E-Government and Value Creation in the Context of a Least Developed Country

To my family

Örebro Studies in Informatics 16

JEAN DAMASCENE TWIZEYIMANA

E-Government and Value Creation in the Context of a Least Developed Country

A perspective on public value and information infrastructure

Title: E-Government and Value Creation in the Context of a Least Developed Country
A perspective on public value and information infrastructure
Publisher: Örebro University 2019
www.publications.oru.se

Print: Örebro University, Repro 11/2019

ISBN 978-91-7529-310-3

Abstract

Jean Damascene Twizeyimana (2019): E-Government and Value Creation in the Context of a Least Developed Country: A Perspective on Public Value and Information Infrastructure. Örebro Studies in Informatics 16.

This thesis is in the field of information systems (IS), more specifically about IS impact. This thesis uses literature review and interpretive case study methods to investigate the phenomenon of value creation through e-government.

The research was carried out from 2014 to 2019. Data was collected through interviews, participant observations, and document review. The main research question is "How do we create value through e-government in the context of an LDC?" It embodies the sub-questions: what is the value of e-government? And how do we attain such value?

This thesis comprises four studies.

The thesis found that value creation of e-government is a process of understanding: the value that e-government creates; the context in which e-government resides because a process involves a context; and strategic actions to create that value within the context surrounds e-government.

From the findings, this thesis argues that the value of public affairs including e-government refers to public value. The latter would mean citizens' collective expectations about public policies and services. Also, the findings reveal research needs about the public value of e-government in the LDCs in Sub-Saharan Africa and on methods of measuring and creating the public value of e-government.

As original contribution, this thesis suggests a framework of six overarching and overlapping areas of e-government for the public value. The anticipation-reality gaps and their inter-relationships are identified, and five inter-related critical success factors are suggested. Also, the information infrastructure (II) framework, particularly, the notion of the cultivation of the installed-base is suggested as a promising avenue in the management of the public value creation in general, and in an LDC in particular.

Keywords: E-government, value creation, public value, information infrastructure, LDCs, installed-base, Rwanda

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Acknowledgements

Foremost, my thanks will go to the Almighty God. Jehovah-Jireh, Genesis 22:1

In choosing who to include in this section, I found it difficult to include all the people who supported me along this journey. I owe a thankful message to the following characters.

My sincere thanks to my main supervisor, Professor Annika Andersson. Annika is more of a mentor than a supervisor. She trusted me as a mature researcher and that produced fast results in the writing process and publications. Trust is the key in any business. On this occasion, I would like to thank Professor Åke Grönlund in his role as a team leader for the cooperation between Örebro University and the University of Rwanda. He provided all the support that I needed for publishing and attending academic seminar events. In addition to that, he was my main supervisor for the first three years. Of course, I cannot forget to thank my co-supervisor, Hannu Larsson, for his humbleness, time, and constant fruitful comments and insights.

I would like to thank my fellow PhD students and lecturers from the informatics department for their support and for creating a conducive environment. Surely, I cannot forget the administration team at Örebro University School of Business for making it feel like home. I would also like to thank Henrik Broborg for his kindness and support.

Also, I would like to thank my family starting from my wife, my sons Asher and Axel, and my brothers Theophile and Eugene. My gratitude is extended to Maman Claire Ausloos and Jacqueline Depiesse.

Finally, I would like to thank the Swedish Development Agency (SIDA) on behalf of Swedish people, the Örebro University School of Business, and the University of Rwanda for providing me with invaluable opportunities. Thank you all who supported me in any way.

Jean Damascene Twizeyimana, Örebro, December 2019

List of Papers

Study 1

Twizeyimana J. D., & Andersson, A. (2019). The public value of E-Government – A literature review. Government Information Quarterly, 36(2), 167-178. doi:10.1016/j.giq.2019.01.001

Study 2

Twizeyimana J. D., & Andersson, A. (2019). The public value of e-Government: anticipations in the IREMBO project in Rwanda – (Under Review)

Study 3

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

Study 4

Twizeyimana J. D. (2019). Towards Realization of the Public Value of e-Government: anticipation-reality gap and critical success factors in the context of Rwanda– (Under Review)

Abbreviations

ASPA	American Society for Public Administration
CSFs	Critical Success Factors
GoR	Government of Rwanda
ICT	Information and Communication Technology
IS	Information Systems
II	Information Infrastructure
IT	Information Technology
KPIs	Key Performance Indicators
LDCs	Least Developed Countries
MIS	Management of Information Systems
PPP	Public-private partnership
ROLP	Rwanda Online Platform
RQ	Research Question
UAT	User Acceptance Testing

Terms and definitions

An Information Infrastructure (II): "a shared, evolving, heterogeneous installed base of IT capabilities among a set of user communities based on open and/or standardised interfaces" Hanseth and Lyytinen (2004).

Context: noun: context (or contexts in plural) - refers to the situation within which something exists or happens, and that can help explain it ("context," n.d.).

Digitalisation: according to Gartner, Inc. and Wikipedia contributors (2019, October 26), digitalisation is the use of digital technologies to change a business model and provide new revenue and value-producing opportunities, the process of moving to a digital business, changing from analogue to digital form.

Government: a government is the system or group of people governing an organised community, often a state. In the case of its broad associative definition, government normally consists of legislature, executive, and the judiciary Wikipedia contributors (2019, October 23).

Least Developed countries (LDCs): are countries that have the lowest gross national income, weak human assets and the highest degree of economic vulnerability ("United Nations Department of Economic and Social Affairs," n.d.).

Public: relating to or involving people in general, rather than being limited to a particular group of people ("public," n.d.).
In this thesis, the notion "public" is understood as citizens in their different stakeholder roles which include, e.g., citizens as such, as tax-payers, as civil servants, as clients, as users (Castelnovo, 2013).

Public Administration: public administration, public service or the civil administration refers to the management of public assets, including operations at municipal, county, regional and state level (Bannister & Connolly, 2014).

Public sector: according to Wikipedia contributors (2019, October 25), the public sector is the part of the economy composed of both public services and public institutions.

Public service: a service rendered to the public by elected, appointed, or hired officials; for the benefit of the public, but not for profit (Cambridge Dictionary). A public service is usually provided by government to people living within its jurisdiction, either directly (through the public sector) or by financing provision of services - Wikipedia contributors (2019, October 12)

Public value: citizens' collective expectations from their government's policies and actions (Moore, 1995). Among others, citizens also expect better living style 'wellbeing', better service delivery, government, the efficiency of their government, and stewardship.

Technology: according to Wikipedia contributors (2019, October 26), technology is the collection of techniques, skills, methods, and processes used in the production of goods or services or the accomplishment of objectives, such as scientific investigation

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1. Introduction

The world we live in today, going technology, including information and communication technologies (ICTs), is becoming more and more a lifestyle. The advent of the internet, its associated technologies and applications, have brought in and institutionalised new models and innovative ways of performing an activity (Ndou, 2004). In fact, technology revolution in general, and ICTs-driven technology revolution in the context of this study, is becoming unavoidable for a private or public institution to stay competitive and responsible, all towards satisfying the public out there in their increasing needs because of the dynamic world we live in, or because of this rapidly changing technological framework.

The research and practices about the adoption of today's modern computer technologies by the government (public administration) are under the domain known as "E-Government". In this regard, it is also important to acknowledge that technology in general, and e-government in this study, is not value free, rather, its design and/or implementation is driven by the value that the adopters want (Bannister & Connolly, 2014).

1.1. Research Scope

In a competitive environment like today, creating value is what distinguishes one business entity from others, and puts one business entity above others. Something is more important if it is value-creating; otherwise, it would have little purpose. Today, managers who dare express that they are creating value, such expressions are making them look wise, pro-active, and promising in their respective businesses.

This thesis is positioned in the field of e-government research, a subdomain of Information Systems (IS) research. The object of study is the value creation of e-government projects in the least developed country context. More specifically, a special focus is put on a clear understanding of value creation of e-government (e.g., type and/or dimension), and arrangements or actions towards e-government value creating in the context of a least developed country by an example of a case study in Rwanda.

With such focus on value creation of e-government within the context by which they are implemented, this thesis falls into the IS research on the tier of impact (direct or indirect, intended or unintended) of IT artefact on the humans who directly (and indirectly) interact with them, structures and contexts within which they are embedded, and associated collectives (groups, work units, organizations).

1.1.1. Information Systems (IS) Research

Information Systems (IS) research is concerned with the study of IT artefacts, the understanding of (1) how IT artefacts are conceived, constructed, and implemented; (2) how IT artefacts are used, supported, and evolving; and (3) how IT artefacts impact or are impacted by the contexts in which they are embedded (Benbasat & Zmud, 2003). In other words, IS research is into i) managerial, methodological, and technological capabilities and operational practices involved in planning, designing, constructing, and implementing IT artefacts; ii) the human behaviours reflected within, and induced through the planning, designing, constructing, implementing, and direct or indirect usage of these artefacts; iii) managerial, methodological, and operational practices for directing and facilitating IT artefact usage and evolution; iv) as a consequence of use, the impacts (direct or indirect, intended or unintended) of these artefacts on the humans who directly or indirectly interact with them, structures and contexts within which they are embedded, and associated collectives such as groups, work units, organizations (Benbasat & Zmud, 2003; Orlikowski & Iacono, 2001).

It is necessary to recognise that a focus on organisations is prominent in IS research and practices if we can compare to groups or work units. Hence, in a nutshell, research or practices into designing, deploying, implementing, and evolving modern computer technologies in organisations belong to that thing or "domain" labelled "Information Systems" also shortened as "IS".

In this research, the focus is on modern computer technologies in public organisations, that is, the focus is on the "e-Government", a subdomain of IS.

1.1.2. E-Government

E-government is commonly understood as the use of ICTs by the public administration or government (Fang, 2002; Field et al., 2003; Grönlund & Horan, 2005) for, among others, achieving a better government (Field et al., 2003); improving efficiency and the delivery of public services (Field et al., 2003; Grönlund & Horan, 2005; Guida & Crow, 2009; Heeks, 2002; Ndou, 2004; Rose, Persson, et al., 2015); and for providing many opportunities for citizens to participate in the government activities and management (Fang, 2002; Field et al., 2003).

The term e-government is the most used, but also in some cases, the terms E-Government, E-Governance, and Digital Government are often used interchangeably (Grönlund & Horan, 2005) because of the multi-disciplinary nature of the field of E-Government. It would involve various domains,

mainly, public administration, social science, political science, management, computer science, IT, and information systems. For example, political scientists tend to use the term E-Governance, IS researchers tend to use the term E-Government, and data scientists tend to use the term Digital Government. While not intending to promote one of the terms and undermine the others; in this research, the term "e-government" is used.

Like Benbasat and Zmud (2003) nomological net for the IS, Grönlund and Horan (2005) also argued that in the context E-Government; the "e", role and methods of government, all three need to be in the discussion formula for E-Government. According to them, researchers in the field of E-Government should discuss the implications of IT design and use in government.

1.2. Motivation and the Problem Context

Even though organisations, both private and public, have realised the potentials and competitiveness of modern computer-based technologies (Clemons, 1986); failures and distress in the implementation of IS have been there since the very beginning too (Joshi, 1991). Since then, there is a growing interest in research and practices about IS implementation success. For example, (i) Management of Information Systems (MIS) research, a research domain that sees implementation as the quality of the process of implementation, a view that sees systems implementation as a change process and systems designers as change agents (Ginzberg, 1976, 1981; Zmud & Cox, 1979).

In that view, various research on the change process emerged, they include, the planned-change approach (Kolb & Frohman, 1970; Lewin, 1947; Schein, 1961), the innovation-process approach (Wetherbe & Dickson G.W, 1985), and the socio-technical systems approach (Bostrom, 1980; Mumford & Weir, 1979). Secondly, research with goals to come up with approaches that can guide explanations of sources of implementation failures (Joshi, 1991), research with goals to come up with models of success which can be used in planning and evaluation , research about challenges and critical success factors in implementation of Information systems and E-Government systems; and research with ambitions to understand the implementation process (Ginzberg, 1976, 1981; Zmud & Cox, 1979), and implementation analysis Elmore (1979). Elmore (ibid) has distinguished "forward mapping" and "backward mapping" as two approaches to implementation analysis. Elmore (ibid) suggested "backward mapping" like a better fit when one looks at how things work in practice. According to Elmore

(ibid), the "Forward mapping" approach suggests that a policy implementation analysis starts with a clear understanding of the statement of the policymaker's intent, proceeded with a sequence of more specific steps implementers should be doing at each level of the policy implementation, and then state an outcome, usually in terms of an observable effect on a target population, consistent with the initial purpose of the policymakers. A drawback with the forward mapping approach, it would be interpreted as a mechanism to fit a problem into the solution, a practice that would have limited to offer because it would not match every problem and situation of the policy implementation. Backward mapping is an approach that opposes the forward mapping assumption that policymakers control the organizational, political, and technological processes that affect implementation, where a back mapping approach supports the view is that the implementation process is a political process, whereby managing competing goals, interests, and values of participating groups would dictate the sequence and the direction of implementation (Flak et al., 2009; Joshi, 1991; Markus, 1983; Rose, Persson, et al., 2015). Of course to support Moore strategic triangle idea that public sector performance should be evaluated against the following three primary parameters: the public value, (2) the source of legitimacy and support, and (3) operational capabilities such as financial resources and innovation capabilities to secure that value Moore and Khagram (2004).

In the context of e-government, for more than a decade there has been a global interest in e-government implementations from the West in Africa (Berman & Tettey, 2001; Heeks, 2002; Hornnes et al., 2010; Nkohkwo & Islam, 2013). There is no doubt that such growing interest in E-Government is because of potential, competitiveness, the tangible and intangible benefits that are seen or assumed in e-government. However, this revolution has been seen to be more sustainable in developed countries than in many developing countries (Heeks, 2003).

In his study on e-government development in the LDCs; Heeks (2003) found a high failure rate of e-government projects in the LDCs, with an estimation of 35% total failures (i.e., the initiative was there but never implemented or was implemented but immediately abandoned), 50% are partial failures (i.e., major goals for the initiative were not attained and/, or there were significant undesirable outcomes), and that only 15% are successes (i.e., most stakeholder groups attained their major goals and did not experience significant adverse outcomes).

There are many reasonable explanations about why e-government projects often fail in the LDCs. It has been often mentioned that ICTs and E-government projects often fail in the LDCs because of the implementation of these technologies. They adopt technologies and method tested in the context of the developed world which defer from LDCs. Such importing of modern technologies, which often are, from the developed world would not satisfy the local challenges and conditions (Twizeyimana et al., 2018) . For example, where e-government is seen well-established in developed countries, ICTs and e-government development in the LDCs struggle from various challenges including technical challenges such as lack of adequate e-infrastructure, poor management, high levels of illiteracy in general and in ICTs, lack of or shortage of qualified IT personnel, etc. (Twizeyimana et al., 2018).

In the particular case of Rwanda, a country taken as a case study for empirical investigations, ICTs and e-government face challenges which are mainly in the area of information infrastructure development in the country (ibid).

In their research (ibid), found that in the context of LDCs in general, and the particular case of Rwanda; major challenges and issues that the development of ICTs and e-government face, those challenges have to do with Information Infrastructure development in those countries. Today there is an increasing call for theories and practices that would address the aspect of contextualization in the design, implementation, and evolution of information systems.

Also, failures or dissatisfactions from e-government projects may arise when the management of projects neglected the role of the non-technological aspects of innovation, as well as the necessity of adequately inform the potential users about the services made available as a result of the funded projects Castelnovo (2010). None- technological aspects include but not limited to the context in which the projects are implemented, for example, government projects (include but not limited to e-government) are often designed to operate across multiple user groups and departments; and then different users with different intentions, interests, and value, and these users are seen as competing to increase their stake and control on the system under implementation (Kling & Iacono, 1984; Larsson & Grönlund, 2016; Markus, 1983; Rose, Persson, et al., 2015). Also, the none-technological aspects of ICT innovations (the case of e-government projects in this research) include the value proposition of them because there are competitive

advantages for organisations, public or private, which pay attention to the potential value and use of ICT Ndou (2004).

For example, the existing research on ICTs and e-government, mainly conducted in the developed countries, show that there is no such thing called "e-government paradox", a notion that would mean that the adoption e-government projects will not provide benefits. Castelnovo (2008, 2013) argues that there is no such thing as "E-Government paradox", rather, the project could be seen as a failure in the view of some stakeholders because project managers were unable to foresee the benefits, or because the project yields the value to a different group of stakeholders. Castelnovo (2013) argued that practices and research on e-government should be in the view of stakeholders. And that foreseeing the value for all stakeholders involved is the key to the realisation of the full potential of the project for all stakeholders involved.

1.3. Objectives and Research Questions

The existing research pointed out that digital innovations (ICTs in general and e-government) have been seen unsustainable, for example, e-government in many least developing countries (LDCs), due neglecting the non-technological aspects of these digital innovations, for example, the context by which they are implemented, and value propositions of these projects. Today, there is a growing interest in research and practices that would go deep into value propositions and the local context of e-government projects.

In that direction, by means of an example of a case study on the IREMBO project which is a an ongoing large scale public-private partnership (PPP) project to digitalise into a single-window platform all G2C and G2B services in Rwanda, the main objective of the research reported in this thesis was to investigate the phenomenon of value creation of e-government, with a focus on the LDCs.

That main objective was addressed in terms of the following specific objectives:

Objective 1, to investigate the meaning of value creation in e-government;

Objective 2, to investigate the value (types or dimensions, or parameters) of e-government;

Objective 3, to investigate the espoused value and value of e-government in action in an LDC; and

Objective 4, to investigate critical success factors towards the public value in the implementation of e-Government in the context of an LDC.

In brief, this thesis wishes to have a clear understanding of:

i) the public value of e-government projects ii) the context by which they are implemented, iii) activities (arrangements, tactics, and strategies) that implementers or policymakers are undertaking to meet the public value of e-government. This research is motivated by the existing arguments that e-government projects often fail because of neglecting the non-technological aspect, including but not limited to the context by which they are implemented; and value propositions of these projects. Some current major recommendations are that e-government projects are achieved through a clear understanding and balancing of the public value of these projects; and also, through cultivation of the context by which they are implemented.

This research was guided by the public value and information infrastructure (II) theories. The public value theory was seen a reasonable theory to better explain the value from actions, policies, activities … of public sector institutions. That is, considered here as a reasonable theory for explaining and guide that thing called value and value creation of e-government. On the other hand, the II theory is ingrained in the context to explain better and guide the efforts (arrangements, activities …) of value creation of e-government projects within the context by which they are embedded. For example, the II theory lies on the notion of "installed base", the notion that conceives the design and implementation of IIs as ongoing and interrelated activities of ''cultivation of the installed base''. The notion of "installed base" embodies sociotechnical and practice-oriented, i.e. it includes the physical and social context of work, existing technologies and routines, and the worker's skills and beliefs (Aanestad & Jensen, 2011; Hanseth & Lyytinen, 2004). Hence, the information infrastructure (II) theory, for example, through its parameters such as the notion of installed base, state-wise-strategy for change, modularity, etc., is a context-ingrained theory that has been used for design and development of information infrastructures (information infrastructures are those large scale information systems that are changing in time).

Information infrastructure, as a theory, has been used to frame a number of extensive case studies (Ciborra 2000; Hanseth and Ciborra 2007), and in particular to develop an alternative approach to IS design that posits: infrastructures should rather be built by establishing working local solutions supporting local practices which subsequently are linked together rather than by defining universal standards and subsequently implementing them. These two theories, the public value and II, are described in the section about theories.

