user involvement in evaluation in a relatively short period of time and at affordable costs. This research's evaluation process redesign suggests how the lack of information about service qualities can be addressed by using ROSE as a means to access such information. However, the developed technology component is limited as it is a mock-up. It still needs to be piloted in order to be tested in a real-life set up for feasibility, effectiveness, and efficiency in organizations. The ROSE design is explained next.

5.2. ROSE Design

ROSE comprises the technology, social and information components based on the IS artifact concept. This concept is grounded in the fact that an IS artifact consists of a technology artifact, an information artifact, and a social artifact and that the three artifacts are "interacting with and even transforming one another where, in coming together as an IS, they ultimately serve to solve a problem or achieve a goal for individuals, groups, organizations, societies or other social units" (Lee et al., 2015, p. 6).

The information used as the basis for suggesting the evaluation process redesign through ROSE comes from the e-government evaluation literature as well as from the empirical studies informed by the service users, providers, and other parties involved in e-government in Rwanda.

The suggested service evaluation process redesign introduces discussions by practitioners about services and their improvement based on user feedback. ROSE would feed those discussions with users' views of the services. ROSE presents an opportunity for users to express their opinions on the services they use. The ROSE back-end is used by organizations to design evaluations, manage evaluations, and view the results, while the front-end is used by service users to participate in evaluations. The interactions represent the information artifact and the interacting parties constitute the social artifact, while the channel for interaction, the information processing and storage capacity are provided by the technology artifact. The three constructs comprising ROSE are explained next.

5.2.1. The Social Artifact

The social artifact comprises the relationships among e-government service stakeholders. The stakeholders are either on the user side or on the government side.

On the user side, the stakeholders are the citizens who use services themselves as well as the intermediaries. The latter, also referred to as consultants, agents, or middlemen, are persons who have the ability and capacity to access service portals and request services on behalf of citizens who are not able to use the service themselves. These intermediaries can be divided into two groups: private and public ones. The former assist citizens for a certain fee while the latter are helpdesk agents and assist citizens free of charge. In the case of the government's one-stop service portal, intermediaries were reported as intervening in delivering over 80% of services (Tumwebaze, 2018). It is worthwhile to note that some of the services require the consultant's intervention by default. An example is the construction permit application, which requires specific technical skills and where only registered civil engineers and architects may submit applications, thus becoming private intermediaries. An example of public intermediaries is for business registration, where the employees of the Office of the Registrar General provide support to those in need. The intermediaries are professionals who use the services regularly, understand how they work, and thus have different requirements to those of a private user who may be uncertain about service use as he/she only uses it occasionally. ROSE offers an option for users to identify their category and thus allows for the differentiation of private users' and intermediaries' feedback. This same option allows for the filtering of the results based on user categories.

On the government side, the stakeholders are organizations with different responsibilities. They include policymakers, project managers, service delivery evaluators, and service providers. In some of the organizations there are also public intermediaries. As per the situation at the time of conducting this research, there were some interactions among the stakeholders on the government side. However, there were no direct interactions between service providers and users. In relation to the evaluation, the interactions were top-down. The RGB conducted evaluations for non-digital services and published the results and made recommendations to service providers regarding areas of improvement. As a contribution to improve the state of affairs, this research proposes the initiation of e-government service evaluation, involving different organization stakeholders as "owners" of evalua-

tions or "actors" in evaluations, where users are the source of service information. Through ROSE, an organization, as an owner, can design evaluations and involve others. The involved organizations assume the role of actors as they take part in the evaluation. An organization becomes an owner depending on whether it takes the lead in evaluations, while an actor is involved depending on the role they have in executing evaluations. Evaluations can be at the national, sectoral, or organizational levels. For instance, if the RGB takes the lead to evaluate all online services in Rwanda, then the RGB is an owner. The CoK, as one of the online service providers, becomes an actor by providing users with the option to participate in the evaluation which is available through the CoK's website. In this case, the evaluation is at the national level. If the Rwanda Housing Authority (RHA), as the authority in charge of construction, initiates an evaluation of construction permits, this would be a sectoral evaluation. The RHA is an "owner" while CoK is an actor, as a construction permit service provider. However, if, for example, the CoK designs an evaluation of its construction permit service, then in such a case, the CoK is the owner of an evaluation at the organizational level. Besides designing and making evaluations available, ROSE provides the owner with the functions to manage actors' access rights to the evaluations. The possible rights are: 1) manage users, 2) manage survey, and 3) view statistics. These rights can be combined as needed.

As through ROSE the users are the source of information, the evaluations adopt a bottom-up approach and can take place at any time. The use of ROSE complements the top-down approach of e-government with bottom-up information from users who were previously not part of the information system. By the top-down approach, I mean that services are decided and designed by the government, most of the time without users' involvement. It is true that if users are involved they may not know what and how to contribute. This is how the bottom-up approach, involving users after service use, would be appropriate to complement the top-down approach. In this manner, their input would be based on their experience and expectations of service usability and usefulness, and complement the providers' assumptions of users' needs.

On one hand, users' involvement may be time and resources consuming but, on the other hand, users have the right to participate in what is done for them. There is, therefore, a need to decide on how and when to involve users, and also choose who to involve and to what extent. For user involvement to be effective, there is a need to balance all the interrelated aspects of user involvement. The involvement aspects are also greatly influenced by

the context. For example, in Rwanda where the use of e-government services is dominated by the intermediaries, these agents, together with the few direct users such as students and employees, could be involved. Although those who can be involved may be a small number to start with, their input would be relevant to inform service improvement. Consequently, the number would increase as more citizens gain online access.

Starting by involving few users would be a better means to prepare to involve more users in the future. ROSE is web-based and designed with the possibility for targeting a specific category of the Rwandan population. As an example, ROSE generates a link to each evaluation which can then be e-mailed to intermediaries who are known to the service provider organizations' owners or actors in the evaluation. Evaluations could also be emailed to specific categories of the population, such as students and employees, who are potential users of e-government services. Thus, the evaluations target only those who are online, those able to use the services. This avoids hypothetical feedback from non-direct users of services. The improved social interactions are illustrated in Figure 5.1.
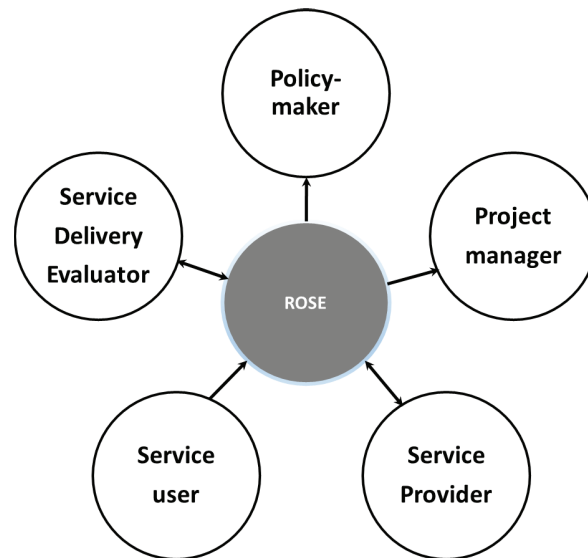

Figure 5.1. Social interactions in ROSE

5.2.2. The Information Artifact

The information artifact is constructed by the information flowing between e-government service stakeholders. On the user side, the ROSE information artifact is comprised of the data that the users provide through the front-end of ROSE as they assess services through a survey. This information is composed of the users' views of the quality of service and on users' characteristics including age, gender, occupation, computer experience, internet experience, as well as the channel used to access the service under evaluation. The evaluation survey also provides room for open comments on services and suggestions for improvements. The users' views of the quality of service are expressed through answering an online survey which consists of 40 statements (See appendix 5). These statements are based on the 13 service quality dimensions identified in Study 3 as important in assessing e-government services in Rwanda (accessibility, availability, awareness, benefits, financial cost, customization, ease of use, information quality, information security, privacy, responsiveness, support, and website quality). Through the front-end of ROSE, users rank those statements on a 1-5 Likert scale. For a given service, the evaluation value can vary between 1 (very poor) and 5 (very good), which is a mean value of the averages of each dimension across users. Users' entries for quality of service are provided by selecting a number corresponding to their level of agreement with a statement and entries for users' characteristics are provided by selecting an option from a drop-down menu. The use of multiple choices is likely to reduce the risks of providing data in the wrong format.

On the government side, through ROSE's back-end, the information artifact is comprised of the data generated from the survey and corresponding graphical representations, both resulting from processing users' views of the services. The service providers have expressed that although they provide services in the manner in which they think is good for the users, they do not know what the users think of the services, what they like or not, or what they find to be missing. This artifact solves the problem of a lack of such information by means of providing information on services as experienced by users. This information allows evaluation owners, as well as those actors to whom they give the right, to see service trends which can then be used to inform improvement. The ROSE information channel is illustrated in Figure 5.2.