This thesis, as a whole, is produced from four operational studies; one theoretical study, and three empirical studies. The empirical case was the

IREMBO project, a large-scale Public-private partnership between the Government of Rwanda (GoR) and private partners for digitalising into one single portal all G2C and G2B services in Rwanda. In the IREMBO project, value creation is a goal; hence, a reasonable and suitable case study in this thesis. The IREMBO case is described in the method section.

The main research question was posited as:

"*How do we create value through e-government in the context of an LDC?*"

This research question embodies the following specific questions: 1) 'What do people mean when they claim that they are creating value through e-government?' And 2) what value (type, dimension) does e-government create?'

Practically, the above main research question has been addressed through the specific questions below:

1. What is the current knowledge about the value creation by e-government?
2. How do we minimise the gap between the public value anticipated and public value in-action in the implementation of e-Government in the context of an LDC?

The above specific research questions have been operationalised in 4 studies; one theoretical study and three empirical studies as follows.

The first study, Study 1, is theoretical.

Using a systematic literature review, the first study investigated the following two research questions:

- *What is the current state of research on the public value of e-government?*
- *What value is e-government supposed to yield?*

Twizeyimana and Andersson (2019), in a summary, presented the findings in Study 1. In more details, this thesis describes the concept value creation of e-government.

The second study was an empirical study on the IREMBO project that employed the public value framework produced in study 1. Study 2 investigated the anticipated public value in the IREMBO project.

In this second study, the research question was:

- "*What public value is anticipated in the IREMBO project* for building G2C and G2B e-government portal in Rwanda?

In the quest to better understand value creating arrangements and strategy in the LDCs, the third study, Study 3, empirically investigated the experiences, challenges and lessons in the implementation of the IREMBO E-Government platform for G2C and G2B in Rwanda.

The research question investigated in this study was:

- *What are the important challenges and the lessons from the implementation of the "IREMBO" project?*

Also, the fourth study empirically investigated the gap between the anticipated public value and the value achieved in action in the IREMBO project. Study 4 investigated the following three research questions:

- *What public value is anticipated, and what public value is in action in the IREMBO project? What gap is there between the values expected and the realised values? And what are the critical success factors for public value creating in the context of an LDC?*

For data collection and analysis, Study 4 also used the public value framework developed in Study 1.

The table below presents the relationships between the studies, objectives, and their corresponding specific research questions as well as their operationalisation in individual studies conducted.

Table 1: Linking studies to study objectives and their corresponding research questions

Research Objectives		Studies			
		Study 1	Study 2	Study 3	Study 4
Objective 1		x			
Objective 2		x	x		x
Objective 3			x		x
Objective 4				x	x
Specific Research Questions (SRQ)	Operationalised Research Questions (ORQ)	Study 1	Study 2	Study 3	Study 4
SRQ 1	ORQ 1	x			
SRQ 2	ORQ 2	x	x		x
	ORQ 3		x		x
	ORQ 4		x		x
	ORQ 5				x
	ORQ 6			x	x
	ORQ 7			x	x

Specific Objectives

Objective 1, to investigate the meaning of value creation in e-government;

Objective 2, to investigate the value (type or dimension, or parameter) of e-government;

Objective 3, to investigate the espoused value and value in action of e-government in an LDC;

Objective 4, to investigate critical success factors towards the public value in the implementation of e-Government in the context of an LDC.

Specific Research Questions (SRQ)

SRQ 1, what is the current knowledge about the value creation by e-government?

SRQ 2, how do we minimise the gap between the public value anticipated and public value in-action in the implementation of e-Government in the context of an LDC?

Operationalised Research Questions (ORQ)

ORQ 1, what is the current state of research on the public value of e-government?

ORQ 2, what value is e-government supposed to yield?

ORQ 3, what public value is anticipated in the IREMBO project for building G2C and G2B e-government portal in Rwanda?

ORQ 4, what public value is in action in the IREMBO project?

ORQ 5, what gap is there between the anticipated values and the realised values in the IREMBO project?

ORQ 6, what are the important challenges and the lessons from the implementation of the "IREMBO" project?

ORQ 7, what are the critical success factors for public value creating in the context of an LDC?

SRQ and ORQ relationships

SRQ 1 ←→ ORQ 1 and ORQ 2

SRQ 2 ←→ ORQ 2, ORQ 3, ORQ4, ORQ 5, ORQ 6, and ORQ 7

Studies

Study 1, the Public Value of E-Government: A Literature Review

Study 2, the public value of e-Government: anticipations in the IREMBO project in Rwanda

Study 3, E-Government in Rwanda: Implementation, Challenges, and Reflections

Study 4, towards Realisation of the Public Value of e-Government: anticipation-reality gap and critical success factors in the context of Rwanda

Cover paper, E-Government and Value Creation in the context of a Least developed Country: a perspective on Public Value and Information Infrastructure

1.4. Thesis Structure

The introductory chapter presents the research scope, followed by the motivations and the context of the problem of study. At the end of the introductory section, the objectives and research questions are described. Chapter two discusses the research context. The e-government development in the LDCs and the particular case of Rwanda is discussed to set the general context for this thesis. Chapter three discusses the research design. In this chapter, the theoretical framework is described. The theoretical framework of this thesis mainly relies on socio-technical theory. Under this umbrella, two theories have guided the collection and analysis of data that was relevant to address the research questions posited in this thesis. They are the public value theory and the information infrastructure theory. After theories, Chapter three continues by discussing the research philosophy and methodology of this thesis as well as the methods that were used to collect and analyse the required data. Chapter four will follow to describe the findings. Finally, in Chapter Five, the conclusions, contributions, implications, and recommendations are summarised.

2. Research Context

Through a case study in Rwanda, one of the LDCs, the research reported in this thesis investigates the important topic of the value creation of e-government projects. More specifically, this research is into i) a clear understanding of the public value of e-government projects ii) an understanding the context by which they are implemented, and ongoing activities (arrangements, tactics, and strategies) by implementers or policymakers; all towards achieving the public value of e-government in that specific context.

The existing studies found that e-government development in the LDCs in general, and sub-Saharan Africa is lagging because of several challenges including the very basic challenges to the implementation and use of e-infrastructure (Twizeyimana et al., 2018). Common challenges in the LDCs include high levels of illiteracy in general, ICT illiteracy, lack of basic e-infrastructure, and shortage of qualified IT personnel (ibid).

The exploration of the context or the contextualisation is an important aspect for a successful implementation of IS, and it is today's current call in research and practices in IS.

Hence, through employing the II theory in the investigation of the context in which e-government is implemented, and also through employing the theory of the public value of e-government to investigate the meaning and what are the parameters of the value of e-government; this thesis addressed the ongoing claims that e-government projects often fail because of neglecting the non-technological aspect. The non-technical aspects to include but not limited to the consideration of the context in which projects are implemented and value propositions of those projects from all stakeholders that are involved. And the current research is also responding to the current call for contextualisation in both theories and practices about e-government development. Hence, research and practices about ICTs in general, and e-government in the LDCs, such efforts should understand and address the context; the challenges that hinder ICTs and e-government development are the important elements of the context.

In their research about investigating challenges and prospects of e-government development in the context of Rwanda, (Twizeyimana et al., 2018)found that in their quest for succeeding the implementation of the IREMBO project while transcending various challenges to e-government such as IT management skills, lack of qualified staff, high level of illiteracy, and digital divide, etc.; the Government of Rwanda has cultivated the exist-

ing install base of public-private partnership (PPP) and signed a BOT contract with a private company. The company was tasked to design, build and operate the IREMBO platform for 25 years because the government wanted to benefit from the partners' knowledge of the technology and management of e-platforms. Also, in the effort to overcome the challenges of illiteracy and the digital divide; the implementers of IREMBO cultivated the installed base of private agents, the agent-based framework to support those who do not know how to use, those who do not have access, was introduced before and already in operation from telecommunication companies.

The contextualisation is an important aspect for a successful implementation of IS, and it is the current call in research and practices in IS. The next section gives an overview of e-government development in the LDCs, a movement that is facing a lot of issues, challenges, and uncertainties.

2.1. E-Government Development in the least Developed Countries

This section presents an overview of the e-government development in the context of least developed countries, an effort that has been reported to face various issues, challenges, and uncertainties.

As confirmed by the UN in its resolution 2768 (XXVI) of 18 November 1971, Least developed countries (LDCs) are countries that exhibit the lowest indicators of socioeconomic development, with the lowest Human Development Index. According to UN (1971) country is classified among the Least Developed Countries if it meets the following three criteria: (i) It is a poor country, that is, a country has per capita gross national income (GNI) that is less than US$1,025 (averaged over three years.); (ii) a country has human Assets Index (HAI) that is 60 or below, HAI to account indicators of nutrition (i.e., percentage of population undernourished); health (i.e., mortality rate for children aged five years or under); education (i.e., the gross secondary school enrolment ratio); and adult literacy rate. (iii) And the Economic Vulnerability Index (EVI) that is 36 or above. The EVI accounts instability of agricultural production, instability of exports of goods and services, the economic importance of non-traditional activities, merchandise export concentration, handicap of economic smallness, and the percentage of population displaced by natural disasters.

Despite the ideas that countries that start implementing e-government today can benefit from easy import of modern technologies (Nabafu & Maiga, 2012; Ndou, 2004; Shin, 2008) when one compares least developed countries to developed countries, e-Government is seen well-established and

successful to some extent in the developed countries. However, e-government in Sub-Saharan Africa is severely lagging when compared to developed countries (Mutula, 2008).

There are some reasons for the situation being "as it is". E-government is new in many of the LDCs.

Compared to developed countries who now records more than two decades of e-government development, and are exercising a competitive e-infrastructure required for E-Government such as a high number of educated population, high rate of IT penetration, entrenched and robust IT policies and institutions, good economy growth, good management skills, a good stake of IT skills and competencies, etc. (Schuppan, 2009); e-government development in the LDCs is challenging. Important challenges to a successful implementation of e-government in the sub-Saharan Africa include, among others, lack of organisational and technological development Ndou (2004), poor infrastructure, lack of policy, legal and skill-factors (Mutula, 2008; Nkohkwo & Islam, 2013), and the digital divide Nkohkwo and Islam (2013), inefficient government and public administration, limited capacity, and poorly-trained personnel (Heeks, 2002; Ifinedo, 2006; Imran & Gregor, 2010; Mutula, 2008; Nabafu & Maiga, 2012; Ndou, 2004; Nkohkwo & Islam, 2013; Nkwe, 2012).

For example, in Uganda, e-government has faced challenges with financial resources, building ICT infrastructure, awareness and social-political factors (Nabafu & Maiga, 2012). In Nigeria, issues related to poor organisational skills, attitudinal problems, inadequate infrastructural support, and poor or unavailable human capital resources were highlighted (Amagoh, 2016). In Zambia implementation of e-government has faced challenges such as resistance from employees and citizens, lack of ICT infrastructure, lack of IT skills in human resources and financial because of overreliance on donor support whereas in Botswana, a country reported to be an ICT power in Sub Saharan Africa, the e-government implementation faced challenges regarding a lack of a formal e-government strategy, lack of trust in the e-government technology, illiteracy, and awareness of the importance of e-government to citizens (Bwalya, 2009).

In a benchmark study by American Society for Public Administration (ASPA) in 2001 with objective to benchmarking countries in their online presence ; on a five stages scale: Emerging stage, Enhanced stage, Interactive stage, Transitional stage and Seamless stage, shown that all the 32 countries at the Emerging stage were from the LDCs Ndou (2004). Also, the same

findings showed several cases of developing countries at the Enhanced Presence stage and interactive Presence stage, which show their enormous likelihood to succeed in E-Government. Ranked at the emerging stage are countries characterised by static and insufficient information that is infrequently updated, few interactive features, and non-existent online services.

The explanations of these findings are, of course, found in the challenges LDCs, developing, and transitional countries face. The challenges may include a large digital divide, inadequate information infrastructure that would consist of lack of IT skills and competencies, inadequate e-infrastructure, lack of operational capabilities (financial resources and innovation capabilities), poor management and organisational structures, and leadership (Nabafu & Maiga, 2012; Ndou, 2004; Nkohkwo & Islam, 2013; Schuppan, 2009; Shin, 2008).

Some years after the ASPA study, Heeks (2003) assessed 40 reports and a pool of e-government experts in developing and transitional countries and found that an estimate of 35% of e-Government projects are total failures (i.e., the initiative was there, but never implemented or was implemented but immediately abandoned), 50% are partial failures (i.e., major goals for the initiative were not attained and/, or there were significant undesirable outcomes), and that only 15% are successes (i.e., most stakeholder groups attained their major goals and did not experience significant adverse outcomes).

The significant worries should be seen into what failing implementation of e-Government initiative would mean for countries and in the special case of LDCs which lack resources. Hence, among other distresses, failures mean the loss of financial costs (time and money invested), the loss of opportunity costs (the alternative ways/projects in which that money could have been spent), the increase in future costs (such as increase of barriers and resistance because of the loss of morale, loss of credibility and trust in e-government as an approach to change), increase in political costs for rebuilding the image and overcoming the humiliations of involved parties, and last but not the least, the loss of beneficiary costs - the loss of benefits that a successful e-government project would have brought to citizens/stakeholders (Heeks, 2003).

In a summary, the implementation of e-government in the LDCs might require appropriate approaches that account specific context and issues including but not limited to the consideration of human, organisational and technological development Ndou (2004), accommodation of certain unique conditions, needs and obstacles (Nabafu & Maiga, 2012; Ndou, 2004;

Schuppan, 2009; Shin, 2008), that is, the adaptation to local conditions and the organisational change that is required. In common, the existing research highlighted that major hindrances to a successful implementation of e-government in the sub-Saharan context are because of the gap between existing e-government implementation models and the local context (Nabafu & Maiga, 2012; Ndou, 2004; Schuppan, 2009; Shin, 2008).

The next section discusses the development of e-government in Rwanda, especially the ongoing IREMBO project for building Rwanda's single window for e-government.

2.2. E-Government in Rwanda

Rwanda is officially named "the Republic of Rwanda", and is also known as "the land of a thousand hills" because of its landscape. Being a relatively small landlocked country, Rwanda is located in Central and East Africa, a few degrees south of the Equator and east of Lake Kivu, and is one of the African Great Lakes. Rwanda is bordered by Uganda, Tanzania, Burundi, and the Democratic Republic of the Congo (Rwanda country profile).

The country covers an area of 26,338 km², about the size of Macedonia, or slightly smaller than the US state of Maryland. Rwanda has a population of 11.5 million primary as of 2016; this makes Rwanda's population density one of the highest in Sub-Saharan Africa.

Capital and largest city is Kigali.

Spoken languages are Kinyarwanda (the official language of Rwanda), English and French, Swahili. And Kinyarwanda is the common language across the country.

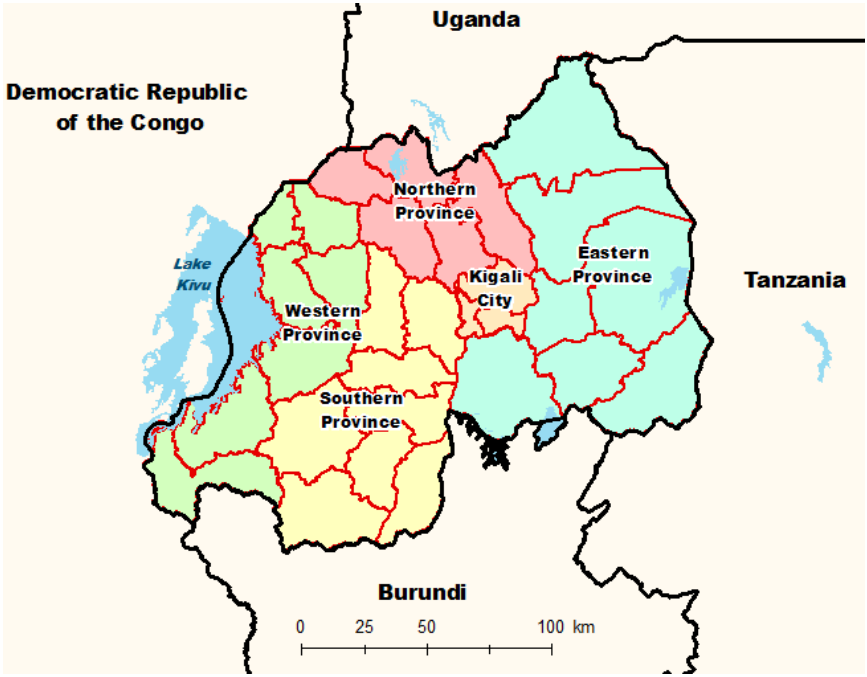

Figure 1: Rwanda Map – Wikipedia contributors (2019, September 17)

Rwanda is small in size, but its history is one of the most known, at least heard, globally.

Rwanda had a strong monarchy that existed from BCE (Before Common Era) to 28 January 1961 because on 28 January 1961 Rwanda became a republic from the so-called 1959 Rwandan Revolution movement. It is also important to note that the Kingdom of Rwanda was one of the oldest and the most centralised kingdoms in the history of Central and East Africa. The last but not the least, the country is remembered on its horrific history, the 1994 Tutsi Genocide.

Today, Rwanda continues its recovery after the horrific 1994 Tutsi Genocide. Currently, Rwanda performs well in the area of peace, reconciliation, business, investments, and infrastructure development in general, and in the particular case of ICTs.

Like many other LDCs, the introduction and development of ICTs in Rwanda, face a lot of challenges and issues. Since the year 2000, like many other countries, Rwanda is embracing Information and Communication Technology (ICT) to develop in its various sectors. According to the Rwandese Ministry of Information Technology and Communication (MITEC) previously designated as the Ministry of Youth and ICT (MYICT), ICT has been seen a key driver for Rwanda in achieving its Vision 2020 of transforming the country from a Least Developed Country to a middle-income country Twizeyimana (2017, p.172). The idea is that ICTs would facilitate access to information and services which in turn would yield a dynamic and knowledge-based economy (ibid).

Considerable efforts have been put in place for ICT and its development in the country. Among others, some efforts are documented in policy documents such as the National Information Communication Infrastructure plan [2000 – 2015] and the Smart Rwanda Master Plan [2016 – 2020]. NICI Plan I (2000 – 2005) targets to put the legal and regulatory framework in place. NICI Plan II (2006-2010) targets to build a basic ICT infrastructure. The major infrastructure consists of telecommunication networks, a national fibre optic backbone, a submarine cable, and an integrated national data canter. More infrastructure development initiatives include the electricity Roll-Out Program that aims at covering the entire country with access to electricity, a competitive internet and mobile networks. 33.5% of the total Rwandan population had access to the Internet, and 77.8% had mobile phones. Another initiative is the 4G LTE rollout that aims at providing access to high-speed internet in the country. The 4G LTE rollout is currently reaching 18 out of the 30 districts which compose Rwanda, and a Free Wi-Fi is now operational in 485 buses in public transportation (Twizeyimana, 2017). NICI Plan III (2011 – 2015) deals with service improvement, and the Smart Rwanda Master Plan (2016 – 2020) has a focus on Government digital transformation.

In 2012, some challenging questions emerged as a result of an assessment of Rwanda's ICT maturity level (National ICT Competitiveness, 2012) that was conducted in 2012. The assessment results placed Rwanda 88th out of 144 globally and also revealed that despite a lot of investment and ambitions; the ROI in terms of improved service delivery, efficiency, and productivity was a rare resource. It was by then after disappointing results from the assessment that IT policy-makers called for a revision of the then IT strategic plan, which resulted in the development of the current IT Masterplan (2016 to 2020).

According to the Smart Rwanda Master Plan (SRMP), Rwanda is now embracing ICTs seeking improvements in the main seven areas: Health, Finance, Trade and Industry, Agriculture, Education, Governance, Women and Youth Empowerment in Technology. Where three main goals are set: (i) Economic Transformation, (ii) Job Creation and Increase in productivity, (iii) and Accountable Governance. And the enablers are the Effective ICT Governance and Management, ICT Capacity and Capability, Secured and Shared Infrastructure (SRMP). The figure below is adopted from the SRMP to depict the seven primary areas, three enablers, the main three goals and the associated objectives.

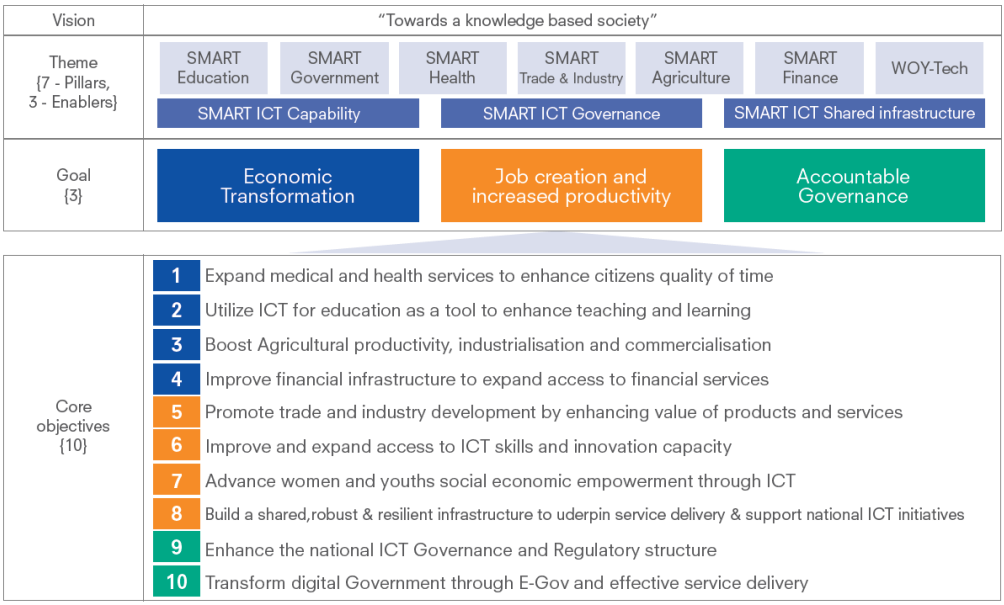

Figure 2: ICT sector in Rwanda - main areas, enablers, main goals, and core objectives adopted from Smart Rwanda Master Plan "SRMP" (MITECH, 2015)

With the introduction of SRMP, the dimension "E-Government" was given its specific section for the first time in the National IT Plan. If you allowed, the SRMP era would mark the official birth of e-government in Rwanda.

In the current era of the Smart Rwanda Master Plan [2016 – 2020], the e-government is expected to help streamline the Rwandese government towards excellence in service delivery. The focus is on digitalising the government towards a 24/7 self-service, "cash-less" and "paperless" government;

with 95% of all government services are transacted online by 2018 MITEC (2015; 2016; 2017), MYICT (2015), and Twizeyimana (2017). The anticipations are high. The main objective is to have a zero-paper government: digital transactions and 24-hour Self-Service Government. The core project in this direction is the IREMBO project.

The implementation of the "IREMBO" project is the case study of this thesis.

And the "IREMBO" project is described below:

2.2.1. IREMBO Project - Building Rwanda's single window for e-government

After realising that huge investments and efforts that Rwanda put in ICT sector did not provide the expected outcomes which include but not limited to the improved delivery of public services, improved access to information, improved administration, improved social life, improved citizens' participation in government activities and processes, etc.

The government of Rwanda took new decisions, and one of the important decisions was the introduction of the IREMBO project.

In 2015, the Government of Rwanda has entered into a Public-Private Partnership (PPP) agreement with the private company Rwanda Online Platform Ltd (henceforth referred to as ROL) to digitalise into a single-window portal called "IREMBO" (which means "gate") all G2C and G2B services (Rwanda Ministry of Information Technology and Communications, 2015, 2015; Twizeyimana, 2017).

The expectations from the IREMBO project are among others, to eliminate inefficient manual processes, eliminate trips, delays, long queues, the bottleneck in service delivery, and bridging the gap of access to government services and information.

The IREMBO PPP agreement is in the form of Build, Operate, and Transfer (BOT) for the next 25 years (started in 2014), and within that period, ROL is paid through a commission fee framework, a percentage taken from the service fee paid by citizens when they are provided with a service via the "IREMBO" portal/platform (Rwanda Ministry of Information Technology and Communications, 2015, 2015; Twizeyimana, 2017). On the other hand, besides the expected improved services, administration, etc., also the government of Rwanda would benefit from the private partner's capacity to design, finance, procure, build, and maintain the platform; but also to benefit from the agreement that the partner has a role in dealing with financial, technical, infrastructure, and managerial challenges which are among the most important in the LDCs, especially in sub Saharan Africa.

The first 100 e-services are planned to be digitalised and available on the "IREMBO" portal by the end of 2017 (Twizeyimana, 2017).

Some of the first 100 e-services which are being digitalised are applications for birth, marriage, and death certificates, land management services (registration, transfer, merging, subdivision, and building permits), transportation licenses, insurance licenses, and motor vehicle inspection (Twizeyimana, 2017).

The IREMBO as a platform provides a front-office for users (citizens and businesses) to file their applications over the internet, and a back-office system for public servants to manage users' applications where back-office operations are managed by and under the responsibility of each government agency in the IREMBO project (Twizeyimana, 2017).

Besides citizens as primary beneficiaries, the IREMBO project involves multiple and different stakeholders: citizens, policy-makers, business contractors, and public servants; who would differ in their end goals from the project and in their major of success in the IREMBO project. Mainly, the project involves stakeholders from private companies in the partnership, Ministry of ICT (in charge of ICT policies in Rwanda), the Rwanda Development Board (RDB) whom are in charge of implementation and monitoring of IT projects in Rwanda, and the ministry of local government through the affiliated agencies which include districts, sectors, cells, and locality offices whom are the public servants for the majority of services in the IREMBO project (Twizeyimana, 2017).

Hence, the "IREMBO", is on the one hand, an example of a common e-government portal, while at the same time being a large-scale e-government project operating in a LDCs context – the case of Rwanda, and also in a unique implementation context, with a long-term PPP and multiple government levels being involved (Twizeyimana, 2017). Then, I argue that the choice of the "IREMBO" as a case study is a reasonable choice and would provide a reasonable framework to address the main objective and research question of this thesis.

And that, selecting the "IREMBO" project as a case study in the study of the implementation of e-government services in Rwanda with a focus on the local context and the public value would help to test various propositions underpinning this study. For example, some propositions to be tested include (I) implementation of an e-government project is complex and challenging endeavour because of the complexity of the government as an entity, a diversity of stakeholders with different goals, values and views on the project and its success (Chircu & Lee, 2005; Rose, Persson, et al., 2015);

(II) implementation of e-government programme (for example, e-government) is successful if it cultivates the public value. This would secure sources of support and legitimacy, which in turn would enable the operational capabilities (e.g., financial resources and innovations) see Moore and Khagram (2004). The public value view would help to deal with managerial concerns such as sharing of responsibility, responding to expectations of politicians, employees, citizens and businesses (Grimsley & Meehan, 2007; Liu et al., 2008; Rose, Persson, & Heeager, 2015; Rose, Persson, et al., 2015). Coordinating stakeholders' basic values in the execution of a project (for example, e-government) may be an important route to success (Rose, Persson, & Heeager, 2015; Rose, Persson, et al., 2015). In fact, the public value perspective would be important to study the success of e-government (Grimsley & Meehan, 2007; Rose, Persson, & Heeager, 2015; Rose, Persson, et al., 2015; Scott et al., 2016)and provide a useful framework for measuring that success (Bannister & Connolly, 2014; Castelnovo, 2013; Grimsley & Meehan, 2007; Rose, Persson, & Heeager, 2015; Rose, Persson, et al., 2015; Scott et al., 2016).

On the other hand, despite significant investments and efforts, the value of e-government is not clear defined and the success of e-government is hard to be replicated especially in least developed countries (LDCs) - more importantly, in the local government which is seen as the interface between citizens and government (Chircu, 2008). Also, it is worth mentioning that, outsourcing the implementation of government programme (e.g., e-government) through Public Private Partner-ship (PPP) would entail a low impact on the public value because of differences in the values and goals between the public sphere and the business sphere.

3. Research Design

Based on a case study in Rwanda on the IREMBO project, and under guidance of the public value and information infrastructure (II) theories; the research reported in this study investigated the phenomenon of value creating of e-government.

This thesis is composed of four central studies: one theoretical study and three empirical studies.

The first study is a systematic literature review on the public value of E-Government with an aim to organise the existing research on the public value of e-government in order to develop a conceptual framework of the public value of e-government that would guide further studies on the public value of e-government, in particular the framework guides the empirical studies on the public value of the IREMBO project which is an empirical case study of this thesis.

Thus, building on the first study, the second study investigates the anticipated public value of the implementation of e-government in the context of an LDC. The case study was a large-scale e-government project known as IREMBO, which is a single-window portal for service delivery for both G2C and G2B in Rwanda.

The third study investigates the experiences, challenges and lessons in the implementation of the IREMBO E-Government platform for G2C and G2B in Rwanda.

Then, through a case study on the IREMBO project, the fourth study builds on the previous studies (first, second, and third studies) to investigate the gap, and critical success factors towards achieving the public value of e-government, more importantly, in the context by which an e-government project is embedded and implemented.

The next table, Table 2 presents the research questions, and subsequent studies.

Table 2: Description of research questions, methods, and subsequent studies

Main RQ	Specific RQs	Operationalized RQs	Studies
"How do we create value through e-government in the context of an LDC?"	1. What is the current knowledge about the value creation by e-government?	1.1. What is the current state of research on the public value of e-government? 1.2. What value is e-government supposed to yield?	Study 1
		1.2.3. What public value is anticipated in the IREMBO project for building G2C and G2B e-government portal in Rwanda?	Study 2
	2. How do we minimise the gap between the public value anticipated and public value in-action in the implementation of e-Government in the context of an LDC?	2.2. What public value is in action in the IREMBO project?	Study 4
		2.3. What are the important challenges and the lessons from the implementation of the "IREMBO" single window for e-government in Rwanda?	Study 3
		2.4. What gap is there between the anticipated values and the realised values in the IREMBO project?	Study 4
		2.5. What are the critical success factors for public value creating in the context of an LDC?	Study 4
Studies	Study 1, the Public Value of E-Government: A Literature Review Study 2, the public value of e-Government: anticipations in the IREMBO project in Rwanda Study 3, E-Government in Rwanda: Implementation, Challenges, and Reflections Study 4, towards realisation of public value of E-Government: anticipated value, reality gap, and critical success factors in the context of Rwanda		

3.1. Theories

In this thesis, the object of study is the public value of e-government and its creation. The empirical base is a case study in Rwanda, a sub-Saharan region of the LDCs.

This thesis lies under a socio-technical theory.

While lying under a socio-technical theory, this thesis was guided by the public value and information infrastructure (II) theories in collecting and analysing the data that were required to address the main goal and corresponding research questions.

Concerning the IS research, the socio-technical theory has been used to study the implementation and management of new technologies (Land, 2000). The sociotechnical theory postulates that the design and performance of new systems can work satisfactorily if the 'social' and the 'technical' are brought together and treated as interdependent aspects of a working system (Clegg, 2000; Klein, 1994). However, in practice, the sociotechnical ideal might seem a rare quest. For example, there have been reported a lack of an integrated approach to organisational and technical change, and often, stakeholders and users in particular, who do not have substantial influence on system development (Clegg et al., 1997; Clegg, 2000). Land (2000) highlighted the successfulness of socio-technical thinking, for example, by giving studies which show that paying attention to the social issues as a complement to the techno-economic issues produces results that satisfy managerial aspirations (Mumford and Henshall, 1979).

For more than a decade there has been a global interest in e-government implementations from West to Africa (Berman & Tettey, 2001; Heeks, 2002; Hornnes et al., 2010; Nkohkwo & Islam, 2013) but this revolution has been seen to be sustainable in developed countries than in many developing countries (Heeks, 2003).

In a benchmark study by the American Society for Public Administration (ASPA) in 2001 showed that all the 32 countries at the Emerging stage were from the LDCs Ndou (2004). Also the same findings showed several cases of developing countries at Enhanced Presence stage and interactive Presence stage, which show their enormous likelihood to succeed in E-Government. Ranked at the emerging stage are countries characterised by static and insufficient information that is infrequently updated, few interactive features, and non-existent online services.

Some years after the ASPA study, Heeks (2003) – he assessed 40 reports and a pool e-government experts in developing and transitional countries, and he found an estimate that 35% of E-Government projects are total

failures (i.e., the initiative was there but never implemented or was implemented but immediately abandoned), 50% are partial failures (i.e., major goals for the initiative were not attained and/, or there were significant undesirable outcomes), and that only 15% are successes (i.e., most stakeholder groups attained their major goals and did not experience significant undesirable results).

Since then, there have been many and reasonable explanations about why e-government projects often fail in the LDCs. In most cases, It has been frequently mentioned that ICTs and E-government project often fail in the LDCs because the implementation of these technologies in the LDCs adopt technologies and method tested in the context of the developed world which defer from LDCs. The later that is the LDCs face a lot of challenges including technical challenges such as lack of adequate e-infrastructure, poor management, and high levels of illiteracy in general and in ICTs, lack of or shortage of qualified IT personnel, etc.

In the particular case of Rwanda, a country taken as a case study for empirical investigations, (Twizeyimana et al., 2018)identified the information infrastructure for e-government, social inclusion, governance, management, trust in the new system, and languages as six overarching categories of aspects that challenge a successful implementation of e-government in Rwanda. Also, in the context of Rwanda, Bakunzibake et al. (2019) identified the lack of plan of 'to-be' service processes, unclear change management strategy, poor organisational learning mechanisms, and unclear operational goals in the local government to be the organisational issues underlying the implementation of 'one-stop' e-government initiatives in Rwanda. Whereas in their study about Challenges in implementing citizen-centric e-Government services in Rwanda, Mukamurenzi et al. (2019) identified lack of a change management strategy, limited cooperation, language and literacy barriers, incomplete automation, difficulties with system integration, and a lack of intermediaries' management mechanisms to be the key e-government challenges in Rwanda. According to (Twizeyimana et al., 2018), in the context of LDCs in general, and the particular case of Rwanda; major challenges and issues that the development of ICTs and e-government face, those challenges have to do with Information Infrastructure development in those countries. Hence, importing of modern technologies, which often are, from the developed world would not satisfy the local challenges and conditions. And today a call for theories and practices that would address the aspect of contextualisation in the design, implementation, and evolution of information systems is on the rise.

Summing up the above argument about causes of failures in the implementation of ICTs in LDCs, this thesis supports that failures or dissatisfactions from e-government projects may arise when the management of projects neglected the role of the non-technological aspects. This thesis argues that the none- technological aspects include the context in which the projects are implemented; for example, government projects are often designed to operate across multiple user groups and departments; hence, with different users with different intentions, interests, and value, and these users are seen as competing to increase their stake and control on the system under implementation (Kling & Iacono, 1984; Larsson & Grönlund, 2016; Markus, 1983; Rose, Persson, Heeager, et al., 2015). And that the none-technological aspects include the value proposition of the projects. In the direction of the latter, Ndou (2004) argues that there are competitive advantages for organisations, public or private, which pay attention to the potential value and use of ICTs.

Thus, under the socio-technical umbrella, that is, with consideration of the technical and the none-technological aspects in the implementation of IS, in this thesis, the public value and information infrastructure theories are used.

The public value theory is used to guide efforts of understanding the meaning of value creation of e-government, and what value (type or dimension) does e-government create. And the II, a context-ingrained theory, was used in studying the aspect value creation of e-government projects within the context by which they are embedded. It is also important to acknowledge that in the context of the implementation of e-government projects, the challenges that hinder the development of ICTs in general, and in the particular case of e-government are the important elements of the context in the implementation and development of these projects. They are important because they influence strategies, decisions and actions in the implementation of e-government. For example, in their study to understand what work (decisions and actions) actors in the IREMBO project (implementers and decisions makers) were doing to overcome the existing challenges in Rwanda; researchers (Twizeyimana et al., 2018) found that decisions and actions which were being taken were being influenced by the challenges at hand that time. In this thesis, the II theory has been used to better understand the existing installed-base in terms of existing practices, the challenges ahead, and ongoing arrangements or work and activities that actors, implementers, and policymakers are undertaking to meet the anticipated goals and outcomes.

Table 3: Theories as used in this thesis

<table>
<tr><th colspan="6">Thesis: e-Government Implementation in an LDC</th></tr>
<tr><td rowspan="3">First-order theory</td><td>Study 1</td><td>Study 2</td><td>Study 3</td><td>Study 4</td><td>Study 5</td></tr>
<tr><td colspan="5">Socio-technical theory</td></tr>
<tr><td colspan="3">Technical sub-system</td><td colspan="2">Socio/environmental sub-system</td></tr>
<tr><td>Second-order theory</td><td colspan="3">Information infrastructure</td><td colspan="2">Public value</td></tr>
<tr><td rowspan="2">Third-order theory</td><td colspan="3"></td><td colspan="2">A framework of the public value of e-government</td></tr>
<tr><td colspan="5">Critical success factors of</td></tr>
</table>

The existing theories about the success of e-government implementation in the LDCs are deducted from theories of challenges these countries face regarding e-government implementation. This is not surprising if we acknowledge the frequent claims in the existing research that about failures of e-government initiatives in these regions is that failures are because of various challenges countries in this region face regarding e-government implementation.

Also the existing research on e-government implementation in the developed world suggest that a clear understanding of the public value of e-government would make more accessible to design and achieve e-government projects (Flak et al., 2009; Rose, Persson, & Heeager, 2015; Rose, Persson, et al., 2015; Scott et al., 2016) and that the public value view would help to deal with managerial concerns such as sharing of responsibility, responding to expectations of politicians, employees, citizens and businesses (Grimsley & Meehan, 2007; Liu et al., 2008; Rose, Persson, & Heeager, 2015; Rose, Persson, et al., 2015). In a review of the literature on the value of e-government, I found a total lack of this kind of research in the context of the LDCs. Thus, I argue that it is reasonable to pursue the public value perspective to study e-government implementation in the LDCs.

Also, coming back to the existing theory used for explaining failures and success of e-government in the LDCs, that is the theory that these countries have many challenges to e-government implementation when compared to the developed world; the information infrastructure would be a reasonable perspective to explain the e-government implementation and its challenges in the LDCs, because many (if not all) of those challenges are related to the information infrastructure (II) development in these countries. For example, common challenges reported so far include elements of the existence of a significant digital divide, inadequate e-infrastructure, lack of e-government champions, lack of IT personnel for managing e-government projects, lack

of skills and competencies. (Nabafu & Maiga, 2012; Ndou, 2004; Nkohkwo & Islam, 2013; Schuppan, 2009; Shin, 2008)

Therefore, through the information infrastructure (II) perspective, this thesis builds on the existing knowledge about failures and success of e-government in the LDCs, theory of the existence of many challenges to e-government in those regions. Also, this thesis builds on the public value which, in this thesis, is pursued as a reasonable theory to investigate the intent of stakeholders (policy-makers, citizens, businesses, and public servants) in e-government project implementation if we may acknowledge the importance of the ends-in-view to strive for at policy implementation regardless whether it follows a "forward mapping" or "backward mapping" approach Elmore (1979).