Figure 5.2. The suggested information channel

5.2.3. The Technology Artifact

The ROSE technology artifact acts as a direct channel for interactions about services among the evaluation stakeholders, as an information processing unit, and as a storage unit. It is web-based and facilitates e-government service evaluation. It captures users' views of the quality of services they use, saves it, processes it in a meaningful manner, and automatically displays information on the quality of a specific service. Processing data in a meaningful manner means that the output of ROSE serves different organizations in their respective responsibilities. For services providers, the information generated represents the quality of services where services perform well or otherwise. This gives indications regarding what service aspects can be improved. For sectoral and national evaluations, the evaluations provide an overview of service performance and indicate those that perform poorly compared to others. The organization in charge would then use that information to formulate recommendations accordingly. The services are evaluated by assessing the quality dimensions, with each of them entailing various factors. For a service, ROSE calculates an average value of the values of the dimensions assessed. Each dimension's value is an average of the values of its own factors, while a factor's value is an average of all the values participants assigned to it in their evaluations. The dimensions can be assigned different weights depending on the priorities that the evaluation owner gives to each dimension for a specific service at a given time of evaluation. The weights correspond to three levels of importance: low importance, average importance, and high importance. To achieve the purpose of supporting interactions among stakeholders in service evaluation, ROSE had to fulfill the following:

- Capture data about users' views on the services they use;
- Store the data for processing;

- Process data in a meaningful manner and generate information indicating users' view on services;
- Display the information in a reader-friendly manner; and
- Provide a means to assess different services from different organizations.

The technology artifact development

The ROSE technology artifact was developed based on weekly meetings with the developer. The developer participated in the development requested by the researcher. The latter discussed the need for developing a prototype of an online evaluation and the former agreed to take part. The development was done on a part-time basis and free of charge. The first meeting took place at the end of April 2018. The development process took five months and was done on a part time basis. The initial meetings were centered on ensuring that the system requirements are understood in the same way by the researcher and the developer. During the development phase, each implemented function was tested by the researcher who then provided feedback to the developer. The latter revisited the development processes whenever it was required to ensure that each function performs as expected. At the end of the development phase, random data was used to test ROSE functions to ensure that the developed system handles data as required.

To support multiple organizations, ROSE is built as a SaaS (Software as a Service) where data for each organization is processed in isolation. The administration and evaluation data collection elements are built together on ASP.NET MVC Core version 2.1 using MySQL for data storage. ROSE is accessible as a web application hosted on Microsoft Azure Cloud. The user interface consists of a combination of HTML, CSS, and JavaScript while business logic is coded in C#. The technology component interacts with the information and social components during service evaluation.

ROSE has two interfaces, a front-end and a back-end. The front-end provides users with a simple survey form to fill (see Figure 5.3). The back-end has two parts: one for the evaluation design and the other for managing access to evaluations. The evaluation design part is the one that allows evaluation owners to design evaluations for specific services in a user-friendly manner. This involves naming the evaluation, describing the evaluation, and selecting the evaluation dimensions and corresponding factors and weights, as well as the user's characteristics for consideration in a specific evaluation.

The dimensions, factors, weights, and user's characteristics are predetermined in ROSE, but the latter offers the flexibility of selecting which ones to consider for a specific service evaluation. Figure 5.4 provides a view of the evaluation design part. Once users start evaluating services, it is in this same area that the results are displayed. See Figure 5.5 for a sample of a summarized results display and Figure 5.6 for a view of results filtered according to the respondents' characteristics. The access management part allows evaluation owners to associate actors with specific evaluations. It is also through this part that those actors are assigned access rights. See Figure 5.7 for a view of the access management part.

Figure 5.3. ROSE front-end interface

Figure 5.4. The evaluation design part showing the dimension "support" and its factors
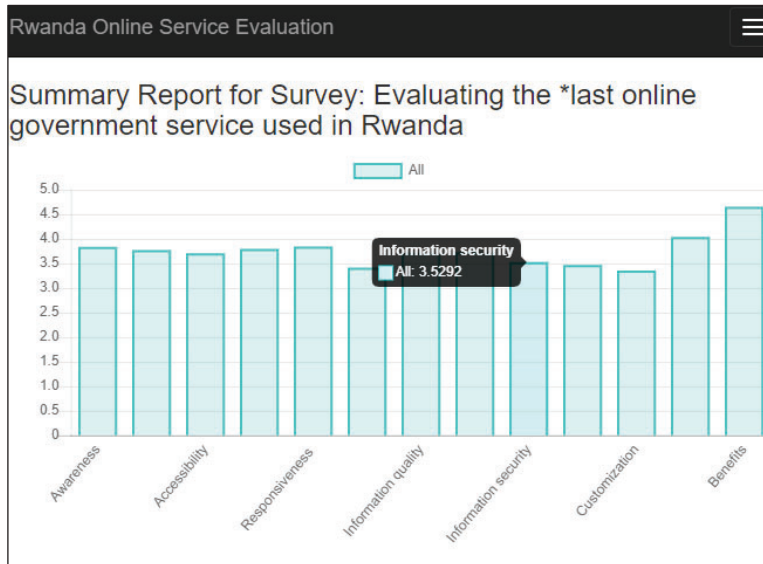
Figure 5.5. Evaluation summary

Dimension	Respondents		AverageValue	
Awareness	60	26	3,84	3,69
Availability	60	26	3,78	3,75
Accessibility	60	26	3,71	3,70
Ease of use	60	26	3,79	3,62
Responsiveness	60	26	3,84	3,58
Support	60	26	3,42	3,26
Information quality	60	26	3,72	3,44
Website quality	60	26	3,73	3,63
Information security	60	26	3,53	3,53
Privacy	60	26	3,47	3,27
Customization	60	26	3,36	3,15
Financial cost	60	26	4,04	3,87
Benefits	60	26	4,66	4,50
Average	60	26	3,76	3,61

Occupation

Student	▼

Figure 5.6. Evaluation results filtered on "student" as occupation

Figure 5.7. Access management interface showing evaluations and access rights

5.3. ROSE Testing

The evaluation process redesign which this research proposes for use in evaluating e-government service was explained to the e-government organizations through the demonstration of ROSE. The demonstration sessions were conducted during the meetings held with seven senior managers of the most important government organizations for e-government policy and government quality, two service providers, and the service developer organization in Rwanda. These meetings were also an opportunity for the managers to assess ROSE through one-on-one semi-structured interviews.

ROSE use was also tested by a sample of 60 users through an online survey. The sample was composed of students, teachers, and employees from the College of Science and Technology at the University of Rwanda. They first had to use ROSE to assess the latest e-government service which they used in Rwanda and then provide their opinions on ROSE usability and usefulness in service evaluation. The user survey took place from October 8th, 2018, for two months, and the manager interviews were conducted in October 2018. It was important to seek senior managers' views as their organizations are potential users of the suggested evaluation process redesign. Similarly, the evaluations would be done by service users and their views are important and were therefore sought.

From the managers and users' opinions, the suggested evaluation process was welcomed and the improvement recommendations were provided. The improvement recommendations were considered when refining ROSE to allow for the assessment of e-government services in Rwanda in general. For instance, following the comments on the version demonstrated, options deemed as usable in the evaluation design, such as respondent characteristics, were made non-mandatory and could be activated or deactivated by the evaluation designer as required. If the evaluation is sent to students, for instance, there is an option to deactivate the "occupation" characteristic, as it is already known.

After the refinement, the organization willing to assess a service they deliver was given access to the refined ROSE. During the test, there were technical problems in delivering the service they were testing and they decided to postpone the service evaluation as they wanted to first fix the problems. Due to time limitations, it was not possible to take the test again prior to finalizing the writing of this thesis, however, the organization expressed their willingness to use ROSE again.

6. Results

The objective of the present research was to improve e-government service evaluation in Rwanda. The main research question of this thesis is: *How can e-government service evaluation be improved in Rwanda?* To answer this question, four studies were conducted and are reported on in this thesis. The results indicate that e-government service evaluation is limited to counting the services provided online at the national level and that evaluation of the quality of services is yet to be conducted. There is a lack of user feedback to providers at the organizational level, which implies a lack of evidence for improvement actions. This research suggests a service evaluation process redesign that brings both the users and the providers in the evaluation process, and also designed an evaluation approach for providers to design evaluations and collect user feedback to inform service improvement actions.

In this chapter, I start by presenting the key results of the research in Table 6.1 and summarize the studies that comprise this thesis. Finally, I revisit the main research question and present the research limitations.

Table 6.1. Summary of key results per study (Continued on the next page)

Research question: How can e-government service evaluation be improved in Rwanda?			
Research Objectives	1. To understanding issues related to e-government evaluation	2. To understand e-government evaluation at the organizational level in Rwanda	3. To suggest a user-centered evaluation process that could be used to evaluate e-government services in Rwanda
Studies	1. Evaluating eGovernment Evaluation: Trend and Issues	2. Challenges in Implementing Citizen-centric e-Government Services in Rwanda	3. Improving Qualities of e-Government Services in Rwanda: A Service Provider Perspective	4. Designing eGovernment service evaluation in Rwanda
Research questions	1. What is the status of research on e-government evaluation?	2. What are the challenges in implementing e-government in Rwanda?	3. What are the service providers' views of e-government service qualities in Rwanda? 4. How do those views relate to the issues found in the literature?	5. How can e-government services in Rwanda be evaluated?
Key results	Explained e-government evaluation in terms of	Clarified the e-government de-	Identified e-government service quality dimensions. These were:	Based on the Information Systems Artifact

	evaluation objects, their scope, the degree of integration, and involved stakeholders from which evaluation indicators emanate and from whose changes e-government maturity results. These elements were conceptualized into an e-government maturity model.	velopment realities in Rwanda and identified implementation challenges. These challenges are in five categories: • Information applications and systems • Business management • Human factors • Infrastructure • Policy formulation Identified that there was a lack of precisions on how e-government goals can be measured and the need to manage challenges toward the desired e-government.	• Quality dimensions mentioned by service providers in Rwanda which are also found in the literature • Quality dimensions found in the literature but not mentioned by service providers • "LCD factors" - discussed in terms of their influence on the delivery and quality of services This study conceptualized e-government sevice development and suggested considering user input in service evaluation in addition to general e-government quality dimensions and international best practice.	(ISA) concept suggested an e-government service evaluation process redesign and developed the Rwanda Online Service Evaluation (ROSE) approach to facilitate evaluation. The suggested evaluation process was welcomed by the providers and the users and was perceived as useful and usable in Rwanda.

6.1. Study 1

Title: Evaluating eGovernment Evaluation: Trend and Issues

Study 1 was a theoretical investigation. It formed the basis of the overall thesis by investigating e-government evaluation, the thesis' research area. It answered the research question: *What is the status of research on e-government evaluation?* In this study, I investigated e-government evaluation literature in order to understand issues related to e-government evaluation. This study was done by conducting a literature review to find key aspects so as to understand how e-government could most constructively be evaluated at different stages of development. The literature review followed Webster and Watson (2002)'s guidelines for conducting literature reviews and used 26 articles and seven reports. The findings were summarized in a model suggesting that that evaluation focuses on a number of evaluation objects and stakeholders which reflect an integrated view of e-government maturity in a given context and time. Both objects and stakeholders typically change over time, and usually the number of both will grow. From stakeholder interest and object characteristics emanate indicators. The indicators are also

influenced by "evaluation timing," the point in time when evaluation takes place, as both technology and services improve and ambitions increase. These are represented in Figure 6.1. The "*scope*" on the x-axis, means that more complex "*evaluation objects*" get involved over time. The "*degree of integration,*" on the y-axis, represents both technical and organizational integration. Technical and organizational aspects are represented together as they evolve together. For instance, automation uses technology to accomplish organizational functions – such as automated service delivery – with reduced human interaction, and without that reduction there is no automation. Another example is open government whereby technology is used to provide citizens with access to government organizations' information. Technical and organizational aspects are, thus, not easily separable. Rather, they affect each other and evolve together. "*Stakeholders*" may be involved as a consequence of technical and organizational integration and scope, or other "external" reasons, such as when a government has a large share of their economy supplied by international sponsors. Those changes also influence the "*evaluation indicators*". Ultimately, e-government maturity is more about integrating the different aspects. As governments are different, e-government evolves differently in each country.
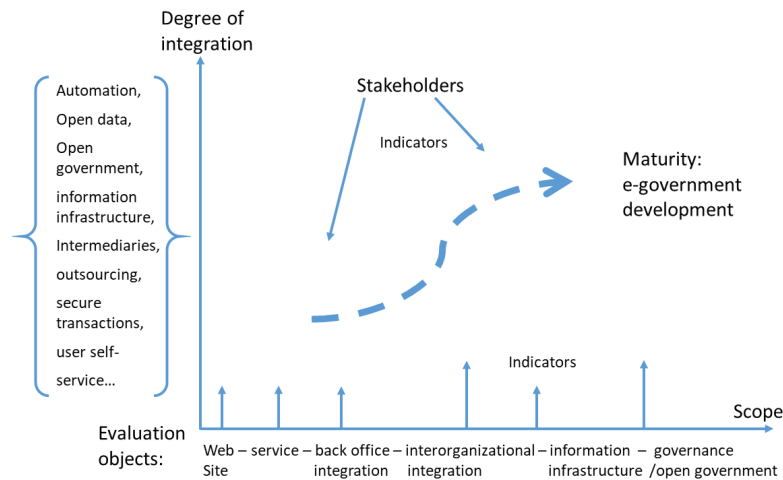

Figure 6.1. A general e-government maturity model based on the factors from the literature; moving towards a wider scope and deeper integration (Source: Study 1)

This literature review, conducted to investigate the e-government evaluation, found that problems still persist in term of understanding e-government, its implementation, how it evolves, and how it is evaluated. Most research evaluated input and output while fewer addressed of outcome and impact. The evaluations of e-government were also found to have a tendency of showing the development level of e-government for a specific country but not explaining why e-government evolves the way it does.

Study 1 identified e-government development aspects that evaluations focus on. It notes that e-government development is not straightforward, but rather evolves differently in different countries. E-government is influenced by many factors including the technical systems used, the organizations where the systems are implemented, and the involved stakeholders. And as there is no way to know in advance how e-government will evolve, e-government requires monitoring and nurturing to keep track of its development. Formative evaluations would thus be useful for providing information in a continuous manner, and such information would be used to continuously inform decision making regarding the course of action to take towards the desired e-government.

The e-government development conceptualization in this study guided the next research steps, through studying e-government implementation in Rwanda in Study 2, e-government evaluation at the organization level in Study 3, and e-government service evaluation design in Study 4. Based on the linkage between e-government development and evaluation (discussed in Study 1), Study 2 investigated e-government implementation in Rwanda. Study 1 also puts forward that stakeholders play an important role in the evaluation and that indicators are needed in order to know what the evaluation is to measure. Based on these, Study 3 explored views of service providers on the evaluation of quality dimensions, as a starting point to conduct service evaluation in Rwanda. Study 4 also considers the role of stakeholders and the need for measurements in conducting evaluations, as found in Study 1 and Study 3 respectively, and suggests an evaluation process redesign which involves service users, providers, and evaluators in service evaluation, while using the evaluation dimensions found to be relevant in the Rwandan context.

6.2. Study 2

Title: Challenges in Implementing Citizen-centric e-Government Services in Rwanda

Study 2 was based on empirical data regarding e-government implementation in Rwanda. The contribution of the second study to the thesis was to improve the understanding of e-government in the Rwandan context. As found in Study 1, e-government evaluation relates to e-government development. Subsequently, Study 2 studied e-government implementation in Rwanda to set the scene for the remainder of the research. The research question of this study was: *What are the challenges in implementing e-government in Rwanda*?

I collected data on e-government service development, integration, and operationalization in Rwanda. This study was informed by interviews conducted with e-government stakeholders in the country, including decision-makers, managers, and intermediaries. The latter are citizens who help those who do not have the capacity or ability to access the services. The main findings are that e-government challenges can be divided into five categories:

1. *Information applications and systems* – challenges in this category are related to functional processes;
2. Business management challenges – challenges at the organizational level;
3. *Human factors challenges* – challenges that citizens face in using e-government services;
4. *Infrastructure challenges* – e-government physical facility challenges;
5. *Policy formulation challenges* – found to be related to the national situation such as insufficient human capital and the young IT private sector.

The identified challenges are depicted in Figure 6.2, grouped into the above-mentioned categories.
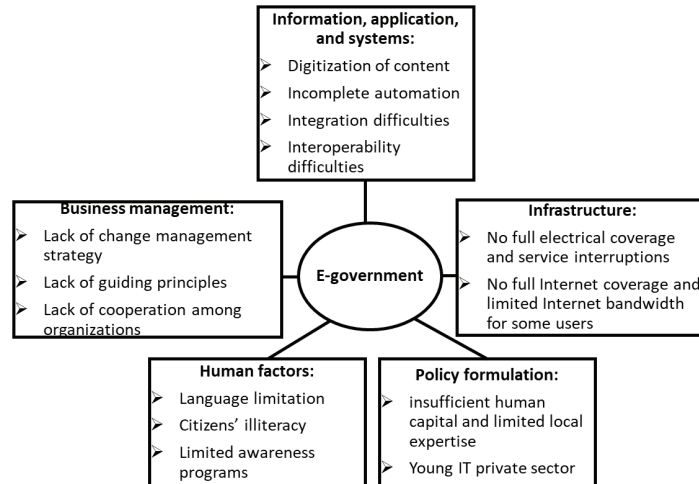
Figure 6.2. E-government implementation challenges in Rwanda

In Rwanda, e-government services have been provided by systems accessed through the organizations' websites until 2014, when service delivery started being integrated and provided through the "Irembo" portal. As of December 2018, 94 e-government services, including those that are most requested by citizens, were delivered through "Irembo". The commonly requested services include birth certificates, national ID cards, and marriage certificates. The use of intermediaries dominate service access and as of February 2018, over 80% of services were delivered through third parties or intermediaries (Tumwebaze, 2018). As e-government develops over time, more stakeholders are becoming involved from both the government and citizen sides. On the citizen side, they include citizens who use the services themselves as well as the intermediaries who support those who cannot use the services themselves. On the government side, the stakeholders are organizations with different responsibilities. They include policymakers, project managers, service delivery evaluators, and service providers. In some of the organizations, there are public intermediaries as well.