In this thesis, I acknowledge that the understanding of the values of different actors (citizens, policymakers, and implementers of the project) would provide a basis to design E-Government systems which would satisfy the expectations of various stakeholders concerning the expected benefits.

The success of e-government is highly associated with how much, how far, and how good it provides the expected value for the intended users for the public interest.

In this direction, a perspective value of e-government is adopted for the purpose of this thesis.

Finally, a perspective on Information Infrastructures (IIs) in e-government is added to improve our understanding of e-government implementation in the LDCs. For example, IIs take us into further details on context, and the process (i.e., resources and/or capabilities in that context) doing that in a strategic way can yield to the realisation of (the public value of) e-government in LDCs.

The choice of the public value of e-government, and Information Infrastructure (II) as lenses to guide this study, was made because of their complementarity for an analysis that fits the political context – the public value theory; and also to fit the sociotechnical context – the Information Infrastructure perspective.

3.1.1. The public value framework

There are various theories that study the success of IS which include Delone and McLean IS success model, the Capability Approach by Sen, etc. The public value theory has claimed to provide a fruitful lens to study the success of e-government projects with the idea that it would provide measures of

success of e-government initiatives (Flak et al., 2015; Rose & Persson, 2012; Rose, Persson, et al., 2015).

Also, in their IS success model, Delone and McLean have realised the importance of the public value, and they have improved the success theory to come up with what they called reposition the Delone and McLean IS success model with public value to account for an important measure of success: social value (Scott et al., 2016).

The value creation in e-government has been overlooked as a perspective of methods and practices in private organisations, especially with a simplified and confusing assumption that the public sector would look like the private sector.

That simplification has led to surprises and disappointments of the potential value of e-government, mainly, because the adopted IT value assessment model in the private sector would not measure and/or capture the value of e-government. For example, assessing the value of e-government in the perspective of financial value as reflected in cost and labour-savings has been challenging, and sometimes that value was invisible.

It is important to account that although both public and private institutions exist to serve people, the mandates and/or concerns are different. For instance, private institutions mainly deal with citizens as customers to maximise the financial income whereas government as institution their mandate is to act as stewards of citizens and serve them accordingly. For government institutions, their end objective goes beyond the money income to account their mandate, that is, a consideration of a broad range of the "public value" other than productivity (Bannister et al., 2014; Moore, 1995).

In the quest for "public value", governments deal with strategic goals which go beyond money income to account political and social objectives which include efficiency in public service, equal treatment of constituents, social inclusion, openness, freedom of information (FOI), community regeneration, community well-being, stewardship, and accountability (Bannister et al., 2014; Cordella et al., 2012; Chircu, 2008; Chircu et al., 2005; Jørgensen & Bozeman, 2007; Moore, 1995; Rose, Persson, & Heeager, 2015; Rose, Persson, Heeager, & Irani, 2015; Twizeyimana, 2017).

The public value framework helps to deal with managerial concerns such as sharing of responsibility, responding to expectations of politicians, employees, citizens and businesses (Liu et al., 2008; Rose et al., 2015).

In his research, Moore and Khagram (2004) produced a "public value" theory through the provision of a strategic triangle of constituents of (I) the

"public value", and (II) of an act to produce it. Their "public value" theory -> the strategic triangle is made of three complex issues government managers are (should be) considering before they commit the government to a particular course of action. Their proposed three elements of the strategic triangle for the "public value" and act to produce it are: (1) the important "public value" that an organization is striving for, (2) the source of legitimacy and support that the organisation should rely on to take action and provide the necessary resources for efforts to create that value, (3) the "operational capabilities" (new investments, innovations, alliances) and/or resources the organisation rely on (or have to develop) to deliver the desired results. According to their idea (strategic triangle), before taking action to a particular course of action, public organisations should identify the important value they want to generate, secondly, they should seek for legitimacy and support from citizens directly or through elected representatives (or politicians), third, they should secure operation capabilities necessary to deliver that "public value". Moore et al. (2004) also argue that their the suggested idea (model) on the public value and its creation (as symbolised by the strategic triangle) looks a first step for a generalised model that also would work for business organisations alike or even better than traditional business models; especially, when applied to private sector organisations which rely on maintaining social credibility and/or legitimacy, or those which operate in intensely politicised environments.

However, the "public value" is commonly understood as citizens' "collective" expectations from their government and public services (Castelnovo, 2013; Castelnovo & Simonetta, 2008; Chircu, 2008; Moore, 1995).

In the context of e-government, the public value should then be understood as citizens' "collective" expectations on what improvements e-government should bring, for example, in terms of political and/or social aspects.

More practically, how e-government systems are designed, implemented, and managed for improving the "public value" which goes beyond the money income to also consider (but not limited to) political and social objectives such as efficiency in public service, equal treatment of constituents, social inclusion, openness, freedom of information (FOI), community regeneration, community well-being, stewardship, and accountability.

3.1.2. Information Infrastructure (II)

The theory of II has been used in the analysis of cases, including the description of complex technical systems (Ciborra, 2002), with links to standardisation processes (Braa et al., 2007), the study of ICT and/or e-government infrastructure (Aanestad & Jensen, 2011; Hornnes et al., 2010; Humes & Reinhard, 2009; Janssen & Borman, 2013; Krishnan & Teo, 2012).

Hanseth and Lyytinen (2004) define an information infrastructure (II) as: "a shared, evolving, heterogeneous installed base of IT capabilities among a set of user communities based on open and/or standardised interfaces". II theory relies on the core principle of the "installed base". The notion of "installed base" embodies sociotechnical and practice-oriented, i.e. it includes the physical and social context of work, existing technologies and routines, and the worker's skills and beliefs (Aanestad & Jensen, 2011; Hanseth & Lyytinen, 2004). II theory conceives of design and implementation of large-scale IIs as ongoing and interrelated activities, as ''cultivation of the installed base''. Also, II theory suggests a state-wise transition as the change management strategy. From the design perspective (see **Table 4**), IIs distinguishes between two generic challenges in designing information infrastructures "large-scale IT system, a case of e-government" (Aanestad & Jensen, 2011; Hanseth & Lyytinen, 2010). The first challenge is called a "bootstrap problem" which is related to the establishment of new Information Infrastructure; and secondly, the "adaptability problem" that relates to the further growth and expansion of an Information Infrastructure where unforeseen demands, opportunities, and barriers may arise.

Table 4. Design problems and principles (Aanestad & Jensen, 2011; Hanseth & Lyytinen, 2010)

Design problem	Explanation	
Bootstrap problem	Design initially for direct usefulness	Useful without a more extensive user base
	Build upon the existing installed base	Exploit existing infrastructures, platforms or communication formats already in use; no need for new support infrastructures
	Expand installed base by persuasive tactics to gain momentum	Generate positive network effects from extending the user base before adding new technology, ensure that the user base has grown to sustain the added cost of development and learning
	Seek appropriate modularity to ensure easy stakeholder mobilisation	Identifying a generic problem that can be addressed in the appropriate modularity with an easy stakeholder mobilisation; and that the path to a solution can be short; and that the solution can be reused by many stakeholders or actors.
Adaptability problem	Make the IT capability as simple as possible	Make the information infrastructure as straightforward as possible (both technically and socially); promote overlapping IT capabilities
	Modularise the information infrastructure	Separate the layers of infrastructure from each other and exploit gateways to connect different layers

Whereas for the change management (see **Table 5**) IIs literature advocates gradual transitions of the "installed base" in the design, implementation and change efforts in the II. For example, a gradual transition could be achieved by what the II theory calls "cultivation of installed base". The "cultivation of installed base" is vital.

Table 5. change management (Aanestad & Jensen, 2011; Hanseth & Lyytinen, 2010)

Strategy	Explanation
Cultivation Of installed base	The "cultivation of installed base" emphasises that an appropriate strategy for the design, implementation, and change/transformation initiative in Information Infrastructure, should consider such a sociotechnical "installed base" as its starting point. There should be no way to "jump" or switch between the old and the new Information Infrastructure (system); rather, a gradual and stepwise transition. In other words; building on the "installed base".

Hence, the Information Infrastructures (IIs) perspective would enrich a better understanding on implementation, development and evolution of successful e-government; and the latter should be studied and managed as an information infrastructure rather than a typical information system.

Concerning this thesis, we argue that while questing for a successful implementation of an e-government project, there is a need for a clear understanding of the context (installed base) and how it should be managed. We also support that accounting the "public value" in public projects would be one of the central components of the public sector (government)'s installed base (Jørgensen & Bozeman, 2007; Moore, 1995). We finally argue that investigation of the public value of e-government in the context of the least developed countries (LDCs) and implementation arrangements and installed base would enrich a better understanding towards a successful implementation of e-government projects.

Information infrastructure, as a theory, has been used to frame a number of extensive case studies (Ciborra 2000; Hanseth and Ciborra 2007), and in particular to develop an alternative approach to IS design. According to Ciborra and Hanseth (1998), infrastructures should be built by establishing working local solutions supporting local practices which subsequently are linked together rather than by defining universal standards and subsequently implementing them.

Information Infrastructure has later been developed into full design theory, focusing on the growth of an installed base (Hanseth and Lyytinen 2008).

3.2. Research Methodology

This thesis work is grounded on a constructivism methodology (or philosophy), namely, the interpretive approach (Myers & Avison, 1997).

Though they are related and have been used interchangeably by researchers, the concept research methodology is different from a research method McGregor and Murnane (2010). A research methodology describes which philosophy is underpinning the research work whereas research methods are techniques, procedures, tools, theories, conceptual frameworks, taxonomies, models, etc. which are used to sample, collect, analyse data, and also for reporting the research results (McGregor & Murnane, 2010; Miles & Huberman, 1984). In other words, a research methodology, also called "philosophy", determines what research methods to be employed.

There are two main competing philosophies (methodologies) about the development of science and scientific theories: positivism and non-positivism.

3.2.1. Research philosophy: positivism and constructivism

A positivism ideal: positivism and post-positivism stipulate that science and scientific theories develop around "infallible" method of science. Some examples of scientific method include experiments, observations, inference, and hypothesis testing.

A non-positivism ideal: critical theory, interpretive, constructivism, context-embedded methodologies stipulate that knowledge is socially constructed where people construct their own understanding and knowledge of the world, through experiencing things and reflecting on those experiences.

Be it positivism or non-positivism. No one is better than the other because science and scientific knowledge as we see it develops from both positivism and non-positivism perspectives, and trials and failures (Feyerabend, 1993; Kuhn, 2012; McGregor & Murnane, 2010; Popper, 2005). Hence, it would look naive to think that science and scientific theories develop only around the exact method of science. While not taking sides in this debate, this thesis supports a view that the development of science and scientific theories develop around "infallible" method and/or process; with the word "infallible" method to mean a reasonably clear, rigour, systematic, objective, and repeatable method and/or process.

According to McGregor and Murnane (2010), valid research methodologies fulfil and are differentiated by the following four axioms: (1) what counts as knowledge and how people come to know it (Epistemology); (2) what is nature, reality, feeling, being (Ontology); (3) what is acceptable as

rigor for forming arguments, judgements, and insights (logic); (4) what counts as fundamental values and what is consciousness: moral choices, ethics, and normative judgements – especially, is there a place for researchers and participants in the research, or should they remain emotionally detached? (Axiology). That is, researchers can embark on research projects feeling safe, simply describing their methodology, methods, and then doing their research the way it is described by their methodology because if their chosen methodology fulfils the four axioms above, such methodology would be scientifically rigor, would yield to valid and trustworthy results, and would influence others to trust the body of knowledge being generated (McGregor & Murnane, 2010; Miles & Huberman, 1984).

Concerning methodology, this thesis is grounded in a constructivism methodology (or philosophy), namely, the interpretive approach (Myers & Avison, 1997) to investigate the phenomenon of value creation of e-government.

3.2.2. Interpretive Approach

The interpretive methodology suggests that knowledge (or reality) is socially constructed, for example, through language, perceptions, or meanings (Myers & Avison, 1997). The approach facilitates the comprehension of the phenomenon from the view of those experiencing it - i.e., those who influence or are influenced by the phenomena being investigated (Cavaye, 1996; Klein & Myers, 1999). Also, the approach facilitates the comprehension of a complex phenomenon where the boundaries between the phenomenon and the context are not evident (Benbasat et al., 1987; Yin, 2009).

In the context of IS (for example, e-government system which is a focus in this thesis research), Walsham (1993, p. 4) posited that interpretive research is: "aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context". According to (Orlikowski & Baroudi, 1991; Walsham, 2006), the interpretive research methodology gained importance in IS research, especially, for investigating human actions and interpretations vis-à-vis the development and use of IS. Furthermore, the approach facilitates the comprehension of the context where the boundaries between the phenomenon and the context are not evident (Benbasat et al., 1987; Yin, 2009), and it provides an environment and a framework to produce an understanding of process whereby the information system influences or is influenced by the context (Walsham, 1993).

Miles and Huberman (1984) argue that, despite its epistemology issues such as lack of appropriate procedures to ensure of replicability of findings, issues of sampling and representativeness, and generalisability of conclusion or explanation; the interpretive approach or qualitative data are a source of well-grounded, rich description and explanation of processes occurring in local contexts, and that generalisation is addressed when researchers should fulfil the condition that if other researchers can follow the same settings they may not necessarily reach to the same findings, but at least they may likely reach to analogous findings. On the other hand, generalisation is not the issue of which methodology, rather, methods used for researching its methodology stance. For example, the findings from a case study method are generalisable to theoretical propositions (analytical generalisation) and not to populations or universes (statistical generalisation) as surveys can do Yin (1989).

The next section describes the methods used in conducting the research work, as reported by this thesis.

3.3. Methods

The research reported in this thesis aimed to investigate the phenomenon of value creation of e-government, mainly, meaning, type or dimension of the value of e-government; and also to investigate the existing arrangements and critical success factors for creating value of e-government.

To address the research goal, this research was guided by the public value and information infrastructure (II) theories; and followed both theoretical and empirical approaches. For a theoretical approach (Study 1), a systematic literature review was followed to investigate the existing knowledge about the value creation of e-government, mainly, the current state, the meaning, type or dimension of value creation of e-government. And a case study approach was followed for empirical investigation. The main methodology used in this thesis work (Study 2, 3, and 4) was a case study, in which qualitative data collection and analysis methods were used. Data collection was through both primary and secondary sources. Data was collected through direct interviews and observations as primary sources. Data was collected through policy documents, projects reports, and plans as secondary sources. Data analysis for the empirical case studies (Study two and four) followed content analysis and thematic analysis and concept-driven coding approaches (Gibbs, 2007). Study 3 followed content analysis, Study 2 and Study 4 each followed thematic analysis.

3.3.1. Thematic analysis

Unlike data-driven coding (also called open-coding) that starts without any codebook or a pre-defined list of codes (categories or themes), thematic analysis or concept-driven coding starts with a codebook, also called a template or a framework (Gibbs, 2007). According to Gibbs (2007), those categories that the codes represent may come from previous studies or be generated by reading through some transcripts, field notes, focus groups and/or printed documents. In concept-driven coding, also referred to as deductive categorization (Spiggle, 1994), the framework approach (Ritchie, Lewis, Nicholls, & Ormston, 2013; Smith & Firth, 2011), and template analysis (King, 1998; Gibbs, 2007); the coding process consists of the identification of a chunk of text that exemplify a construct (category, theme, or idea) in the initial framework (Gibbs, 2007). One of the core expectations is to amend the initial framework during the analysis as new ideas, and new ways of categorizing, are detected in the text (Gibbs, 2007).

Close to content analysis but not the same, thematic analysis would go beyond that to permit the researcher to combine the analysis of their meaning within their particular context (Loffe & Yardley, 2004). In content analysis, only the frequency of codes is counted to find significant meanings in the text (Morgan, 1993). According to (Loffe &Yardley, 2004; Shields & Twycross, 2008), more frequent identification could indicate greater importance or reflect greater willingness or ability to talk about the topic (Loffe &Yardley, 2004; Shields & Twycross, 2008). Hence, both approaches present strengths and weaknesses. For example, in content analysis there is the danger of missing the context because of only focusing on the frequency, and with thematic analysis there is a probable increase of bias. However, in this study, the bias was addressed by following the main objective, research question, and the conceptual framework of the public value of e-government. All three approaches together informed the data collection and also facilitated drawing meaning from the data.

Data analysis was facilitated by NVIVO software and followed the procedures of content analysis (study 2), and template analysis (Study 3, and 4). The empirical base of this thesis was the IREMBO, a large- scale Public-private partnership to digitalise into a single-window portal, all G2C and G2B services in Rwanda.

Thus, the IREMBO project (described in section 2.2.1) was identified as a suitable case to understand e-government in Rwanda today, because it is a large-scale and complex project meant to act as a central driving force for

e-government in the country. The background information about Rwanda and the IREMBO project is presented in section 2 of this thesis.

3.3.2. Literature Review Approach

A literature review on a specific topic is worthwhile if there are a growing interest and accumulation of research on that topic (Webster & Watson, 2002). Mainly, the literature review is used for theory development (Rowe, 2014; Webster & Watson, 2002), close areas where a plethora of research exists, and uncover areas where research is needed (Webster & Watson, 2002). Also, a literature review may aim to understand the phenomenon as a whole, its overall meaning and its relationships from the parts to the whole and reciprocally, as in the hermeneutic circle (Rowe, 2014).

Literature reviews contribute to theory building when they are a thorough and comprehensive, that is, based on a reasonable quantity and quality of relevant literature (Schwarz, Mehta, Johnson, & Chin, 2007), and emerge from a coherent conceptual structuring of the existing research to identify critical knowledge gaps, including theoretical biases, thematic gaps, alternative theoretical underpinnings (Rowe, 2014; Webster & Watson, 2002). And that, a literature review contributes to theory building when, in addition to landscaping the review should 'conjecture new real phenomena to explain hitherto unexplained empirical phenomena' Okoli (2012, p. 5 cited by Rowe (2014)). To their theory development goal, reviews are distinguished into three main types: reviews for describing, for understanding and for explaining (Rowe, 2014).

Thus, in study 1 of this research, a thorough and comprehensive review of the existing research in the field of the value of e-government was done in order to understand the current knowledge about the value creation of e-government, uncover areas where research is needed, and ultimately the study conceptualized the meanings, types, or dimensions of the public value of e-government.

In Study 1 of this thesis work, Webster and Watson (2002)'s review process was followed to review the literature in the field of the value of e-Government published in academic journals, proceeding from the year 2005 to 2016. Webster and Watson's review process was followed because it provides a systematic method for data collection (i.e., for the searching, selection, and analysis of data) and the analysis of literature reviews.

3.3.2.1. Data collection in the literature review study – Study 1

The literature review process in study 1 (i.e., the searching, selection, and analysis of data) followed Webster and Watson (2002) structured approach. This approach suggests that the searching for material should start from leading journals in the field. In response to that requirement, the search for relevant literature in Study 1 was started by searching the e-Gov. Reference Library (EGRL), version 12.0 of July 2016 which was the latest version of EGRL at the time and contained 8181 peer-reviewed references in the study domains of e-government. The EGRL is a repository that aims to capture and integrate into one source the majority of English language and peer-reviewed academic papers on e-government. In the quest for saturation, the search continued through "snowball sampling", That is, checking for more relevant papers by checking in the reference list of relevant papers as are identified. The full text of the pertinent new papers from the snowball sampling have been searched in Google Scholar, ISI Web of Science and Scopus. For the accuracy of the search, the following keywords were selected: "Value, IT, government, public administration, public sector, public organisations, public agencies, public institutions, and e-government."