Despite the fact that the required technology is being acquired, more services are being developed, and stakeholders increasing in number, user feedback on services is not yet in focus. This is the area that the present research

aims to improve on. As this research focuses on solving e-government evaluation problems in Rwanda, it was worth studying e-government context-related challenges so as to suggest realistic solutions. Some of the identified challenges are related to the LDC context realities where, for instance, citizens' ability or capacity to use services are limited. While recognizing that Rwanda has undertaken efforts to develop some policies, establish institutions, acquire technical infrastructure, and placing initial government services online, this study presented the challenges that need to be addressed in order to achieve the desired e-government service level. As technology may be imported, though organizational arrangements cannot be, Study 2 suggested that evaluation service processes be redesigned, for Rwanda to realize its full e-government potential. This study observed the lack of precision regarding how e-government goals can be measured. Study 3 and 4 aimed at addressing that lack. The understanding of e-government implementation in Rwanda gained from Study 2 was the foundation of Study 3, for studying providers' views of qualities of service at the organizational level.

6.3. Study 3

Title: Improving Qualities of e-Government Services in Rwanda: A Service Provider Perspective

Study 3 was an empirical study whose data was collected in Rwanda. Study 3 built on the importance of stakeholders and evaluation measurements, as identified in Study 1, and on the e-government realities in Rwanda, explained in Study 2, to investigate that which providers prioritized in terms of service quality and explored if and how they can be improved based on the literature. Study 3 answered the research questions: *What are the service providers' views of e-government service qualities in Rwanda? How do those views relate to the issues found in the literature?* In this study e-government service development was conceptualized as depicted in Figure 6.3. The reasoning behind the conceptualization is that service provision is in general informed by the general quality dimensions (arrow 1) and the international best practice (arrow 2). The best practice is also informed by the general quality dimensions (arrow 3). In the event of differences between the providers' focus and the general factors, the reasons of differences could include the lack of awareness of those dimensions and practices, finding those dimensions and practices not relevant to the providers' context, or that the LDC factors are the ones which most immediately influence service providers' focus (arrow 4). To improve the service quality, the framework

suggests considering input from users. Often, research into service quality is informed by user studies, and users are informed by general discussions about service quality (arrow 5). Local user input can also be used to inform service provision (arrow 6).
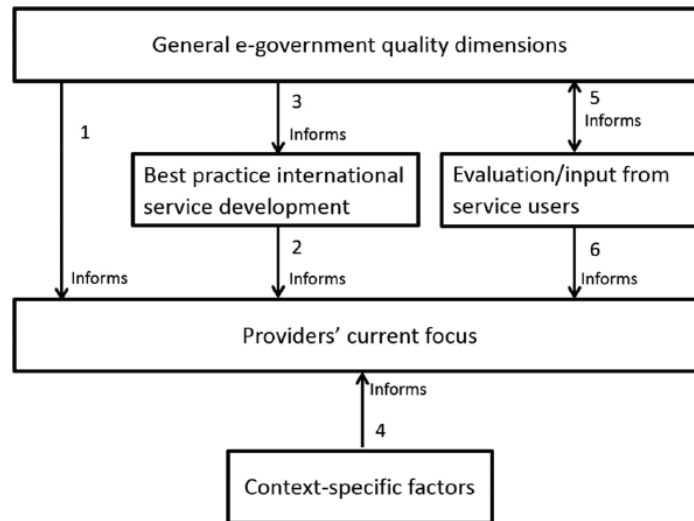
Figure 6.3. A conceptual framework of e-government service development (Source: Study 3)

In general, the more service providers are informed by general research and best practice, the better. This implies that the gap between providers' focus and general research narrows. Rwanda and other LDC, being new to e-government, tend to be more concerned with contextual factors. For instance, in Rwanda efforts have been made to develop and avail services for use, and the focus on service usability is observed. This study suggests that, as e-government develops and contextual factors get manageable, there is a need to also pay more attention to the quality of services. This could be achieved by consulting international research, best practices, and user input. The latter could be done through evaluations suggested by the literature as crucial for the success of e-government. Rwanda shares similarities with other LDC. For instance, the use of intermediaries to address e-government service usability issues is also common in other LDC, due to the low socio-

economic conditions. As such, recommendations for improving e-government services formulated taking those conditions into consideration – as is the case in Rwanda – may be used by other LDC as well.

Study 3 aimed at determining how factors and practices are taken into consideration by service providers in Rwanda. The key informants for this study were the service providers, as they are the ones responsible for developing and improving services and would thus be the ones whose interest in evaluation would make evaluations happen. This study found three categories of quality dimensions of e-government services:

- Quality dimensions mentioned by service providers in Rwanda which are also found in the literature
- Quality dimensions found in the literature but not mentioned by service providers
- "LCD factors" that influence the delivery and quality of services

Quality dimensions shared between the Rwandan context and the literature are *accessibility, availability, awareness, cost, ease of use, information quality, information security, responsiveness,* and *support*. In general, these are handled in manners adhering to international best practice. The main difference concerned *accessibility*. As the number of citizens able to use the services themselves is still limited, there is a dominant use of intermediaries for service access.

When compared to the dimensions prevalent in the literature, the providers' quality dimensions did not include *benefits, customization, privacy,* and *website quality*. These were thus recommended for consideration in evaluating services. The reasons for providers to focus on some items and not on others may be linked to the fact that e-government is in its early stages, where most of the efforts made to avail services online which are mainly done through outsourcing service development. This may have contributed to the greater attention service providers pay to availing services, compared to the quality of services. Other reasons may include that most of the citizens were new to online services and most likely unaware of what the government owed them in terms of quality. The intermediaries who intervened in providing most of the services may also have had no interest in focusing on improving qualities. The providers were found to prioritize context-specific aspects. These are related to the low income, human resource weak-

ness, and economic vulnerability that characterize LDC contexts. Those aspects include a lack of sufficient financial resources for infrastructure such as electricity and internet, language issues, limited human skills, and end-user illiteracy. These affect service delivery and use, and in Rwanda they were found to be addressed by the use of intermediaries.

For evaluations to take place and be used effectively for the improvement of services, the service providers – who are the main drivers of service development and thus potential primary users of evaluations for service improvement – have to be interested in those evaluations, and have some means to request, access and use user data for service improvement. The role of service providers and the quality dimensions identified in Study 1, and discussed in the context of Rwanda in Study 3, informed Study 4 in terms of suggesting an evaluation process redesign to guide providers and other interested organizations in conducting user-centered service evaluations.

6.4. Study 4
Title: Designing eGovernment service evaluation in Rwanda

Study 4 aimed at investigating how e-government services in Rwanda can be evaluated in practice. This is done by exploring what senior managers in key e-government organizations consider feasible and worthwhile in service evaluation. Those managers are from the three most important government organizations for e-government policy and government quality, two service providers, and the service developer organization. A redesign of the e-government service evaluation process was suggested in order to introduce user feedback in evaluating e-government services and involve service providers in conducting evaluations to inform service improvement. The redesigned evaluation process is illustrated in Figure 6.4.
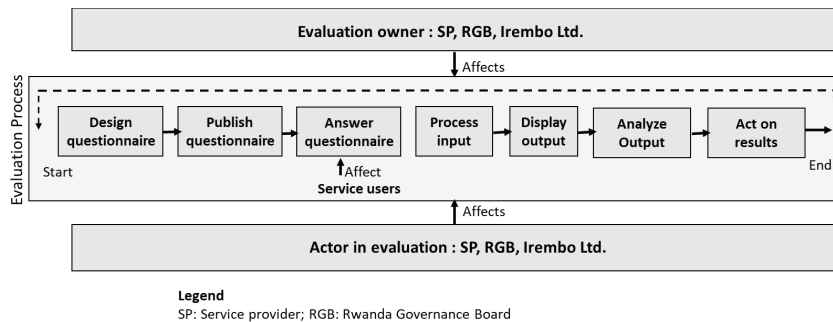
Figure 6.4. Suggested evaluation process (Source: Study 4)

The evaluation owners and actors include service providers (SP), the organization in charge of monitoring service delivery and citizens' perceptions of service delivery, Rwanda Governance Board (RGB), and organizations in charge of service design and implementation, such as Irembo Ltd. As an owner, an organization initiates and designs an evaluation. All of the organizations do not have to get involved at the same time. Each of them can be an actor when involved in the evaluation. The evaluation owner designs and publishes the questionnaire, the actor can play a role by reaching out to users through the questionnaire, to assess services in which the actor has an interest. The organizations play the role of owner or actor depending on the purpose of evaluation, which also indicates the level of evaluation. The current service evaluations are summative and are conducted at the central level by the RGB who, in the end, supplies providers with improvement recommendations. Though qualities of e-government services are yet to be evaluated, there is a likelihood that evaluating them would follow the same approach. The suggested process redesign includes changes that would offer the providers more frequent and direct access to user feedback through evaluations. Changes in the evaluation process are expected to inform service improvement by providers. Service improvement implies improved qualities of service, which would impact user experience positively. As the providers are the ones in charge of service delivery, this research suggests that their involvement in evaluations would inform service improvement. Subsequently, testing the process redesign involves them in a search of what is achievable and worthwhile in practice.

The evaluation process redesign was illustrated through the designed and developed web-based Rwanda Online Service Evaluation (ROSE). A technology artifact is defined as a human-created tool whose raison d'être is to

be used to solve a problem, achieve a goal or serve a purpose that is human defined, human perceived or human felt (Lee et al., 2015). By using ROSE the evaluation process would involve seven steps (see Figure 6.4). The steps and the possible responsible parties are: design questionnaire (by the evaluation owner), publish questionnaire (by the evaluation owner and actor), answer questionnaire (by service users), process input (by ROSE), display output (by ROSE) analyze out output (by the evaluation owner and actor), and act on results (by the evaluation owner). Whoever the evaluation owner and actors are, the ultimate aim of evaluations is to provide information that is useful in the decision making process for service improvement. Study 4 considered the Rwandan realities such as lack of e-government service evaluation tools identified in Study 2, and the current evaluation practice which does not involve service users and providers directly, and also suggested ways of rectifying these problems by developing an evaluation approach that could be used while involving service providers and users. The design and development of ROSE prototype took into consideration the 13 quality dimensions identified in Study 3.

Discussing the evaluation process redesign and the demonstration of ROSE for that purpose involved service providers who, as discussed in Study 3, are the main drivers of service development and improvement. The evaluation of ROSE was undertaken with the providers and a sample of users from the University of Rwanda. The latter were selected depending on the need to involve different e-government stakeholders, as identified in Study 1, as well as the e-government realities in Rwanda which indicated the limited capacity and ability of citizens to use e-government services, as found in Study 2. Those who use the services can be found among the literate population with access to the Internet, such as the university population. The use of ROSE would enable users to communicate their views on used services, and service providers to consider those views mainly for improving existing services though also when designing new ones.

After ROSE's prototype demonstration, the testing took place through the use of the Content, Context, and Process (CCP) framework (Stockdale & Standing, 2006). The demonstration was presented to six organizations. They included three of the most important government organizations for policy and government quality – the Ministry of ICT and Innovation (policymaker), Rwanda Information Society Authority (the national ICT governance organization), and the Rwanda Governance Board (the organization in charge of monitoring service delivery and citizens' perceptions of

service delivery). They also included Irembo Ltd., who are in charge of developing services for and maintaining the national portal (Irembo) as well as two e-government service providers, the City of Kigali and the Office of the Registrar General.

After the demonstration, senior managers in each of the organizations provided their feedback on the use of ROSE in evaluating e-government services, through semi-structured interviews. ROSE was also tested by a sample of 60 users from the College of Science and Technology at the University of Rwanda. They used ROSE to assess the most recent e-government service they used and then provided their views on the ROSE usability and usefulness. The comments and opinions of managers and users were considered when improving the prototype. They guided the refinement of the design and development, mainly to make ROSE more general to e-government services through the flexibility in evaluation designs. For instance, the initial prototype required every user undertaking the evaluation to specify their occupation, yet some of the services are provided solely by intermediaries whose occupation is known as "service operator". Thus, while evaluating a service provided to a specific category of users, there would be no need to ask them for information which is already known. However, as this option is still needed for other services, the refinement consisted of allowing the evaluation designers to activate or deactivate the option.

The findings of this study indicate that the evaluation process redesign, demonstrated through ROSE, was perceived as useful and usable. The managers welcomed the proposed evaluation process changes due to a number of reasons, which they expressed. The process redesign introduces measures of qualities that were not previously available, brings together user feedback on services, and allows for the evaluation of services at different levels: organizational, sectoral, and national. At the organizational level, the suggested evaluations would inform timely service improvement. At sectoral and national levels, using the suggested evaluations to assess different services would allow comparing services and ranking their provider organizations. This ranking was perceived as instigating the competitive spirit which in return prompts better service quality. At the national level, evaluations would inform the evaluators regarding which aspects require formulations for improvement recommendations. In general, adopting the suggested evaluation process changes for evaluating e-government services would guide dynamic, formative, and summative evaluations for electronic government service. This would complement and improve the current static national

summative evaluations conducted to evaluate government services in general.

6.5. Improving E-government Service Evaluation in Rwanda

The main research question of this thesis is: *How can e-government service evaluation be improved in Rwanda?*

E-government service evaluation improvement requires process changes. In the case of Rwanda, this research suggests an evaluation process redesign which uses user feedback and involves service providers in evaluating qualities of services. The changes in the process redesign take into consideration the fact that providers' current focus is on availing services from which most citizens benefit, mainly with the assistance of intermediaries, due to socioeconomic conditions in Rwanda. The improvement this research suggests is the use of user input through service evaluations.

In the present research, the suggested evaluation process redesign is explained through the Rwanda Online Service Evaluation (ROSE) approach. The user feedback on services is the evaluation input fed into ROSE which then processes it and provides an output. The output is the information that reflects the qualities of services. The different e-government stakeholders play different roles in evaluations. In the case of Rwanda, the stakeholders are users or organizations providing services, organizations involved at the policy, managerial, and regulatory levels, and service developers. In the suggested evaluation process the organizations can play the role of evaluation owners or actors.

Thus far the regulator – the RGB – leads evaluation processes and makes recommendations to service providers regarding what to improve. This research suggests changes in the providers' role. Service providers in Rwanda have service delivery responsibilities, however the improvement recommendations are provided by the RGB. The present research suggests that there be some changes required in the service evaluation process in order to cater for providers' role as well as capacity redefinition. The changes would allow providers to participate in designing and conducting evaluations which would provide them with instant and direct access to information from users, which would in return inform service improvement. Providers' involvement in the evaluation process comprises the designing stage and is likely to increase their ownership of the process as well as their use of evaluations. Involving providers in evaluations is judged to be important as they are the ones who are responsible for service development and delivery, and having user feedback on services readily available is an opportunity to use that

feedback in service improvement or design. This would be an improvement on the present situation, where only summative evaluations are conducted with large intervals between them. In the current situation, the improvement recommendations are provided depending on when the RGB evaluates a service. The RGB does not evaluate all the services every year, it only evaluates services in a sample of organizations. This research suggests that service providers should not only rely on the RGB evaluations, but that they should also conduct formative evaluations for operational purposes and to complement the RGB's summative ones. In the present research, such providers are the City of Kigali and the Office of the Registrar General. The suggested changes could also benefit service developers such as Irembo Ltd., who design and develop services for the one-stop e-government service portal. Service providers and developers would conduct regular formative evaluations to improve service design and delivery, while other government organizations responsible for monitoring, evaluation, regulatory and coordination, such as the RGB, and RISA, would carry out summative evaluations as their responsibilities require.

The existing evaluation method involves providers as receivers of improvement recommendations from summative evaluations. However, service improvement requires continuous evaluation in order to keep track of service development and to undertake corrective and improvement measures by those responsible, namely service designers and providers, as soon as they are required. As the RGB conducts service delivery evaluations to ensure the quality of service, it would also be the appropriate organization to make decisions regarding the suggested evaluation process and advocate for facilitating organizations' capacity and role redefinition. This would lead to having a common evaluation method, such as ROSE, for use by the RGB, service providers, service developers and other organizations. The use of a common method for evaluation was found to be one of the ways to motivate providers to conduct evaluations, as they will be assessing themselves using the same method as the national evaluator. In this way, organizations will be incited to improve services so as to rank better in the national summative evaluations, which will in return have a positive impact on the quality of services and on user experience.