The following five inclusion criteria have been facilitated in the selection of relevant articles:

(i) the article is published in peer-review journals or conference proceedings in the period 2005 – July 2016;

(ii) written or presented in English;

(iii) discussing the value of IT projects in the context of e-government;

(iv) conceptualising, measuring, or implementing the value of IT in the context of government; and

(v) The full-text is available for examination.

By combining the relevant papers from the initial search and the snowball sampling, 53 relevant articles were considered for this review study and then analysed.

3.3.2.2. Data Analysis in the literature review study - Study 1

For data analysis, Webster and Watson's (2002) concept-centric method was adopted.

Guided by the concept-centric method, relevant articles were grouped (categorised) based on their main thesis, foci, and orientations. The approach of grouping literature based on some themes or concepts is what (Webster & Watson, 2002) refer to as a "concept-centric" view. And the artefact created, that is, the categories created which also are referred to as a concept matrix; were analysed to help in the identification of areas where a plethora of research exists, and areas where research is needed in the field of the public value of e-government. Also, content analysis, especially, open coding (Vaismoradi, Turunen, & Bondas, 2013) has been adopted to analyse and code the data to develop some concepts related to the meanings and the types of the value of e-government, hence, theory building.

3.3.3. Case study approach

The empirical investigations of this thesis followed a case study method in a single case study setting.

Yin (2009) argues that a single case study is appropriate if the objective of the research is to explore a previously un-researched subject such as the implementation of IREMBO project which was the empirical base of this study.

IREMBO is an ongoing, large-scale Public-private partnership to digitalise into a single-window portal, all G2C and G2B services in Rwanda. The IREMBO project is unique in many ways, for example, it is one of few, if not the only e-government initiative today, that is executed in a PPP and BOT environment. The IREMBO case is described in section 2.2.1 of this thesis.

As previously highlighted, the case study was the major approach of this thesis work. For example, among the four studies of this thesis, Study 1 followed a literature review, and the rest of the studies were under a case study method.

Yin (1989) argues that a case study method is not merely a data collection tactic nor a research design but a comprehensive research strategy. According to Yin (1989), the case study method should be designed in a way that it indicates not only what data are to be collected, but, for example, if we can consider the research questions, the associated propositions and the unit of analysis (the case to be studied). The case study design also should tell what is to be done after the data have been collected, for example, it should tell how the data is to be analysed (linking the data to the propositions/main

objectives). The case study design should suggest also the criteria for interpreting the findings.

A (qualitative) case study method can be adopted when there is a desire to investigate a contemporary phenomenon in its real-life context, if the context is pertinent to the object of study and/or the boundaries between the phenomenon and context are not clearly evident, in case there are more variables of interest than data points, in case there is a need for multiple sources of evidence where the data triangulate, and in case there is a need to benefit from the prior development of theoretical propositions to guide data collection and analysis.

A case study should rely on primary documents, secondary documents, cultural and physical artefacts, direct observations and systematic interviews but without bonds on any of them Yin (1989).

Also, a case study is suitable to investigate the "what" questions which aim to explore purposes, but are suitable also for qualitative investigations to address process-oriented questions of "why" or "how" (Leech & Onwuegbuzie, 2007); especially, when a ''how'' or "why" question is being asked about a contemporary set of events over which the investigator has little or no control Yin (1989).

Like its competitors, (e.g., surveys, experiments, archival analysis), the case study strategy can be used for three purposes: exploratory, descriptive, and explanatory studies, with an added on the ability to cover contextual conditions more than any of its competitors, can do Yin (1989). Furthermore, the case study strategy should not be confused with "qualitative research"; instead, case studies can be based on any mix of quantitative and qualitative evidence.

With regards to the scientific generalisation of the findings when adopting a case study method, Yin (1989) argues that, like experiments, case studies are generalizable regarding the theoretical propositions and not regarding populations or universes. Hence, when adopting a case study method, "the investigator's goal is to expand and generalise theories (analytic generalisation) and not to enumerate frequencies (statistical generalisation)" according to Miles and Huberman (1984). In the context of qualitative, case studies, researchers should fulfil the condition that if other researchers can follow the same settings, they may not necessarily reach the same findings, but at least they may likely reach to analogous findings.

According to Miles and Huberman (1984), data collection entails data reduction, and data reduction can profitably occur before, during, and after

data collection. Data reduction should not be understood as context-stripping; rather, data reduction should mean (I) techniques to scope, focusing, and bounding the collection of data; (II) thinking about the existing data set and generating strategies for collecting new data without butchering the data or absorbing fieldwork time; and (III) considering data display objects which would facilitate the drawing of conclusion/meaning, and verification.

3.3.3.1. Data collection in Study 2

About the objectives of this thesis, Study 2 addressed two specific objectives, objective 2 to investigate the value (types or dimensions, or generating mechanisms) of e-government; objective 3 to investigate the perceived and actual value of e-government in an LDC. Concerning objective 3, study 2 focused on the espoused (anticipated) value of e-government in an LDC through the example of a case study on the IREMBO project in Rwanda (described above in section 2.2.1).

Data was collected over a period from August 2015 to December 2017 and was collected from three main sources. First, through secondary sources, mainly from the following five documents: (I) About Rwanda Online (II) ICT Sector Profile - e-Government: "Enabling Excellence in Service Delivery" (Rwanda Ministry of Youth and ICT, 2015); (III) ICT Sector Strategic Plan [2018-2024] - "Towards digital-enabled economy" (Ministry of Information Technology and Communications, November 2017); (IV) IREMBO Implementation Framework for the Development and Deployment of Rwanda's Single Integrated e-Government Platform (The Government of Rwanda, February 2016); and (V) Smart Rwanda Master Plan (SRMP) - "Towards a Knowledge-Based Society" (Ministry of Information Technology and Communications, October 2015).

Secondly, through purposive semi-structured interviews with policymakers, project managers and/or implementers from both the private partner ROL and the Government of Rwanda (GoR) represented by RDB IT as per the PPP agreement. Additionally, participatory observations from a two-day conference organised by the ROL were conducted. In brief, the analysed data is composed of 18 interviews with 18 informants, five documents, and one participatory observation. Data collection was facilitated by six questions. Also, during the observations and interviews, data was captured through note-taking. Note-taking was chosen above the other available options such as audio and video recording because employees would refrain from elaborating and speaking openly if they were being recorded. While acknowledging the shortcomings of note-taking, which include difficulties

in writing while simultaneously paying attention, making sense of notes after the fact, documenting the informants' exact words (Maccani et al., 2015), we also acknowledge the benefits of note-taking for the note-taker (Piolat, Olive, & Kellogg, 2005), which relate to better recall performance when reviewing self-produced notes (Kiewra et al., 1991).

3.3.3.2. Data analysis in Study 2

The data analysis followed a thematic analysis and a concept-driven coding approach (Gibbs, 2007). Unlike data-driven coding (also called open-coding) that starts without any codebook or a pre-defined list of codes (categories or themes), concept-driven coding starts with a codebook, also called a template or a framework (Gibbs, 2007). The categories that the codes represent may come from previous studies or be generated by reading through transcripts, field notes, focus groups and printed documents (Gibbs, 2007). As previously mentioned, in concept-driven coding the coding consists of the identification of a chunk of text that exemplifies a construct (category, theme, or idea) present in the initial framework with the main goal to amend the initial framework (Gibbs, 2007).

Concerning the research question regarding the anticipated public value, our initial codebook is comprised of six overarching areas, proposed by Twizeyimana and Andersson (2019), which could create the public value through the implementation of e-government.

NVIVO was used as a tool to conduct the analysis. Among others, the NVIVO tool facilitates the comparison of data from different sources and also enables the researcher to view data in various ways (tables, maps, descriptive figures, explanatory figures, descriptive matrices, etc.). NVIVO, thus, facilitates smooth data analysis for drawing conclusions and verification (Miles & Huberman, 1984).

3.3.3.3. Data collection in Study 3

Study 3 addressed objective 4, that is, to investigate the critical success factors towards the public value in the implementation of e-Government in the context of an LDC. To do so, study 3 adopted the case study strategy and the interpretive approach through content analysis and the open coding technique to investigate the implementation process of the IREMBO, with emphasis on arrangements, experiences or challenges in the implementation. The approach was reasonably facilitated us to identify contemporary challenges encountered by the direct actors in the early implementation of the IREMBO project while utilising the data itself.

I collected data through extensive participatory observations, as well as semi-structured interviews.

The study was conducted over the period from August to December 2015. During this time, I spent at least one day a week at Rwanda Online Ltd (ROL) headquarters, for the purpose of having colloquial interaction and talking with project managers to get a deeper understanding of the project. Rwanda Online Platform Ltd (ROL) is the business that entered into a public-private partnership (PPP) agreement to build, operate, and transfer (BOT) the IREMBO platform within 25 years.

Further participatory observations took place during regular visits at the company, especially during training sessions where each session lasted around three hours on average, and during a two-day retreat.

Two interview questions guided the data collection in this research.

1) Concerning the project IREMBO, what are the major challenges and experiences so far? And
2) What measures are in place to address those challenges?

During observations and interviews, data was captured through note-taking.

When compared to its competitors (audio/video recordings), the advantages with note-taking include, but are not limited to, a comfortable environment for informants to feel freer in their interactions with the researchers. Notwithstanding the shortcomings with note-taking (Piolat et al., 2005; Kiewra, 1985). As in our previous study, Twizeyimana (2017), the challenges to note-taking have been addressed through (I) listening first and take notes after (during dialogue break or directly after the event); and (II) through reviewing self-produced notes just after the session for a better recall performance.

Apart from colloquial conversations at ROL, and observations at the retreats, shorter interviews were also conducted to get responses to more direct questions that had been raised during the participatory observations. The interviewees were selected by purposive sampling of people from stakeholders directly involved in the work with IREMBO. A total of 16 semi-structured interviews were conducted, with an average length of 10 minutes. Eleven interviews were conducted with employees at ROL and five with government actors.

Observations were conducted through participation in four training events for Civil Registration Officers (CROs), and during a two-day retreat with participants from senior management, corporate department, project management, and IT support departments at Rwanda Online Platform Ltd. CROs are public servants at sector level in the local government and, among other activities, CROs are in charge of providing services related to the civil status or life events to citizens and include, but are not limited to, registration and issuing certificates of marital status, birth, death, and authentication services. Hence they are the direct users of the IREMBO system at the local government level.

Table 6 and Table 7 respectively, present a generalised profile of participants in participatory events and summarised profiles of interviewees.

Table 6: Generalized profile of participants in the observed training sessions.

Event	Date	Location	Participants & roles	Domain/ Department
Training	1st October 2015	Bugesera District – Nyamata	Civil Registration Officers (CROs)	Civil Registration Office at the sector level.
	15th October 2015	Kigali e-ICT Center		
	19th October 2015	Rulindo District-BDF Centre		
	16th December 2015	Gicumbi District - BDF Centre		
Retreat organised by ROL	27th & 28th August 2015	Bugesera District – Nyamata	Chief executives, Project managers, invitees which included consultants and researchers	Senior management, Project management, and corporate offices at ROL
Fieldwork visits at ROL	August - December 2015	ROL Headquarters in Kigali	Chief executives & Project managers	Senior management, Project management, and corporate offices at ROL

Table 7: Generalized profile of interviewees.

Industry	Domain	Department
Interviewees from ROL	Executive	Senior Management Office
	Management	Directorate of Product Development
	Management	Infrastructure Development Office
	Management	Payment channels and "directory of services."
	Management	Criminal records and Land services
	Management	Criminal records services
	Management	Training & Capacity Building
	Management	Integrated Call canter / Customer care services
	Technical	IT security
	Legal counsel	Legal Affairs Office
Interviewees from the government	Management	Directorate of ICT Support Unit at Rwanda National Public Prosecution Authority - Ministry of Justice
	Management	System and Network Administration Office of Bugesera District
	Management	IT office of Rubavu District
	Management	IT office of Gicumbi District
	Management	IT office of Kamonyi District

3.3.3.4. Data analysis in Study 3

Data analysis followed an inductive approach, that is, a bottom-up approach for moving from the specific (i.e., coding each piece of text) to the general categories generalised from codes. Hence, with an inductive approach, and concepts are inductively generalised from the data.

In Study 3, content analysis was used following open coding. That is, the study followed a bottom-up approach starting from data transcripts to code, from code to sub-themes, and then from sub-themes to themes. Through open-coding; I read the transcripts line-by-line. Hence a code (word or expression) was assigned to represent the meaning of the entire line or paragraph (a group of lines). Thus, the initial codes stayed close to the informants own formulations (Benaquisto & Given, 2008). Following the initial coding, the analysis moved to sub-themes, where the focus was on relationships between single codes, where similar challenges were discussed. Thus, new codes were created by combining two or more codes whenever it was suitable. This approach was used iteratively, as codes were revised, and scrutinised for overarching relationships (Dwivedi et al., 2011). In the final stage of coding the overarching categories were created to group the related themes. The coding process was conducted by using NVIVO Pro version 11, a software which provides facilities to create, organise, and analyse the codes. Finally, the findings have been interpreted employing the information infrastructure theory, then positioned and discussed through

the existing literature on implementation of e-government in the LDCs and sub-Saharan Africa.

3.3.3.5. Data collection in Study 4

Study 4 applies the learning from the previous studies, Study 1, 2, and 3 to investigate the gap between the perceived and actual value to investigate the critical success factors in the context of the implementation of IREMBO project. The context here is composed of aspects like the nature of the project under study, the local and regional context. In that direction, Study 4 addresses objectives 2, 3, and 4.

Study 4 followed a case study method. The case was the IREMBO project.

The data collection and analysis were conducted from the perspective of Miles and Huberman's (1984) model for qualitative data analysis. This model is composed of three components: data reduction, data display, and drawing conclusions and verification. According to Miles and Huberman (1984), this model protects the interpretivist ideals of preserving the context in which the data resides. In this model, data reduction, data display, and conclusion drawing-verification are interwoven before, during, and after data collection.

Data was collected through fieldwork on the IREMBO project from August 2016 to December 2017.

Data sources were purposive semi-structured interviews with project managers, public servants and policymakers, citizens, and intermediaries. These intermediaries are private businesses and individuals who have been given roles to facilitate the public to access and transact with the IREMBO portal, especially for those who do not have skills or facilities to access and transact government e-services. Hence, intermediaries are generally considered as citizens because they have been trained to facilitate citizens along with the public service delivery through IREMBO. Therefore, intermediaries know how the system works and will give a rich view of the phenomenon. Also, data were collected through direct observations at service delivery points, and documents (policy documents, government documents and/or reports, and projects reports).

Forty-two semi-structured interviews were conducted where each interview lasted at least 15 minutes; four official documents were consulted, and direct observations were randomly executed during the data collection period.

3.3.3.6. Data analysis in Study 4

The analysis of raw data was thematic and was guided by a framework of the public value of e-government, as suggested in Twizeyimana and Andersson (2019). Close to content analysis, but not the same, thematic analysis permits the researcher to combine analysis of meaning within a particular context (Loffe & Yardley, 2004). Through two iterations, we have read, one after the other and line by line, the transcripts of interviews and project reports to understand the anticipated (done in a separate study) value, and in this study, the experienced or in-action public value of the IREMBO e-government project. The analysis was done by reading through all notes and comparing pieces of texts in a phrase with generating mechanisms of each of the six overarching areas of the public value. Whereas there was no fit in all six areas of the framework, a new theme was created, and related themes were grouped into new areas. Finally, we deleted all parameters in the template which had no matches from the data. Hence, the template framework was revised with parameters validated from the data. The NVIVO software tool was used as the mechanical system to manage data for the analysis.

3.4. Ethical considerations

The research reported in this thesis is into the domain of Information Systems (IS). The research followed a qualitative approach to investigate the contemporary and complex phenomenon of value creation of e-government. Being qualitative research with much interaction between the researcher and the object of study through interviewees; throughout this research process, the attention was paid to primary ethical considerations for research in general, for qualitative research, and research in the IS. Under the guidance of the ethical requirements discussed here below, these requirements shielded this research from the bias.

Thus, in this research, the ethical considerations as recommended by the Swedish Research Council (Vetenskapsrådet) and also as suggested by the AIS Code of Research Conduct set by the Association for Information Systems (Association for Information Systems, 2014) had been followed.

The AIS body of ethical code is divided into three categories of code items.

The following table depicts each category and respective code items.

Table 8: the AIS research code of conduct – Adapted from (Association for Information Systems, 2014)

Category	Code Item
Category I: Codes that must ALWAYS be adhered to	
1	Do not plagiarise
2	Do not fabricate or falsify data, research procedures, or data analysis.
3	Do not use other people's unpublished writings, information, ideas, concepts or data that you may see as a result of processes such as peer review without permission of the author.
4	Do not make misrepresentations to editors and conference program chairs about the originality of papers you submit to them.
Category II: Codes in this category are "recommended ethical behaviour."	
5	Give priority to the public interest when dealing with information systems development
6	Respect the rights of research subjects, particularly their rights to information privacy, and to being informed about the nature of the research and the types of activities in which they will be asked to engage.
7	Do not abuse the authority and responsibility you have been given as an editor, reviewer or supervisor, and ensure that personal relationships do not interfere with your judgment.
8	Do not take or use published data of others without acknowledgement; do not take or use unpublished data without both permission and acknowledgement.
9	Declare any material conflict of interest that might interfere with your ability to be objective and impartial.
10	Acknowledge the substantive contributions of all research participants
11	Use archival material only following the rules of the archival source.
Category III: advice	
12	Keep the documentation and data necessary to validate your original authorship for each scholarly work with which you are connected.
13	Do not republish old ideas of your own as if they were a new intellectual contribution
14	Settle data set ownership issues before data compilation.
15	Consult appropriate colleagues if in doubt.

According to (Susha, 2015), the Swedish Research Council (Vetenskapsrådet) generalised the ethical requirements into three main requirements of information, consent, confidentiality, and use; that is these requirements are aligned to ethical conducts codes for social sciences research in many other countries. Hence, it is not a surprise that they cover (to some degree) the AIS research code of conduct described above.

Thus, this research complied with the ethical requirements in general, and in the context of qualitative research; the requirements which here summarised by Susha (2015) into

1. Autonomy – to state that participants' values and decisions should be respected;
2. Beneficence – that research should produce positive benefits while protecting participants;
3. Justice – that all people should be treated equally.

Concerning autonomy, the research should quest for a dynamic (i.e., with possibility to withdraw at any time) informed consent from the researcher participants. That is, the participants should know what they are involved in (an ethical requirement concerning information), and data should not be gathered or used without their consent (consent requirement). This research complied with the autonomy principle because before each interview session. Concerned participants had been contacted, communicated the object and direction of the interview. Recording of interviews was done in few instances where the interviewee agreed to that.

In many instances, interviewee requested not to be recorded, and I complied and requested them to use note-taking; a method which also worked well in collecting the data I wanted. Hence, throughout this research, participants were well informed, they had in their participation, and consent was received in all the data that has been used.

Concerning beneficence requirement that relates to the protection of informants' concerns about disclosure of their identity, or the confidentiality requirement; throughout this research, referring to the sources was anonymous and did not disclosure the precise position or anything that would have to identify the participants in any way. And concerning the third requirement, justice requirement, this research analysed data sources equally without and did not favour any participant or group of participants among others. That is, the analysis conducted included views of all participants in that specific study. Also, in the direction to the justice requirement, this research through citations recognised all others' contributions and sources used.