Given that the services under consideration are provided online and that Rwanda faces challenges regarding e-government due to having a limited number of direct users, this research's insights pertaining to evaluation process redesign are partly conveyed through an online service evaluation ap-

proach, ROSE. ROSE targets those who are online, asking them to participate in evaluations, and provides the relevant organizations with the results. The evaluation results would then inform decisions on service improvement and future service development.

Based on the findings from the studies conducted, this research provides practical guidance on how e-government service evaluation can be improved. The research process leading to answering the main research question is summarized in Figure 6.5.
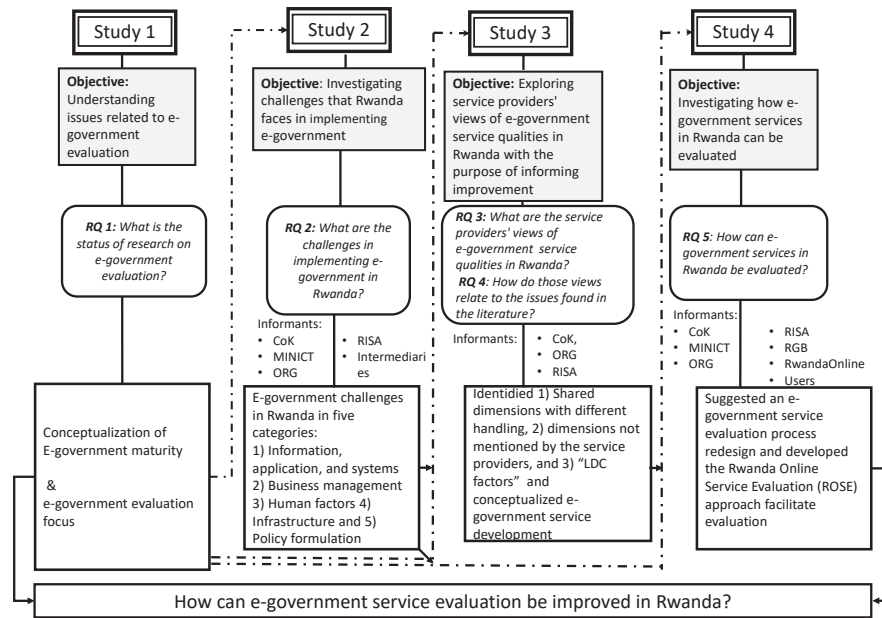
Figure 6.5. Summarized research process

In summary, to improve e-government service evaluation, the present research suggests an evaluation process redesign. The process is explained through a system consisting of a social artifact, a technology artifact and an information artifact. The social system is comprised of users and service evaluation owners or actors at the national, sectoral, and organizational levels. The information system consists of users' input into and output from evaluations. The technology artifact facilitates the design of evaluations, provides users with access to take part in evaluations, allows evaluators to view the evaluation results, and forms the information processing and storage

component as well as the channel for information. The suggested changes would allow conducting both formative and summative evaluations.

6.6. Research Limitations

One research limitation is that the developed online service evaluation prototype was tested with users from the University of Rwanda. Students' views may differ from those of other users with different characteristics such as education level and age. Another limitation was due to the organizational conditions beyond the researcher's control. The suggested online service evaluation approach was tested with managers and users, and the refined version was provided for use to an organization that was interested in using it. During the second test, there were technical problems related to service delivery and the organization opted to postpone the evaluation in order to first solve these problems. Due to time limitations, it was not possible to undertake the test again. However, this was an indication of the need to test the suggested evaluation approach, to appreciate its use and requirements in a real-life organizational context.

7. Conclusions and Discussion

In this chapter, I present the main conclusions from the present research and discuss their implications. I then share reflections on using design science research (DSR) as the research approach as well as present the research contributions and their implications. Lastly, I provide suggestions for further research directions.

7.1. Main Conclusions

The findings from empirical studies indicate a number of problems in relation to e-government implementation in Rwanda. Service providers prioritize availing services online, though they are yet to invest in evaluating the quality of services. At the national level, an evaluation of the quality of e-government services is not conducted and there exist no measurements available for use. Service evaluations conducted by the Rwanda Governance Board have so far included only the number of electronic government services: 44% of public sectors services (RGB, 2018c). The RGB's evaluations target citizens in general, while there is a limited number of direct users of e-government services from the citizenry. In addition, evaluations are top-down, from the RGB down to providers. The RGB reaches out to citizens for evaluations and then, from its evaluation results, indicates the improvement areas to service providers. The RGB evaluations are, at most, conducted annually, which also indicates a lack of timely user feedback to providers for service improvement.

To address these problems, the present research poses the question: *How can e-government service evaluation be improved in Rwanda*? This thesis suggests that the improvement requires redefining evaluation tasks, how those tasks are conducted, and the roles of the involved stakeholders. From the results presented in the previous chapter, the present research concludes that the improvement of e-government service evaluation in Rwanda requires evaluation process redesign. This process redesign consists of:

- Informational changes by using the user feedback on services as input to the evaluation
- Changes in the social aspects by involving stakeholders in evaluation. This consists of involving users as the source of information,

providers and other organizations such as developers as parttakers in designing and conducting evaluations for use in service improvement

- Using a technology component to facilitate information and social changes to take place thus providing for regular formative evaluations by providers and developers and for retrospective summative evaluations by national organizations such as RGB.

The evaluation process redesign calls for changes to improve evaluation. Firstly, at the national level, there is a need for the RGB – as the leading organization in charge of service quality – to establish how e-government services will be assessed at the national, sectoral and organizational levels. The present research suggests an evaluation process redesign that could guide such an initiative. The use of similar methods is key for motivating organizations to conduct evaluations that would allow them to improve the qualities of services in such a manner that the RGB would also be able to recognize the same results. As the RGB evaluations are used to rank organizations at the national level, each organization would be motivated to assess its own services through formative evaluations and take the necessary corrective measures on a regular basis, between the RGB's summative evaluations. This would also be of interest to the RGB, as service providers would not wait for the RGB recommendations but would instead actively, and based on users' feedback, improve services.

Secondly, at the organizational level, service providers who are the developers of services are the drivers of changes in quality of those services. Although the RGB guidance is important for motivating service providers to start formative evaluations, the understanding of the usefulness of evaluations by providers is a key determinant of whether evaluations will actually take place. These organizations are the ones responsible for service development, and subsequently, of service improvement. Unless providers are directly involved in service evaluations it will be difficult, if not impossible, for evaluations to inform service improvement in a timely manner. Providers also strive to improve their ranking in the national evaluations undertaken by the RGB. If organizations use the same evaluation methods as the national evaluator who ranks them, organizations would likely increase their interest in conducting evaluations and using them for service improvement. The improvement of quality of services will result in positive feedback

from users, which would also motivate organizations. Ultimately, conducting and using formative evaluations would be beneficial to the service users, providers, and other evaluators.

Thirdly, it is also worthwhile to highlight that for these evaluations to be effective, the information has to be collected from the appropriate source. These are service users, who from their own experience have information on service quality and service delivery. Even if the RGB puts in place evaluations mechanisms and providers are interested in conducting evaluations, there is still a need for users' involvement to avoid hypothetical evaluations. In other words, the service users are equally as important as those conducting evaluations.

7.2. Discussion

This thesis suggests a process redesign to improve e-government service evaluation in Rwanda. The proposed process requires changes in the social actors involved, in their roles, and in the use of technology to improve information flow among the actors. This section discusses the implications of the changes of the process redesign.

7.2.1. Formative and Summative Service Evaluations

Normally the RGB bears the responsibility for monitoring service delivery and citizens' perception of service delivery at the national level. What this research suggests is to redesign service evaluation processes to include service providers and developers as partakers. This would allow for providers and developers to be in direct contact with users and thus to access feedback on services for operational purposes. Providers and developers would then use the feedback to inform service development and delivery.

As the service evaluation has been conducted by the RGB – as part of its mandate – the suggested process redesign would require changes to guidelines regarding who takes part in evaluations, who can access users for feedback on services, and for what purposes this is done. The change in the organizations' role in evaluation would also require the organizations to be introduced as partakers, and to have the capacity to conduct and use evaluations. This change might be challenging for organizations as it might not be straightforward to identify what to improve and how to do so, compared to the current practice where organizations follow the RGB's recommendations. Human and financial capacities required by the new organizations to undertake evaluations would also require support from the central govern-

ment. This would result in additional responsibilities for providers and developers, however it would be for a good cause as the providers and developers will be able to regularly take improvement decisions based on direct instant user feedback. The RGB and other organizations responsible for monitoring services would still conduct evaluations for retrospective views. In this manner, the RGB's summative evaluations as well as other organizations' formative evaluations would be complementary. If the formative evaluations are conducted, it would be of benefit to providers who will have instant access to user feedback for service improvement. If the results of formative evaluations are used, users will access services with better quality. If formative evaluations are used, RGB would also be able to see, in its summative evaluations, the changes in citizens' perceptions regarding service delivery. The suggested evaluation process redesign relies on user involvement, which is discussed next.

7.2.2. User Involvement Considerations

User participation literature highlights positive aspects of user involvement in IS development, however there are also problems associated with user participation (Holgersson et al., 2018). Heeks (1999) discusses these problems, including not considering the context, ignoring the fact that participation is a change that requires financial and human resources, and inefficient participation. To avoid these and other problems, Heeks (1999) suggests three questions to examine when considering participation: 1) what is the political and cultural context? 2) who wants to introduce participation, and why? and 3) who is participation sought from? Do they want to, and can they, participate? These questions are analyzed in view of user involvement in the suggested evaluation process redesign.

What is the political and cultural context?
In Rwanda, services are delivered by different organizations, depending on their responsibilities. For instance, the construction permit service is requested through the building permit management information system accessible through the City of Kigali's website, the business registration service is accessed via the website of the Office of the Registrar General, and national ID cards, birth and marriage certificates are requested through the "Irembo" platform. The latter is aimed to be Rwanda's e-government one-stop service portal. Evaluation of services is undertaken by the RGB, as it is the organization with the mandate to monitor service delivery and citizens' perceptions of service delivery. This indicates that service delivery processes

are decentralized, while the evaluation is centralized at the national level. On one hand, centralization of evaluation is useful for monitoring the progress at the national level, as it allows the country to assess her achievement in relation to the set goals in general. The RGB is allocated resources to perform evaluation activities, among others, and its recommendations are highly regarded by organizations. This is the common approach to service evaluation in Rwanda. On the other hand, service providers lack instantaneous information on which to base service improvement. The RGB recommendations are indicative of the areas of improvement in general, though they do not include details specific to each of the services. In addition, organizations included in the RGB sample are the ones that receive improvement recommendations. The RGB does not evaluate each individual service every year. This is likely to continue to be the case when e-government service evaluation will be conducted by the RGB. Therefore, the e-government service evaluation process that this research suggests emphasizes evaluations at the decentralized level in addition to the centralized level. The suggested changes demonstrated through the use of ROSE would cater for both decentralized formative evaluations, to serve the organizational operational activities, as well as centralized summative evaluations for the general service monitoring activities.

Who wants to introduce participation, and why?
The present research suggests user involvement in evaluation. This suggestion is presented to organizations that would play an important role in introducing participation in practice. They include policymakers, regulators, and potential evaluation users such as service providers and developers. The testing of ROSE to convey the evaluation process changes was undertaken with senior managers in those organizations. This was due to the fact that although those senior managers had given permission to work with their employees to inform the present research, those managers are the ones who drive change in organizations. The practice they are interested in is the one they would advocate for and is, therefore, the one that is likely to be implemented. The backing by the senior managers would also provide for the required financial and human resources from the central government, required to implement the changes suggested by the evaluation process redesign. In the present research, the reasons for introducing user participation in service evaluation are driven by the interest to satisfy the lack of instant information on which to base service improvement activities – the infor-

mation users would have from their experience. Once again, senior managers are the ones who would support user involvement in organizations. For instance, in the present research the senior managers have confirmed the lack of instant information and also that user involvement would contribute to availing such information for decision making regarding service improvement. This is a starting point for improving evaluation and services.

The motivation to introduce user involvement is another important aspect. User involvement may be considered a good practice, recommended for understanding users' views (Omeni et al., 2014), or as citizens' democratic right. Even if users may not be involved as a design best practice, such participation is a right. Citizens have the democratic right to be involved in what is done for them. These two motivations can complement each other. For instance, services may be developed and made available for use online, in which case citizens may have no choice but to use them. In some cases, offline services may be available as an alternative option. In other cases, when services are availed online the offline options are no longer available. The latter could be considered as mandatory use of e-government services. In the case of Rwanda, while at the outset services were being offered through both channels, the trend is that government services that are available online can only be accessed via the online channel. This option could partly be justified by the fact that given the high cost involved in delivering services online, the country may not be able to afford providing offline services in parallel. In this case, though the user involvement advocated for as a good practice may have not been observed due to a variety of reasons, involving users – who can and are willing – in evaluations, would contribute to complying with citizens' right to participate in that which is done for them. However, it is important to note that though advocated for, user involvement requires balancing government objectives and users' needs, in order to avoid tensions (Kotamraju & Geest, 2012). User involvement implies addressing their needs, which may not necessarily be the government's priority. For instance, a category of citizens may require improved quality of services, while the government priority is to increase the number of online services. The government would, therefore, have to balance the needs of involved users and its vision of online service delivery.

Who is participation sought from? Do they want to, and can they, participate?
In the suggested evaluation process, participation is expected from citizens who use services themselves, as well as the intermediaries who assist citizens to access services; both are referred to as users. With the use of ROSE, which

is an online evaluation, involvement is sought only from those who are online, where the services under consideration are provided. The use of ROSE would, therefore, involve those with the ability to participate. This can, for instance, be done online right after service use. Besides ability, the willingness to do so is also important. Participants should be provided with reasons for why they should participate. As participation requires some effort, users are likely to participate when they understand what the benefits are. Explaining those benefits could be an aspect about which awareness ought to be raised as evaluations are introduced.

At the initial stage, user involvement in evaluations would focus on providing opportunities to those who are able to participate. In Rwanda, citizens in general benefit from online services mainly through intermediaries: private consultants and "Irembo" agents, where the latter are estimated to number four thousand. This accounts for the fact that citizens accessing services directly are still limited in number. However, the limited number of users is not a problem for evaluation. It rather presents an opportunity that evaluators could exploit as next users will likely face the same problems as the relatively few current ones. In this manner, service providers will be better prepared to serve more users. The number of citizens able to participate will grow as more services are placed online and more citizens become users. Moreover, those who may not be aware of their right to participate now may eventually demand to participate in the future. At a later stage, evaluation could also consider involving other e-government service beneficiaries from the general population. However, this would be more challenging as a large portion is not yet using e-government services and would have difficulties to understand and assume their role in evaluation. Other strategies would need to be devised for user participation.

In general, the earlier the users are involved the better. This will get the providers to improve services and be ready to serve eve more users. It is therefore timely to advocate for user involvement so as to consider it from the very inception of evaluations. Lastly, evaluations would mature as the services and users increase in number.

7.2.3. Transferability of Findings to Other Countries

In their e-government development, LDC face common socio-economic challenges including the lack of sufficient infrastructure and end-user illiteracy. Consequently, these countries tend to focus on service access and use intermediaries as a means to address some of those challenges. These views and practices could be advanced by paying attention to the quality of service

in addition to service usability. Experiences from countries with advanced practices could serve as lessons to make use of. This would allow LDC to leapfrog some of the development stages, allowing them to move faster than the developed countries were able to when some resources, such as technology, were not as readily available for use as they are today. Nonetheless, LDC will have to consider other countries' experiences in a contextual manner, to ensure a fit with their conditions. The conceptual framework illustrated in Figure 6.3 places e-government service development in a general context by incorporating international research, best practice, user input, and providers' focus on contextual factors. The e-government service evaluation process redesign detailed in Study 4 is built on that conceptualization. Some of the aspects of the e-government service evaluation process redesign suggested for use in Rwanda could also easily benefit other countries, while others could not. For instance, ROSE could be customized for use in evaluating services in another country while the interest in giving service providers more room to evaluate and improve services would vary from one government to another. In general, service providers' focus on e-government service development would be improved by considering international research, best practice, and user input. Further, the commonalities among LDC would suggest that the findings of the present research regarding improvement to e-government service development in Rwanda would be relevant for use in other LDC. For instance, as a way to start improving service development, countries would start by informing themselves about the gap that exists between its focus in service delivery and the international best practice. They could then use the findings of the present research in a contextual manner. Though LDC have commonalities, each country has its own particular features: governments are different and have different political and organizational culture traits that are different from Rwanda's. Such traits suggest that countries would benefit from the present research findings in a different way, depending on the similarities and differences they have with Rwanda.

7.3. Reflections on the Experience of Using DSR

The present research has used the design science research (DSR) approach (Hevner, March, Park, & Ram, 2004) and was guided by the DSR methodology proposed by Peffers et al. (2007) to study e-government service evaluation in an organizational setting in Rwanda. Design science research has contributed by providing an approach to investigate the main research question: *How can e-government service evaluation be improved in Rwanda?*

DSR guided the understanding of e-government service evaluation in its social context and lead to the suggestion of an evaluation process improvement.

Using DSR was beneficial as it guided the present research in building the foundation of designing, developing, and testing an evaluation process to address the e-government service evaluation problems in Rwanda.