With regard the use ethical requirement about data collection, use, and publication; I have validated data with participants to make sure that they corresponded to their opinion, and also, participants were communicated that the results were going to be published in an academic outlet and for academic purposes not for any other purpose.

4. A Summary of Key Findings and Conclusions

This thesis work investigated the phenomenon of value creation through e-government. The main discussion was about what people mean by advancing that they are implementing e-government for value creation, what value is created through e-government, how we create the value of e-government.

The main objective of the research was to investigate the phenomenon of value creation of e-government, with a focus on the LDCs.

The main research question was "How do we create value through e-government in the context of an LDC?" This general question is addressed by answering the following operationalised research questions

This thesis is compiled from four primary studies; one theoretical study and three empirical studies.

ORQ 1, what is the current state of research on the public value of e-government?

ORQ 2, what value is e-government supposed to yield?

ORQ 3, what public value is anticipated in the IREMBO project for building G2C and G2B e-government portal in Rwanda?

ORQ 4, what public value is in action in the IREMBO project?

ORQ 5, what gap is there between the anticipated values and the realised values in the IREMBO project?

ORQ 6, what are the important challenges and the lessons from the implementation of the "IREMBO" project?

ORQ 7, what are the critical success factors for public value creating in the context of an LDC?

Theoretically, this research was guided by the public value and information infrastructure (II) theories; and the empirical base was the IREMBO, a large scale Public-private partnership to digitalise all G2C and G2B services in Rwanda into a single-window portal.

This thesis work is composed of four primary studies: three empirical studies, and one theoretical study. In the next sections of this chapter, key findings in each of the studies are summarised.

4.1. Study 1, E-Government and Value Creation

Study 1 is a theoretical study conducted through a systematic literature review method.

This study contributed to the main objective of the study through addressing the specific objective 1 and objective 2 above described. More specifically, study 1 had the objective to investigate the existing knowledge on

value creation of e-government, and also investigate the meaning, type, and dimensions of the value of e-government.

In Study 1, the following research questions have been investigated:

- What is the existing knowledge about the public value of e-government? And

- Which value e-government is supposed to yield?

This study produced the current knowledge on the meaning of value creation in the context of public affairs such as the delivery of public services, policies, projects, etc. hence, the meaning of value creation of e-government.

4.1.1. What does "value creation" through e-government mean? And what value?

According to the findings from the literature review study, the first step to creating value is to understand it (Bannister et Connolly, 2014; Castelnovo, 2013; Chircu, 2008; Flak et al. 2009; Moore, 2004; Ndou, 2004; Rose et al. 2015). For example, a clear understanding of the value of e-government would make the design of e-government projects easier in the way that makes them easier to achieve and assess Flak et al. (2009), and coordinating stakeholders' basic values in the execution of a project (for example, e-government) may be an important route to success (Rose et al., 2015). The notion of success here follows Heeks (2003)'s model of success – i.e., a project is a success when most of the stakeholder groups attained their major goals and did not experience significant undesirable outcomes.

Literally, the notion of "value creation" is composed of two terms: value and creation. The first step towards the understanding of this concept, we need to understand clearly each of the two notions by which it is composed. The term "creation" has a straightforward meaning independent of the context. The term creation (in the English Oxford dictionary) is defined as: "the action or process of bringing something into existence."

The term value, on the other hand, has various meanings depending on the context in which it is used. For example, the term "value" in economics is … a measure of the benefit provided by a good or service to an economic agent; and it is represented in terms of money. The alternative interpretation is "what is the maximum amount of money a specific actor is willing and able to pay for the good or service" Wikipedia contributors (2019, October 17). In ethics, "value denotes the degree of importance of something or action, values reflect a person's sense of right and wrong. In this view and in relation to public sector organization, Omar, Scheepers, & Stockdale (2011) argue that providing citizens with services is one of the main sources

of public value, and this value is highly dependent on the level of quality of service delivered by a public organization.

Also, value determines what actions are best to do or what way is best to live or to describe the significance of different actions. Value is the" worth, utility, or importance of an entity" Rose (2012). The singular 'value' should be distinguished from the plural 'values' (Bannister and Connolly, 2014). According to Bannister et al. (2014) "values" are normative characteristics or modes of behaviour that individuals, groups or organisations hold to be right or at least better than other characteristics or modes of behaviour…and 'Value' is a quality applied to a good, service or outcome which supports one or more values.

This thesis supports the understanding that value creation of e-government should be related to the value creation of any other government entity because, with e-government, we are talking about the government. The term "government" here should be understood as the top-level entity in charge of the politics and public administration within a state.

Based on the existing literature in the field of value creation for e-government, this thesis investigated the meaning of value creation and types or dimensions of the value of e-government. These findings were reported in study 1 and revealed that in the context of public sector affairs, the public value theory is a reasonable theory to explain the value of policies and actions of public sector organizations (Moore, 1995). The creation of the public value is the ultimate goal, mission, and ultimately what should characterise or distinguish a government entity from a business entity (ibid). The public value perspective helps to assess public sector organizations not only in the basis of their ability to deliver the value-for-money, but also puts emphasis on value to the citizens (Cordella & Bonina, 2012). For example, on accountability, openness, representativeness, equity, civil services (Chircu & Lee, 2005), political and social objectives in government, social inclusion, community regeneration, community well-being and sustainability (Grimsley & Meehan, 2007). Consideration of stakeholders with their respective value dimensions (Castelnovo, 2013; Chircu, 2008; Dzhumalieva, Noel, & Baudu, 2010). A focus on, increased flexibility, better customer service, reduced inventory, and increased reliability (Chircu, 2008), expectations of politicians, employees, citizens and businesses (Liu et al., 2008; Rose et al., 2015). Generally, citizens expect from their government peace, security, public good creation and resource allocation, better services, information dissemination, democracy, transparency, accountability, social justice and liberty (Chircu, 2008). After all, they expect wellbeing.

Hence, in the quest for "public value", governments deal with strategic goals which go beyond economic gains to account for political and social objectives such as efficiency in public service, equal treatment of constituents, social inclusion, openness, community regeneration, community well-being, stewardship and accountability (Chircu, 2008; Chircu & Lee, 2005; Cordella & Bonina, 2012; Grimsley & Meehan, 2007; Moore, 1995).
Though there is no single, universally accepted definition of what "public value" means (Castelnovo, 2013); Moore's (1995) conceptualisation of the notion of public value is considered by many as the cornerstone of the public value theory. Moore (1995) theorised the notion "public value" as citizens' collectively expectations from government actions, policies, and public services. Alternatively, the public value is understood as the value or importance that citizens attach to the outcome of government policies and their experience of public services (Moore, 1995; Bonina and Cordella, 2009; Scott et al., 2009). The term Citizens to include citizens in their different stakeholder roles, for example, citizens as such, as taxpayers, as beneficiaries, as users, as participants, as entrepreneurs, as custodians, and citizens as policy-makers (Castelnovo, 2013).

However, there have been critics and development of the public value theory which originally conjectured by Moore (1995). Majority of critics concerns the content and completeness of Moore's theory with accusations that it does not provide factors across contexts. Since then, Moore's original theory has undergone a series of development (adaptations, operationalisations, or contextualisation).

In the context of ICTs in the public sector the next paragraphs summarize the public value theory development. These suggested framework for a common ground for a departure when dealing with value creating (or the public value) of e-government.

Kelly et al., (2002) contextualised original Moore's theory into three dimensions of services, outcome and trust as what clients and citizens value in respect of government and public Services. Kelly et al. (2002)'s framework was later on adapted by Kearns (2004), Grimsley and Meehan (2007, 2008). Liu, Derzsi, Raus, & Kipp (2008) identified four types: financial value, social value, operational (foundational) value and strategic (political) which represent a shared understanding of various researchers and practitioners for the e-government project valuation. *Financial value* - implies impact on current or anticipated income, asset values, liabilities, entitlements, and other aspects of wealth or risks to any of the above. *Social value* - im-

plies impact on society as a whole or community relationships, social mobility, status, and identity. Social and psychological returns include increased social status, relationships, or opportunities; increased safety, trust in government, and economic well-being. *Operational (foundational) value* - implies impact in realized operations processes and in laying the groundwork for future initiatives. And *strategic (political) value* - implies impact on personal or corporate influence on government actions or policy, on role in political affairs, or influence on political parties or prospects for current of future public office, including impacts on political advantage or opportunities, goals, resources for innovation or planning. Smith (2009) proposes an analytical framework of four democratic goods provided by digital innovations. They are: inclusiveness (the way in which political equality is realized in at least two aspects of participation: presence and voice), popular control (taking consideration of the degree that participants are able to influence different aspects of the political decision-making process.), considered judgement (entails inquiry into citizens' capacity to both understand the technical details of the issue under consideration and the perspectives of other citizens.) and publicity (publicity centers reflection on the openness of proceedings to the wider public). They argue that those democratic goods are complemented by two additional institutional goods: efficiency (Efficiency demands that we attend to the costs that participation can place on both citizens and public authorities) and transferability (provides an occasion to evaluate whether designs can operate in different political contexts, understood in relation to scale, political system or type of issue). In their effort to investigate the notion of public value in e-government projects, Bonina & Cordella (2009) proposed a framework that distinguishes between two main clusters of public values: (I) those managerial values relating to efficiency, effectiveness and performance of tasks; (II) the cluster of democratic values, relating to equity, honesty and fairness. They argue that the conception of e-government domain seems to concentrate mainly on managerial values (efficiency driven performance measures).

Omar, Scheepers, & Stockdale (2011) conceptualizes the public value as the outcome from e-government impact on service quality, system quality and information quality.

Karunasena, K., Deng, H., & Singh, M. (2011), proposes a four dimensions framework for evaluating public value of e-government. The four dimensions and associated key performance indicators (KPIs) are: ***delivery of public services*** (information: availability of information for citizens through e-government, importance: importance of the information to the citizens,

choice: availability of multiple e-government channels, fairness: fairness of e-government service delivery, cost savings: cost savings for citizens using e-government services, take-up: use of e-government services, citizens' satisfaction: citizens' satisfaction with e-government services; ***achievement of outcomes*** (socially desirable outcomes: achievement of socially desirable outcomes through e-government);

development of trust (Security and privacy: To what extent government secure public information and privacy of citizens through e-government, Transparency: To what extent public organizations disclose their decision-making processes and procedures through e-government, trust: Public's trust for e-government services, participation: Improve citizens' participation in public discussions);

effectiveness of public organization (Efficiency: Increase efficiency of public organization,

Accountability: Improve the answerability of government, Citizens' perceptions: Citizens' opinions about an e-enabled public organizations).

Pirannejad (2011) argues that ICT creates the public value, e.g., of type political, through (I) developing government capacity (human capacity, technology), (II) public service, which includes how ICTs can enable government to improve the process of public service delivery to citizens in new or improved ways; and (III) transparency which refers to how ICTs force governments to give more information to citizens about their functions, revenues, and costs and thus puts pressure to government to be transparent with people.

Jansen (2012) argue that ICTs impact value generating mechanisms of (efficiency, effectiveness, democracy, innovation) to create the public value of type: financial value, organizational value, constituency value, political value, social value. In their model (ibid), ICTs in government impact (I) on efficiency: financial gain, better organization → to produce the public value of type financial & organizational value; (II) on effectiveness: more inclusive public services → to produce the public value of type constituency value; (III) on democracy: Openness, transparency → to produce the public value of type political value; and (IV) on innovation: better access to information → to produce the public value of type value creation in society or soci**al value.**

Bai (2013) suggests three basic public values for analysis. They are: (I) delivery of public services: service available, importance, choice, fairness, cost savings, citizens' satisfaction); (II) effectiveness of public organization

or operating an effective public organization: efficiency, citizens 'perceptions, interactive communication); (III) development of trust: security and privacy, transparency, trust, participation. Castelnovo (2013) argue that e-government initiatives impact on the value generating mechanisms: efficiency, effectiveness, intrinsic enhancements, transparency, participation, and collaboration → to create the public value of type financial, political, social, strategic, ideological, quality of life, stewardship.

Bannister & Connolly (2014) conceptualised a taxonomy of three types of public values for assessing the impact of ICT in public sector. Those are: (I) duty oriented values: responsibility to the citizens, responsibility to the elected politicians of the day, proper use of public funds, compliance with the law, efficient use of public funds, integrity and honesty, facilitating the democratic will, accountability to government, economy/parsimony, rectitude); (II) service oriented values: service to the citizen in his or her different roles, respect for the individual, responsiveness, effectiveness, efficiency, transparency; and (III) socially oriented values: inclusiveness, justice, fairness, equality of treatment and access, respect for the citizen, due process, protecting citizen privacy, protecting citizens from exploitation, protecting citizen security, accountability to the public, consulting the citizen, impartiality.

Rose et al (2014) by means of the public administration literature they conceptualise the public value into four value positions relevant to e-Government. Those are: (I) professionalism (providing an independent, robust and consistent administration, governed by a rule system based on law); (II) efficiency (providing lean administration, which minimizes waste of public resources gathered from taxpayers); (III) service (maximizing the utility of government to civil society by providing services directed towards the public good); and (IV) engagement (engaging with civil society to facilitate policy development in accordance with liberal democratic principles).

Through investigating public sector managers' purposes, motivations and common goals for e-Government initiatives, Rose et al. (2015) posited three (competing) value positions of e-government: (I) administrative efficiency (efficiency, effectiveness, economy, productivity, performance); (II) service improvement (public service, citizen orientation, service level, service quality); and (III) citizen engagement (responsiveness, consultation, collaboration, participation).

Scott, Delone, & Golden (2016) suggested the constructs: cost, time, convenience, personalization, communication, ease of information retrieval, trust, well-informedness and participate in decision-making as the public

value-based constructs to measure net benefits of eGovernment 2.0 systems from a citizen perspective.

According to Cook & Harrison (2015), based on a set of international cases and vetted by a global community of practitioners and scholars, identified seven general types of the public value impacts which should serve as the basis for discussion of an IT investment (e.g., e-government) in the perspective of the public value. The 7 types of public value impacts are:

(I) Social – refers to impacts on family or community relationships, social mobility, status and identity. (II) Economic – impacts on current or future income, asset values, liabilities, entitlements or other aspects of wealth or risks to the above. (III) Stewardship – impacts on the public's view of government officials as faithful stewards or guardians of the value of the government in terms of public trust, integrity and legitimacy. (IV) Quality of Life- impacts on individual and household health, security, satisfaction and general well-being. (V) Strategic– impacts on person's or group's economic or political advantage or opportunities, goals and resources for innovation or planning. (VI) Political– impacts on a person's or group's influence on government actions or policy, on their role in political affairs, influence in political parties or prospects for public office. (VII) Ideological– impacts on beliefs, moral or ethical commitments; alignment of government actions, policies or social outcomes with beliefs, moral or ethical positions.

Pang, Lee, & DeLone (2014) argue that IT resources create value by advancing five organizational capabilities: public service delivery capability, public engagement capability, co-production capability, resource-building capability, and public-sector innovation capability.

More recently, through a systematic literature review on the topic of value creation of e-government, Study 1 of this thesis identified six areas through which e-government creates the public value. They include improving public services; improving administrative efficiency; improving Open Government (OG) capabilities; improving ethical behaviour and professionalism; improving trust and confidence in government; and improving social value and well-being. Table 9 depicts the framework of the public value of e-government, as identified in Study 1 (the literature review study). Those are the overarching and overlapping six dimensions where e-government would create the public value. By relating the six dimensions to the e-government framework Ndou (2004), the six dimensions were in turn grouped into three overarching, and also overlapping dimensions of, (I) improved administration: to include improved administrative efficiency, Open Government

(OG) capabilities, improved ethical behaviour and professionalism; (II) improved public services; and (III) improved social value: to include improved trust and confidence in government, improved social value and well-being. Also, Key Performance Indicators (KPIs) in each of the six dimensions were suggested.

In *Table 13*, six overarching dimensions of the public value of e-government, along with the key performance indicators are described. Those key performance indicators are compiled from the results of the literature review study, study1, and the empirical study about the anticipated public value in the implementation of the IREMBO platform for digital delivery of government services in Rwanda. As it is the case for the main dimensions, there are interwoven overlaps in the KPIs. This information adds to the complexity in dealing with the public value of e-government where it is not straightforward to focus on a single parameter while ignoring the other. In this regard, the framework of KPIs here produced is of type descriptive, that is, a general and conceptual model to pave the way for a discussion about KPIs in the creation and measurement of the public value of e-government here generalised into six overarching and overlapping dimensions.

Table 9: Grouping six dimensions into three dimensions of the public of e-Government – adopted from Study 1: Twizeyimana and Andersson (2019)

Improved Administration	Improved Public Services	Improved Social Value and Well-being
* Open Government (OG) capabilities * improved ethical behaviour and professionalism	* Open Government (OG) capabilities * Improved ethical behaviour and professionalism * Improved trust and confidence in government	* Open Government (OG) capabilities * Improved trust and confidence in government

Table 10: Six overarching dimensions of the public value of e-government with suggested KPIs - adapted from Study 1: Twizeyimana and Andersson (2019)

#	Six Overarching Dimensions	Key Performance Indicators (KPIs)
1	Improved public services	* Improved efficiency in the delivery of public services: provision of more (quantity of) services to citizens, provision of more responsive, efficient, and cost-effective public services, removal of bottleneck and or queues in the delivery of services, * Improved professionalism in the delivery of public services: accountability in the delivery of services, improved transparency and control, participation, and collaboration in the delivery of public services * Increased quality of public information and services: provision of more inclusive public services, provision of public (citizen)-centred services, provision of personalised services (e.g., special provision for disability, language support for minorities, online advice, etc.), provision of services directed towards the public good, etc. * Improved access to and availability of public services: more delivery channels, ubiquitous and pervasive delivery of public services (e.g., online or mobile delivery of public services).
2	Improved administrative efficiency	* Cost-effectiveness: quick operations and/or delivery of public services, cost-reduction * Removal of bottleneck and queues in the delivery of services to citizens * Robustness: responsive, systemic, efficient, effective, sustainable, flexible, lean, and agile * Improved quality of processes * Reduction or elimination of the risk of corruption and abuse of the law by public servants * Proper and efficient use of public funds * Improved better management of public resources (e.g., using online applications and transactions) * a more flexible, pervasive, and cost-effective public sector (e.g., provision of online applications and transactions)
3	Open Government (OG) capabilities	* Increased transparency * Increased public/citizens participation * Improved public engagement and people are well-informed * Improved communication and collaborative actions * Improved public control and influence on government actions and policies * Improved political possibilities and innovations * Increased frequency and intensity of direct involvement in decision making

4	Improved ethical behaviour and professionalism	* Compliance with the law: make decisions by law and authorised policy, reduction or elimination of the risk of corruption and abuse of the law by public servants, maintain accurate and durable records and demand for good information for decisions, achievement of legitimacy, the rule of law, coherence, adaptability, impartiality, legality, equality before law, objectivity, professionalism, trustworthiness, and openness * Better collaboration, cooperation, and better communication * Enabling a durable and competent institutional capacity and impartially serving citizens * Reduction or elimination of the risk of corruption and abuse of the law by public servants. * Maintenance of fundamental beliefs and constitutional principles (e.g., the responsibility to the citizen/politician) * Facilitation of democratic will: increased transparency, participation, and inclusiveness * Reduction or elimination of the risk of corruption and abuse of the law by public servants * Increased integrity, honesty, fairness, equality, accountability, responsibility, economy/parsimony, rectitude * Achievement of legitimacy, the rule of law, coherence, adaptability, impartiality, legality, equality before law, objectivity, professionalism, trustworthiness, and openness
5	Improved trust and confidence in government	* Greater fairness, honesty, equality * Robustness: responsive, systemic, efficient, effective, sustainable, flexible, lean, and agile * Improved public control and influence on government actions and policies * Reduction or elimination of the risk of corruption and abuse of the law by public servants * Increased quality, availability of and access to government information and services * Provision of quality services to citizens * Increased collaboration, participation, and people are well informed. * Maintenance of accurate, durable records * Creation of permanent and competent institutional capacity * better management of public organisations, manage economy, public resources * Increased transparency (i.e., government (or public sector) is more transparent) * improved citizens' experience of service provision and service outcomes * improved interaction at the local level (e.g., visiting a local government website increase citizens' trust in local governments) * protection of foundational values of trustworthiness, openness, robustness, reliability, accountability and security: e.g., better security of public information and privacy of citizens