Initially, the DSR methodology provided an opportunity to identify the research problem of "a lack of e-government service evaluations" and also to receive feedback from the e-government actors in Rwanda, stating that the problem was important to their practice and that there was no guidance for addressing the problem. The involvement of organizations from the early stages of research, provided for by DSR, contributed to their willingness to participate in the further stages of problem-solving. Involving organizations in the further steps of research contributed to generating missing knowledge regarding the problem domain and contextualization of possible solutions to the evaluation problem. This contextualization was important, as it guided the research in suggesting solutions that are adapted to the organizations and the staff of those organizations.

The iterative process provided by DSR was useful for the collection of views on the initial suggestions regarding a solution. It then provided for a better understanding of the problem in its context and for the refinement of the service evaluation approach to fit in the organizations involved in Rwanda. The suggested evaluation process redesign was tested through the developed artifact. This analysis of the use of the artifact generated positive feedback from users, service providers, and service developers, and regulators expressed their interest in using such an approach to conduct evaluations at the national, sectoral and organizational level.

The research process was useful for practitioners to gain an enhanced understanding of e-government service evaluation. They were happy with the suggested process redesign and the concrete ideas on how it could be used in Rwanda. The process that this research followed could be replicated in other developing countries in order to inform and guide their development. There was, however, a challenge when following DSR in the present research, in relation to understanding the problem domain. The present research had to rely mainly on the fieldwork conducted as literature on e-government in Rwanda and its evaluation was scarce. Getting in touch with service providers was important for understanding the activities related to service delivery, however, most of organizational reports are not published and could not be used as references in the present work, with the exception of the RGB reports. Every inquiry had to be channeled to the organization.

The RGB reports that are published are on service delivery in Rwanda in general, and as explained earlier they do not yet include quality of e-government services.

At the stage of evaluation, there was another interesting experience in relation to using DSR. After refining ROSE, it was made available for use to one organization that was interested in taking the evaluation process further. However, in the process of service evaluation, technical problems in service delivery emerged, and the organization decided to postpone the evaluation to first solve the problem. On one hand, this can be taken as a "good" experience of how the fact of having evaluations makes providers aware of the fact that they have to provide quality service. This could be an indication that self-evaluation would lead to improved services; providers would not be satisfied with negative feedback and they would thus be incited to better their services. On the other hand, the technical problems that interrupted the evaluation would indicate the need for implementing the suggested evaluation process redesign in a real organization to see how the evaluation process would actually unfold in a real-life context.

7.4. Research Contributions and Implications

This section presents research contributions and their implications for policymakers, practitioners, and researchers.

7.4.1. Theoretical Contributions

Theoretical contributions in IS research are in a variety of forms. Presthus and Munkvold (2016) summarize those contributions to theory in 13 types. They include concepts, constructs, rich insights, case studies or action/field studies, frameworks and taxonomies, problem-solving research methods, propositions, generative mechanisms, hypotheses, models, mid-range theories, design theories, and grand theories. The theoretical contributions of the present research are twofold. They are 1) the frameworks, conceptually supporting both the analysis and discussion and 2) the suggested evaluation process redesign demonstrated through building a technological artifact guided by DSR.

Frameworks. This research has contributed through the developed frameworks. The e-government maturity model (see Figure 6.1) could guide the analysis and discussion of e-government and its evaluation based on constituting components. Both the evaluation object and stakeholder reflect e-government maturity; they both grow over time and evaluation indicators

emanate from them. The evaluations indicators are also influenced by the point in time at which the evaluation is conducted.

The framework for e-government service development (see Figure 6.3) that guided the analysis and discussion of e-government evaluation in view of service development in Rwanda is another contribution. As e-government is influenced by factors including the technical systems, the organizations using those systems, and the stakeholders, and as these factors were taken into consideration when studying e-government evaluation in Rwanda, the e-government service development framework in Figure 6.3 could also be used to study e-government service development in other countries.

The evaluation process redesign. The proposed evaluation process redesign consisting of changes in the information and social components supported by the technology component is another contribution. This research has followed clearly defined steps in a problem-solving process – the DSR methodology – consisting of six steps: problem identification and motivation, defining the objectives for a solution, design and development, demonstration, evaluation, and communication (Peffers et al., 2007). The process that the research followed is a contribution to understanding e-government service evaluation as well as how it can be improved. The process has resulted in suggesting an evaluation process redesign based on an IS artifact concept. All the three artifacts interact to support service evaluation. The main changes are effected in the information and social components, while the technology component facilitates the occurrence of those changes. The process that the present research followed is a contribution to the problem-solving process and could be used to study e-government service evaluation in other contexts.

7.4.2. Contributions to Practice

This research provides some practical contributions to Rwanda, which is still in its initial phases of delivering integrated e-government service. Practical contributions are made to research stakeholders, organizations involved in service development, delivery, and evaluation. This research contributes to raising the awareness of policymakers, managers, and practitioners regarding e-government development in general, e-government challenges that need attention, the importance of e-government service evaluation and its use, and evaluation considerations.

The use of DSR brought together varied actors of e-government in a problem-solving process in order to address problems for themselves. This is not common in resource-constrained contexts with many international

aid organizations who normally make decisions regarding what happens, how it happens, and when. This thesis contributes by showing how DSR can be used to understand and solve problems through the design, development, and evaluation of an artifact.

This thesis also suggests changes in the social construct of evaluation by introducing service providers and users as active actors in conducting and informing evaluation respectively. The changes in the social construct go along with changes in the information and technology artifacts as well. This thesis highlights the role of service providers in improving the qualities of services informed by user input through evaluations. The changes in the social, information, and technology components would guide the practitioners regarding which aspects require more attention, with regard to service evaluation.

The suggested process redesign is new to Rwanda. The recommended changes demonstrated through ROSE provide guidance to organizations on how to design evaluations and access timely information that illustrates users' views of the services. The involvement of different actors as well as the suggested evaluation approach did not exist prior to this research. By implementing these the results of evaluations would serve as evidence for the decision-making process regarding e-government service improvement and thus inform improvement actions.

Though the empirical evidence used originates from Rwanda, this research can be relevant to other countries, such as LDC, by serving as a reference when embarking on evaluating their e-government services, as many contextual aspects may be similar.

7.4.3. Contributions to Research

The present work contributes to research in different ways. It contributes to the body of knowledge of e-government by adding Rwanda's case. Prior to this research there was no empirical literature on e-government in Rwanda. This research has contributed to this field through the conducted studies informed by evidence collected from Rwanda, by observing the happenings there, by interacting with e-government stakeholders, and through my personal experience as a Rwandan.

The conceptualization of e-government development and the suggested evaluation process redesign can serve as references for further studies on e-government and its evaluation either in Rwanda or in other contexts as it may be fitting to such needs.

Lastly, as this research required and benefited from the partnerships between Örebro University, the University of Rwanda, and RISA, this research can be an opportunity for further collaboration in further research on topics including but not limited to e-government.

7.4.4. Research Implications

This research has implications for policymakers, for practitioners, and for researchers. Regarding policy decisions, as the present research raises awareness about the importance of conducting e-government service evaluations, the improved understanding of that importance may lead to policymakers deciding to prioritize e-government service evaluation and putting in place regulations that would prioritize and facilitate organizations when conducting evaluations.

The present research suggests an evaluation process redesign that could guide e-government practitioners in conducting service evaluation at national, sectoral and organizational levels, in which both the service users and providers play active roles. This research could contribute to the success of e-government, as a result of conducting service evaluations that improve user satisfaction. The ROSE approach could be considered for use as a starting point to realizing the proposed service evaluation process redesign.

For research, the implications of this thesis may build on the fact that there exists limited literature on e-government in Rwanda and on e-government evaluation in LDC. The e-government maturity model in Figure 6.1, as well as the framework for e-government service development in Figure 6.3, could be used to further study the e-government evaluation phenomenon. As such, the present work may be a foundation for more studies on e-government and its evaluation in Rwanda and other LDC with similar socio-economic preconditions. This work may also be a reference for the use of DSR as a methodological approach in a search for solutions through building artifacts.

7.5. Concluding Remarks

Rwanda has ambitious goals for e-government. However, challenges hampering her e-government development exist, and need to be addressed for the goals to be reached. This thesis took steps towards understanding and addressing some of the e-government evaluation challenges. This research found some deficits in the e-government service evaluation process and therefore suggests a process and an approach to remedy the situation. The

suggested remedy considers that effective evaluations require the involvement of users and that timely information for service improvement is accessed when the service providers take part in evaluations. The evaluation process redesign is explained in terms of three components: information, technology and social artifacts. The changes in the evaluation process are demonstrated through an evaluation approach called ROSE. As the test situation of ROSE in the present work is similar to a laboratory setting, further research could examine the feasibility, effectiveness, and efficiency of the suggested evaluation process in organizational settings. This research has focused on the web-based e-government services used in Rwanda. Given that the citizens of Rwanda and other similar countries access mobile phones more than computers, to complement the present work, further research could explore the evaluation of e-government services which are delivered through mobile phones. Future research could also investigate the use of e-government service evaluation in LDC contexts.

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