6	Improved social value and well-being	* Reduced administration burden enabled greater fairness, honesty, equality * Increased social status, relationships, and opportunities * Improved capacity building and empowerment * Increased safety * Achievement of better outcomes in areas of peace, security, poverty reduction, public health, high employment, low crime rates, clean streets, * Improved environment * Enabling freedom and equal rights * Improved citizens' levels of social contact * Improved citizens' social health * Impact on individual and household health, security, and satisfaction * Increased quantity and quality of services to citizens * Improved economic well-being * Impact citizen's income, assets, property, and wealth * Increase ease of doing business (i.e., create value for citizens in terms of increased citizens' well-being and quality of life

Table 11: An overview of theoretical frameworks of the public values - adopted from Ranerup and Henriksen (2019) (Ranerup & Henriksen, 2019)

Authors and source	Rose et al., 2015, p. 551	Bannister and Connolly (2014), Table 2 p. 123	Twizeyimana and Andersson (2019), p. 170
Overarching level	Value positions	Value orientations	Overarching public value dimensions
Names of overarching levels *(in italics)* and their respective content	*Professionalism ideal:* durability, equity, legality, accountability	*Duty oriented values:* responsibility to the citizen, responsibility to the elected politicians of the day, proper use of public funds, compliance with the law, efficient use of public funds, integrity and honesty, facilitating the democratic will, accountability to government, economy/ parsimony, rectitude	*Improved administration:* improved administrative efficiency, Open Government (OG) capabilities, improved ethical behavior and professionalism
	Efficiency ideal: efficiency, value for money, productivity, performance	*Service oriented values:* service to the citizen in his or her different roles, respect for the individual, responsiveness, effectiveness, efficiency, transparency	*Improved public services:* improved public services
	Service ideal: public service, citizen centricity, service level and quality	*Socially oriented values:* inclusiveness, justice, fairness, equality of treatment and access, respect for the citizen, due process, protecting citizen from exploitation, protecting citizen security, accountability to the public, consulting the citizen, impartiality	*Improved social value:* improved trust and confidence in government, improved social value and well-being
	Engagement ideal: democracy, deliberation, participation		

While reviewing the existing knowledge in the field of value creation of e-government, study 1 also revealed that the existing research is more theoretical and concerns mostly the understanding the value that e-government creates. Hence, with reasonable efforts for research about the understanding of the public value of e-government as it is seen in the existing suggested frameworks so far; the frameworks which would relate one another (for example, see frameworks in Table 11 above), this study suggests a focus shift towards more research and practices about how to create and measure the public value of e-government.

4.1.2. How do we create value through e-government?

According to the existing literature, the suggested approaches on how we create value through e-government here follow:

Through the review of public value management literature, in the process view, Pang et al. (2014) identified five organization capabilities through which IT resources contribute to value creation in the public-sector organizations. They are: public service delivery capability, public engagement capability, co-production capability, resource-building capability, and public-sector innovation capability. They argued that argue that IT resources in public organizations can enable public managers to advance public-value frontiers by cultivating these five organizational capabilities and to overcome conflicts among competing values.

Study 1 of this thesis argues that e-government creates the public value through advancing the following six areas: (I) the delivery of public services; (II) government efficiency and effectiveness; (III) global competitiveness and

well-being; (IV) Open Government (OG); (V) professionalism and ethical conduct; and (VI) building trust and confidence in the government.

As described above, Cook & Harrison (2014) identified seven general types of the public value impacts (Social, Economic, Stewardship, Quality of Life, Strategic, Political, and Ideological) which should serve as the basis for discussion of an IT investment (e.g., e-government) in the perspective of the public value. Based on that Cook & Harrison (2014) proposed the Public Value Analysis Framework that can be used for studying the value creation of an IT investment. Their proposed Public Value Analysis Framework for IT investment is described in five steps here below:

In step one, public value analysis begins with the creation of a collaborative definition of the IT action under consideration; in step two, the process moves to stakeholder identification; in step three, stakeholder analysis seeks to determine how the public value impacts for each relevant stakeholder group asking how each form of public value (from the 7 listed above) may or may not be associated with positive or negative changes for the group stemming from the proposed action. Step four asks the decision-making team to look across the stakeholder groups, consider the impacts they have identified for each group, and identify how each stakeholder group will realize that value. Step five requires the change agent to revisit all the public value information generated and start to identify prominent themes, laying the basis for recommendations.

Through studying successful local, state and federal eGovernment solutions in the USA; Chircu et al. (2005) identified six reusable key success factors that can help to maximize the eGovernment value. They are: (I) conduct business process reengineering (BPR) in preparation for e-government (BPR aligns an agency's internal processes with those of other agencies and thus facilitate cooperation (Yuan et al., 2004). Streamlining business processes in preparation for e-government initiatives makes the value propositions of the proposed e-government initiative more 'visible' to potential users (Chircu and Lee, 2003). According to Chircu et al. (2005), putting together a team within each government organization to map business processes specific to that agency, and then reengineering them with effectiveness and efficiency in mind are pre-requisites for the success of the proposed e-government system); (II) offer one-stop e- government solution (the meaning of one-stop e-government portal is 'Government without walls' i.e. it aggregates a variety of information and functionality to users in a way that information is organized according to users functional needs); (III) appoint visionary change agent (someone who can push people hard to make them

change, who sees beyond immediate economic justifications and work toward realizing both long-term economic and political benefits), (IV) divide and conquer (the agencies need to modularize the IT initiative efforts and implement a piece at a time while demonstrating incremental values to participating agencies along the way); (V) build a prototype (build a prototype for that the prototype should display value quickly and early in the process so that the users will grant credibility to the IT developers, participate in implementation and subsequently use the system, and the Key success factor; (VI) mandate change.

A growing trend in strategies or approaches to value creation in the business environment, and also in the public sector organizations, concerns value co-creation (Sarker et al., 2012), and benefits management methods (Flak et al., 2015; Lin et al., 2003).

4.1.2.1. Co-creation of value

Value co-creation starts with formation of alliances" between two or more firms with a primary idea that partnerships generally help increase firm value (Prashant & Harbir, 2009; Swaminathan & Moorman, 2009). The IS community is increasingly acknowledging that IT value is better created through the collaboration of organizations. (Kohli & Grover, 2008) argue that studies on value within the IS discipline should focus on value co-creation either through or surrounding IT.

Value creation literature has been much with a focus of the private sector to draw primarily on three theoretical perspective production, theories of competitive strategy, and theory of the consumer (Hitt & Brynjolfsson, 1996). The theory of production argues that "firms possess a method for transforming various inputs into output, represented by a production function," and the value of any resource (e.g., IT) is demonstrated by its contribution to a positive "gross marginal product" (Hitt and Brynjolfsson 1996, p. 123) cited by Sarker et al. (2012). Theories of competitive strategy, on the other utilize measures such as ROI, ROA, revenue, quality, sales, and IT capital for value assessment (Sarker et al., 2012). Finally, the theory of the consumer focuses on the "total benefit that a given purchase confers to consumers" and assesses value by estimating the demand curve and the total consumer surplus (Sarker et al., 2012).

According to Kohli and Grover (2008, p. 28), value co-creation represents the idea to create value through collaborations and actions of multiple parties each benefiting from that cooperation. In other words, co-creation is an alliance between a firm and its primary stakeholders, wherein the

stakeholders customize and co-produce products and services (Payne et al., 2008).

Sarker et al. (2012) argue that the resource-based view (RBV) of the firm was seen as one of useful theoretical perspectives in understanding value co-creation. With the RBV to suggest that valuable, rare, inimitable, and non-substitutable (VRIN) resources are the genesis of competitive advantage through value creation (Das & Teng, 2000; Mahoney & Pandian, 1992). Sarker et al. (2012) argue that, though RBV highlights the importance of VRIN resources and their manifestations as competencies for potential value creation activities, RBV by itself may not be sufficient to explain all of the aspects of value co-creation, for example, It is the nature of alignment of these resources in the alliance that determines success in terms of value co-created (Das and Teng, 2000; cited by Sarker et al., 2012). The two most common forms of alignment are complementary and supplementary (Das & Teng, 2000). In complementary alignment, firms contribute dissimilar sets of resources to the alliance, bringing a level of completeness to the resource requirements of the alliance (Hill & Hellriegel, 1994). For instance, a company that has a strong technological team may seek an alliance with another company with marketing skills relevant to tapping the market for its technological product. In supplementary resource alignment, firms provide similar kinds of resources, which, when integrated, would create more value... than the sum of the separate values of the resources with individual firms (Das & Teng, 2000).

The other important aspect of co-creating involves the governance of the alliance, and the role of collective strength. In this regard, the role of governance mechanisms and power and politics has been in focus to find solutions for making the alliance produce. Power refers to an individual actor's or relationship partner's ability to influence the behaviour of others, and politics focuses on the use of authority to cause changes in goals and directions within organization Sarker et al. (2012). Alliance governance mechanisms are expected to counter the threat of opportunism inherent in an alliance and safeguard partners' interests (Madhok & Tallman, 1998; Sambamurthy & Zmud, 1999). In this regards, there have been suggestions of mechanisms to address governance issues in an alliance. They include contractual provisions with enforcement for intellectual property protection and informational provisions that facilitate required coordination between alliance partners (Poppo & Zenger, 2002; Reuer & Ariño, 2007).

4.1.2.2. Benefit management

Also as above described, based on the value creation process, benefits management methods were suggested as promising methods to ensure that value is created in a whole life-cycle of the process (Lin & Pervan, 2003). Benefits management is defined as "the process of organizing and managing such that potential benefits arising from the use of IS/IT are actually realized"(Lin & Pervan, 2003), with considerations of other benefits than tangible to include a wide range of benefits such as intangible benefits that are not measured using (Willcocks, 2013). Benefits management approach aims to be a whole life-cycle approach to getting beneficial returns on IS/IT investments.

Without an effective benefits management process, IS/IT benefits may be unrealized, leaving the investing organization without satisfactory payoff - Shakespeare and Ioppolo (2017) cited in Lin and Pervan (2003).

Cranfield research program cited in Lin and Pervan (2003) suggested the process model of benefits management (Figure 3); a model which, according to Lin and Pervan (2003), can be used as the basis for guidelines on best practice in benefits management. The model is presented here below.

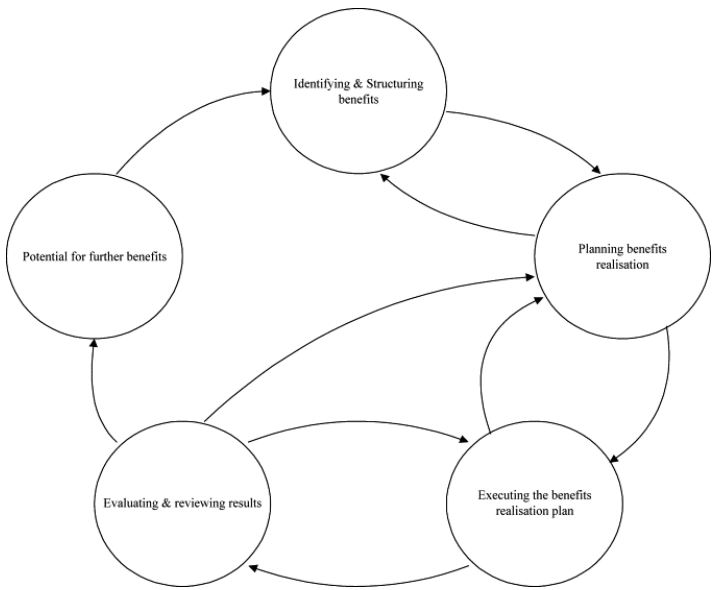

Figure 4: Process model of benefits management (Source: Cranfield research program cited in Lin and Pervan (2003)

Based on a theoretical model for co-creating IT value (see Figure 1 in Flak et al. (2015)), and the standard benefits realization process (See Figure 2 in (ibid)); Flak et al. (2015) proposed an integrated process model for co-realization of value in governmental organizations (Figure 6).

The proposed model concerns the process phases that an organization needs to go through in order to realize benefits and co-created value?

The suggested (process) model is executed in the following five phases: (I) in Phase 1, organizations need to determine what their needs are and to state what benefits they expect from the incorporation of an e-government system into their services. (II) in Phase 2, the systems development team, which should include representatives from all key stakeholders, plans the system and works out detailed designs for the system. (III) in Phase 3 is the implementation of the benefits plan and here once again, co-created value can only come if all the central partners are heavily involved in the process. (IV) in Phase 4, the activities are concerned with measurement of outcomes, including whether the planned benefits have been realized. Alternatively, if they have not, the process calls for a cycling back to Phase 2 where adjustments are made to the plan.

(V) in Phase 5 is the culmination of the first cycle, and it involves post-implementation assessment. According to Flak et al. (2015), in this phase all core partners are involved in determining what benefits have been realized, what new potential benefits have been identified, and whether an additional cycle of changes are called for. If an additional set of changes seems to be appropriate, then the process cycles back to Phase 1 and is repeated to design and implement these.

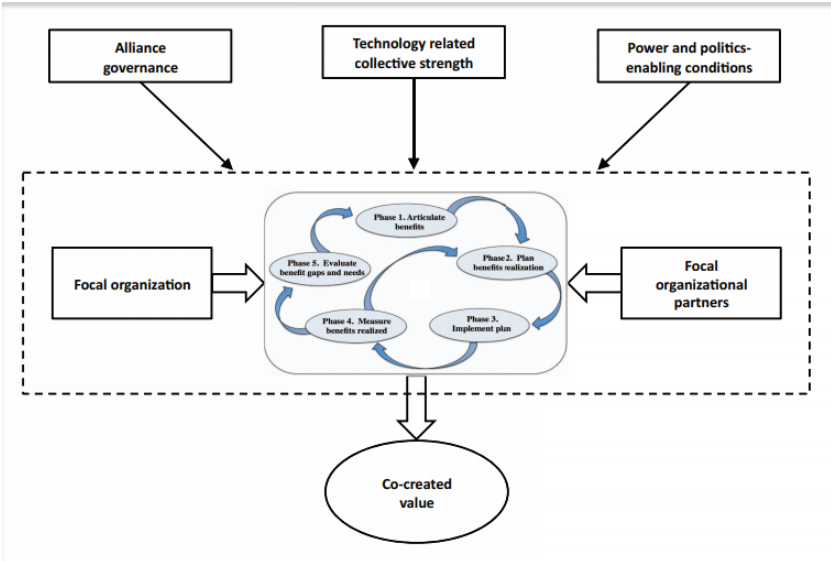

Figure 5: Integrated process model for co-realization of value (Source: Flak et al. (2015))

In the discussion section, this thesis relates the value creation of the IREMBO e-government project in Rwanda to the existing frameworks for value creation.

4. 2. Study 2, public value anticipations in the IREMBO project in Rwanda

Guided by the public value of e-government framework, mainly, Twizeyimana and Andersson (2019)'s framework of six areas where e-government can create the public value, this study investigates the anticipated public value of the implementation of e-government in the context of an LDC. The case study is a large-scale e-government project known as IREMBO, which is a single-window portal for service delivery for both G2C and G2B in Rwanda.

In line with the aim, the research question guiding this research was: "What public value is anticipated in the IREMBO project?"

In the findings, six (6) overarching dimensions of the anticipated public value in the IREMBO project were identified, they are: 1) the improved de-

livery of public services; 2) improved government efficiency and effectiveness; 3) Improved global competitiveness and well-being; 4) Open Government (OG); 5) Improved professionalism and ethical conduct; and 6) building trust and confidence in government. The values embodied in the six dimensions above broadly represent the public value of e-government in the view of citizens and residents of Rwanda.

The next table describes the six areas of the public value anticipated in the IREMBO e-government project in Rwanda. They are suggested along with their respective KPIs.

Table 12: Anticipated public values in the IREMBO project in Rwanda (Study 2)

#	Six Overarching Dimensions	Key Performance Indicators (KPIs)
1	Improved public services	Efficient service delivery; improved availability and accessibility of government information and services; 24 over 7 of availability of public services; Integrated and seamless delivery of public services; more provision of public information and services; multi-channel points of entry and access; single point of entry and access; USSD or Mobile access; Improved processes in the delivery of services; improved quality of public information and services; online, internet, or digital delivery of public services; provision of more inclusive public services; provision of public (citizens) centred services; quick, better, and efficient service to citizens; removal or reduction of un-necessary steps or trips for service delivery; reduced bottleneck and long queues in the delivery of services to citizens; single window point of access and delivery of public services
2	Improved administrative efficiency	Better control and monitoring; Better management of public resources and economy; Centralized, integrated, and interoperating system; improved citizens-government interactions; Improved operational efficiency; cost-reduction; increase efficiency, effectiveness and the achievement of desired outcomes; Ease of working (or reduced work or work burden); improved processes; increased quality of processes, systems, and services to citizens; maintaining accurate and durable records; standardization; time Management
3	Open Government (OG) capabilities	Increased transparency Improved communication and collaborative actions

4	Improved ethical behaviour and professionalism	Enhancing accountability; Increased integrity, honesty, and fairness in the delivery of public services; Reduction or elimination of the risk of corruption and abuse of the law by public servants
5	Improved trust and confidence in government	improved interaction at the local level and/or improved relationships between citizens and government; reduced or eliminate the risk of corruption and abuse of the law by public servants; Increased accountability
6	Improved social value and well-being	Empowerment and capacity building; Improved innovation eco-system and capabilities; Improved national economy and competitiveness; improved quality of life; improved working conditions; time saving and cost-reduction; jobs or employment creation

The above six areas of the public value anticipated in the IREMBO project are compared to/with the areas identified in the literature (Study 1). Because the main areas by Study 1 are similar to main areas by Study 2; comparing and contrasting concern their KPIs. Hence, the improved framework results from comparing and contrasting KPIs of a specific area X in Study 1 to KPIs of a counterpart area Y in Study 2. When KPIs are similar they are combined to form one refined; where KPIs differ they are all added and then KPIs in the improved framework.

It is not surprising that the main areas in study one resemble areas in study two because Study 2 follows template analysis by which the framework of six areas from Study 1 is used as the initial framework for the analysis. Comparing the areas (i.e., KPIs) from Study 1 to areas (KPIs) from Study 2 contributes to improvements in the suggested framework of the areas of e-government for the public value. In fact, comparing the areas (i.e., KPIs) from Study 1 to areas (KPIs) from Study 2 contributes to improvements in the suggested framework of the areas of e-government for the public value.

Table 13 below describes the improved framework for areas of e-government for the public value. The improved framework integrates the suggested areas from the literature study (Study 1), and areas anticipated in the ongoing project, the IREMBO project in Rwanda (Study 2).

Table 13: Six overarching dimensions of the public value of e-government – an improved framework

#	Six Overarching Dimensions	Key Performance Indicators (KPIs)
1	Improved public services	* Improved efficiency in the delivery of public services: provision of more (quantity of) services to citizens, provision of more responsive, efficient, and cost-effective public services, removal of bottleneck and or queues in the delivery of services, * Improved professionalism in the delivery of public services: accountability in the delivery of services, improved transparency and control, participation, and collaboration in the delivery of public services * Increased quality of public information and services: provision of more inclusive public services, provision of public (citizen)-centred services, provision of personalised services (e.g., special provision for disability, language support for minorities, online advice, etc.), provision of services directed towards the public good, etc. * Improved access to and availability of public services: ubiquitous and pervasive delivery of public services (e.g., online or mobile delivery of public services), 24 over 7 of availability of public services; integrated and seamless delivery of public services; more provision of public information and services; multi-channel points of entry and access; single point of entry and access; USSD or Mobile access; improved processes in the delivery of services; improved quality of public information and services; online, internet, or digital delivery of public services; provision of more inclusive public services; provision of public citizens centred services; quick, better, and efficient service to citizens; removal or reduction of unnecessary steps or trips for service delivery; reduced bottleneck and long queues in the delivery of services to citizens; single window point of access and delivery of public services
2	Improved administrative efficiency	Cost-effectiveness: quick operations and/or delivery of public services, cost-reduction, removal of bottleneck and queues in the delivery of services to citizens; Robustness: responsive, systemic, efficient, effective, sustainable, flexible, lean, and agile; Improved quality of processes; Reduction or elimination of the risk of corruption and abuse of the law by public servants; better control and monitoring; better management of public resources and economy: proper and efficient use of public funds; centralized, integrated, and interoperating system; improved citizens-government interactions; Improved operational efficiency; cost-reduction; increase efficiency, effectiveness and the achievement of desired outcomes; Ease of working (or reduced work or work burden); improved processes; increased quality of processes, systems, and services to citizens; maintaining accurate and durable records; standardization; time management

3	Open Government (OG) capabilities	Increased transparency, increased public/citizens participation; Improved public engagement and well-informedness; improved communication and collaborative actions; improved public control and influence on government actions and policies; improved political possibilities and innovations; increased frequency and intensity of direct involvement in decision making
4	Improved ethical behaviour and professionalism	Compliance with the law or make decisions by law and authorized policy, reduction or elimination of the risk of corruption and abuse of the law by public servants, maintain accurate and durable records and demand for good information for decisions; Better collaboration, cooperation, and better communication; Enabling a durable and competent institutional capacity and impartially serving citizens; Maintenance of fundamental beliefs and constitutional principles (e.g., the responsibility to the citizen/politician); Facilitation of democratic will: increased transparency, participation, and inclusiveness, increased integrity, honesty, fairness, equality, accountability, responsibility, economy/parsimony, rectitude, achievement of legitimacy, the rule of law, coherence, adaptability, impartiality, legality, equality before law, objectivity, professionalism, trustworthiness, and openness
5	Improved trust and confidence in government	Greater fairness, honesty, equality; Robustness: responsive, systemic, efficient, effective, sustainable, flexible, lean, and agile; Improved public control and influence on government actions and policies; Reduction or elimination of the risk of corruption and abuse of the law by public servants; Increased quality, availability of and access to government information and services; Increased collaboration, participation, and well-informedness; Maintenance of accurate, durable records; Creation of durable and competent institutional capacity, better management of public organisations, manage the economy, public resources; Increased transparency (i.e., government (or public sector) is more transparent); improved citizens' experience of service provision and service outcomes; improved interaction at the local level (e.g., visiting a local government website increase citizens' trust in local governments); protection of foundational values of trustworthiness, openness, robustness, reliability, accountability and security: e.g., better security of public information and privacy of citizens; improved interaction at the local level and/or improved relationships between citizens and government; Reduced or eliminate the risk of corruption and abuse of the law by public servants; Increased accountability

6	Improved social value and well-being	Reduced administration burden; Enabled greater fairness, honesty, equality; Increased social status, relationships, and opportunities; Improved capacity building and empowerment; Increased safety; Achievement of better outcomes in areas of peace, security, poverty reduction, public health, high employment, low crime rates, clean streets; Improved environment; Enabling freedom and equal rights; Improved citizens' levels of social contact; Improved citizens' social health; Impact on individual and household health, security, and satisfaction; Increased quantity and quality of services to citizens, Improved economic well-being, Impact citizen's income, assets, property, and wealth, increase ease of doing business (i.e., create value for citizens in terms of increased citizens' well-being and quality of life; Empowerment and capacity building; Improved innovation eco-system and capabilities; Improved national economy and competitiveness; improved quality of life; Improved working conditions; Time-saving and cost reductions; Jobs or employment creation

When going into details and analyse each of these overarching dimensions, mainly, by focusing on their parameters, these value dimensions relate or influence each other. The tight relationship is seen between the value dimension of improved delivery of public services and dimension of improved government efficiency and effectiveness. It would not be seen as a surprise because the primary and ultimate role of the government lies in the delivery of (public) services to citizens. These findings would then support (Rose, Persson, et al., 2015), who identified congruence and divergence in the value positions, among a complex nature of dealing with values because of the fact that values can be related to various other values in many different ways – a situation that makes dealing with values rather complex. So far, the findings in this study show value are incongruent (i.e., they are not similar; rather, they are related and complementary. These findings could not be interpreted as if there are no divergences in these value dimensions. The latter can occur when one can focus on the attainment of these value rather than investigating which values are there as it was the object of this study.

With such complex relationships between values, for example, tight congruent relationships between value dimensions make it practically impossible to prioritise some values over others. As an example from our findings, improving the delivery of public services by organisations will depend on

the efficiency and effectiveness of those organisations. In turn, better delivery of public services (e.g. through online or digital systems) will improve interactions between G2C and G2B, remove travel and queues, remove inefficient paper-based transactions, reduce corruption, and finally contribute to economic gains, productivity, impartiality, and honesty.

Furthermore, this study validated the conceptual framework of six areas where e-government can create the public value by Twizeyimana and Andersson (2019), a framework developed in study 1.

During the data analysis of this study, the six areas have been all-encompassing and comprehensive to code excerpts of text from informants' responses about their anticipated values in the IREMBO project. In fact, by using this framework, the coding was well guided, and there were no single excerpts of text in the transcripts where the framework was ambiguous. In brief, Twizeyimana and Andersson (2019) framework of six areas where e-government can create the public value was seen a robust conceptual framework for analysing and discussing areas by which impact of an e-government entity for the public would belong. However, as a newly developed conceptual framework, more empirical testing of the framework would make clearer the framework, mainly, the specific measurement parameters of each of the main dimensions.

4.3. Study 3, E-government in Rwanda: Implementation, Challenges and Reflection

This third study is an empirical study that investigated the experiences, challenges, lessons in implementation of the IREMBO E-Government platform for G2C and G2B in Rwanda. In this third study the theory of II has been used because through its notion of installed base, the II helps to investigate the design and implementation departing from sociotechnical and practice-oriented aspects, including but not limited to the physical and social context of work, existing technologies and routines, and the workers' skills and beliefs (Hanseth and Lyytinen, 2004, Aanestad and Jensen, 2011)

In this study, the following research question was investigated:

What are the important challenges and the lessons from the implementation of the "IREMBO" single window for e-government services in Rwanda?

The study followed an interpretive case study, data analysis followed an inductive approach, the analysis was content analysis, and the coding followed open coding.

This research was in the direction of addressing the ongoing call in the IS domain, with suggestions for considering and departing from the context while dealing with IS research and practices.

There are arguments that the implementation of ICTs and E-government project often fail in the LDCs because of overlooking the context by which they are implemented and embedded. For example, LDCs presents a lot of challenges that hinder e-government development when compared to developed countries. Among others, the challenges are related to lack of basic e-infrastructure required for e-government implementation, use, and access, lack of strong IT institutions and/or policies, low rate of literacy, and low rate of IT skills and competences (Mutula, 2008; Schuppan, 2009). Hence, challenges to e-government development in the LDCs are the major components of the LDCs context because they influence (or are influenced by) strategies and critical success factors towards e-Government in this context. Having the context on board, the theory of II which is a context ingrained theory, the II theory guided this third research with main objective of investigating the implementation of the IREMBO portal for e-government services in Rwanda with a focus on the local context, more specifically, the study investigated the experiences, challenges, lessons in implementation of the IREMBO E-Government platform for G2C and G2B in Rwanda.

Guided by the II this study (Study 3) investigated the existing installed-base in terms of existing practices, the challenges ahead, and ongoing arrangements or work and activities that actors, implementers, and policy-makers are undertaking to meet the anticipated goals and outcomes. The findings of this study revealed that the decisions and actions which were being taken by implementers and policy-makers were being influenced by the challenges at hand that time. The findings also revealed that in the context of LDCs in general, and the particular case of Rwanda; major challenges and issues that the development of ICTs and e-government face, those challenges have to do with Information Infrastructure development in those countries.

In the findings, the study found six overarching categories challenging a successful implementation of e-government in Rwanda. The categories are: *information infrastructure required for e-government, social inclusion, governance, management, trust in the new system, and languages*.

The categories of challenges and their descriptions are listed in Table 13 here below.

Table 14: E-Government implementation challenges - adapted from Study 3, Twizeyimana et al. (2018)

Category of Challenges	Descriptions	Mentioned in No. of interviews
1. Information infrastructure		
1.1. Data/Information management	database, documentation, use of standards	6
- Database and/or use of standards	Lack of standardization required for data retrieval, reuse, sharing, and for interoperability of systems	5
- Documentation and/or service template	Poor documentation of available data and/or services such as the name, type or category of service, cost, delivery location and time, entities involved, etc.	1
1.2. Computer systems	The availability of computers (hardware, software, and equipments), printers, applications such pdf readers, image readers in organizations.	4
1.3. Electricity	Lack of access, availability, stability, reliability of electricity	6
1.4. Internet	Lack of availability/access to internet, and high cost of internet	9
1.5. Regulatory environment	Lack of laws, regulations, and policy documents regulating the delivery of online/digital service in general and through IREMBO in particular	2
2. Management		
2.1. Awareness	Lack of project awareness in concerned institutions and stakeholders	4
2.2. Collaboration	Lack of a collaboration plan and framework within stakeholders in the project	6
2.3. Communication	Poor communication between stakeholders in the project, especially on who is doing what, how, and when.	5
2.4. Stakeholders' engagement	Lack of involving stakeholders in the process from the early stages of implementation.	2
2.5. Operational capabilities	resources and innovations in the financing of the project, involving users, IT staff/ Human resource, etc.	4

3. Governance		
3.1. Project staff and structure	Although a PPP, it was unclear who composed the project team in concerned government organizations.	2
3.2. Roles, responsibilities, and accountability Enforcement, and leadership	Lack of who does what, how, and when. Who is the government	2
3.3. Distributon of power	Conflict due to mandate or who is eligible and legitimate to do what?	2
4. Social inclusion		
4.1. Digital divide and digital inclusion	A need for ICT/e-infrastructure in rural area, especially in high mountains, social inclusion consideration in the use of the system, …	3
4.2. ICT illiteracy and/or digital exclusion	Lack of general ICT skills, computer skills, and/or IT security skills …	6
5. Trust in the new system		
5.1. Capability & reliability	Concerns and Skepticism of capability and reliability of the new system when compared to the existing system	4
6. Languages		
6.1. Usability and translation for the Rwandan context.	There is no common dictionary or language structure for IT terms in the local language. Also, translating entrenched technological terms into local terms is challenging the design and usability of the proposed system.	2

The above table presents areas that challenging the implementation of the IREMBO project for e-government in Rwanda. However, using the information infrastructure perspective Study 3 reveals that the cultivation of the installed base of well-established technologies and management practices in the country is helping the country to address many of the challenges above-described which include financial, technical, and managerial challenges which are major and common challenges in Rwanda and the LDCs in general. For example, the government of Rwanda has entered into a public private partnership (PPP) with the private company Rwanda Online Platform Ltd (henceforth referred to as ROL) for the digitalization of government-to-citizens (G2C) and government-to-business (G2B) services MITEC (2015). That cultivation of the PPP framework in Rwanda; the framework that was adopted before in other projects; that approach was seen a venue to address financial, technical, and managerial challenges which are major and common challenges in developing regions. In fact, the clause that the

private partner is paid through a commission fee framework instigated the private partner to do more in maximising the adoption and use of the system because they could maximise the benefits if, and only if, many users are using the platform. Concerning the latter, through strategic approach such as user training, awareness activities, cultivation of the installed-base of agents, etc. the private partner (ROL Company) is bridging the digital divide, improving the awareness, access, use and adoption of the IREMBO platform. Hence, the challenging digital divide in Rwanda was addressed with the use of evangelists (agents) who are trained to provide support to those who are under- those are who do not have access to internet, do not have IT skills, education illiterates, those who lives in regions which lack of basic infrastructure, etc.

These findings reflecting the existing literature on challenges to e-government implementation in the LDCs.

They would add importance to previous studies in many developing countries and Sub- Saharan Africa (Al-Shboul et al., 2014; Alshehri & Drew, 2010; Kamar & Ongo'ndo, 2007; Mutula, 2008; Nabafu & Maiga, 2012) which have also reported many of these challenges. Context matters and there is no single model to fit all countries (Hanna et al., 2009). The study supported these arguments and argue that although reported challenges in previous studies in developing countries might resemble our and intensity are different across countries and regions because of the context in each country which may include the human and socio-economic development, political support, information infrastructure, implementation strategies and processes, and also differ because of operational capabilities (resources and innovations) available for the project.

For example, in the early stages of implementation of the IREMBO platform in Rwanda, there was no common dictionary or language for IT terms in the local language. This gap affected the design of a user interface in the local language because there was no common IT terminology to be used and it was simple to allow usability and keep the general meaning untouched. Also, the lack of trust in the new system hindered the adoption of the proposed system for e-government in Rwanda. However, although they seem to be similar in names, they are fairly different in their degree of importance and influence.

In this study we have noted that although countries should learn from one another of their experiences, success stories and mistakes, the implementation context and process matters. And also that approaches and strategies that country use matter. As an illustration, the study showed how,

despite common challenges which surface the LDCs, the adopted public-private partnership (PPP) approach to e-Government implementation in Rwanda might indeed seem like a suitable catalyst for e-government success in the country. And that despite its challenges which include the complexity of dealing with the government as an entity, a diversity of stakeholders with different goals, values and views on the project and its success; something that might make the management of the project more complex.

In brief, questing for effective and innovative ways of doing thing, among others, the cultivation of the installed base of the context, including the existing social order (culture, work ethics and practices) and operational capabilities (e.g., technological, economic, human, and innovations); is a promising avenue for realizing e-government in general, and in today's challenging context of the LDCs.

For example, the cultivation of the installed base of PPP framework in Rwanda; the framework that was adopted before in other projects; that approach was seen a venue to address financial, technical, and managerial challenges which are major and common challenges in developing regions. The clause that the private partner is paid through a commission fee framework instigated the private partner to do more in maximising the adoption and use of the system because they could maximise the benefits if, and only if, many users are using the platform. Concerning the latter, through strategic approach such as user training, awareness activities, cultivation of the installed-base of agents, etc. the private partner (ROL Company) is bridging the digital divide, improving the awareness, access, use and adoption of the IREMBO platform. Hence, the challenging digital divide in Rwanda was addressed with the use of evangelists (agents) who are trained to provide support to those who are under- those are who do not have access to internet, do not have IT skills, education illiterates, those who lives in regions which lack of basic infrastructure, etc.

4.4. Study 4, Towards Realisation of the Public Value of e-Government: anticipation-reality gap and critical success factors in the context of Rwanda

This study is an empirical study conducted on the IREMBO project in Rwanda, a study that departed from the three studies above mentioned. The goal was to build on the findings from the previous three studies to identify the anticipation gap, and then come up with critical success factors towards

achieving the public value of e-government, more importantly, in that context by which the IREMBO project was implemented or embedded. The context that would include (I) the type or nature of the e-government project (e.g., the IREMBO project in this case study – who are the actors or stakeholders involved? Who gets what? etc.), (II) the local or country context, for example Rwanda overall context as a country – what is current Rwanda's installed-base of socio-economic development which may include the political system, human development (education level, wealth, etc.).

In this study, study 4, the following research questions were investigated:

1) What public value is anticipated, and what public value is in action?

3) What gap is between anticipated public and public value in action? And;

4) What are the critical success factors for bridging the gap?

The espoused public value of e-government, the public value in action, the anticipation-reality gap, challenges, and the critical success factors were described and discussed. Whereby, the anticipation and reality gap was assessed by relating the anticipated public value of e-government to the public value in action, that is, the public value that is being experienced/affected. The assumption here is that if the public value of e-government was identified and strived for in the project, the gap between expected public values and the public values in action would be little or negligible - hence, towards more closer to the attainment of the public value of e-government projects, the IREMBO in the case studied in this study.

In this study, six categories of anticipated value were identified. They are the improved administrative efficiency; improved delivery of public services; improved ethical behaviour - professionalism - and good governance; improved social value and wellbeing; improved trust and confidence in government; and open government capabilities and innovations.

And five value dimensions are in action or experienced by stakeholders. They include improved administrative efficiency; improved delivery of public services; improved social value and well-being; improved citizens' trust and confidence in government; and improved ethical behaviour- professionalism- and -good governance. These findings, among other insights, revealed that the public value of Open Government (OG) capabilities and innovations were seen to be not in action. The public value category of OG concerns e-government impacts on openness, transparency, participation, communication, and collaboration to provide personal or corporate influ-

ence and control on government actions, policy, etc. all in the quest for enabling more political possibilities, opportunities, and innovations (Castelnovo, 2013; Jansen, 2012; Liu, Derzsi, Raus, & Kipp, 2008).

4.4.1. Anticipation-reality gaps

In relation to the anticipation reality gap, this study identified the following gaps: (I) the anticipation gap, that is, the gap calculated by analysing how the execution of the project reasonably considered key stakeholders from the early stages of the project design through analysing which stakeholders were actually considered; (II) the reality gap which is the gap calculated by analysing the achievements versus anticipations; and the third is, (III) the anticipation-reality gap which is identified by analysing inter-relationships between the gaps (I) and (II), simply, the resulting gap when combining the anticipation gap (I) with the reality gap (II).

For example, we identified that some values were realised but not planned, and this would fall into the anticipation gap - that is, failing to involve all key stakeholders which in turn would result into overlooking the potential public values of the project. Other values were planned, but not yet realised in the view of each stakeholder, that is, the reality gap. Both situations combined take us into the "anticipation-reality gap", a gap that occurs when there is a lack of foreseeing and planning the future.

4.4.2. Critical Success Factors (CSFs)

Finally, departing from these findings, especially, these gaps, the challenges to e-government in Rwanda and in the similar context such as the LDCs; the five interrelated critical success factors (CSFs) are suggested below. The notion of success here is in line with Heeks (2003) view of success that; it is a success if most stakeholder groups attained their major goals and did not experience significant undesirable outcomes.

The suggested CSFs are:

4.4.2.1. Stakeholder Involvement Over User Acceptance Testing (UAT)

More key stakeholders are involved since the early stages of the e-government implementation. The more their values are represented or exemplified in the running e-government system. Otherwise, the so-called anticipated public value in a project will inevitably be the anticipations from a small group of individuals. As a consequence, the project would not deliver the

public value (deliver what is in the interest of citizens' collective expectations). Subsequently, if citizens get no value from the system, they will, therefore, reject these e-government systems. Hence, involving all concerned and potential stakeholders in the entire development cycle, starting from the planning of the project, is a key success factor for realising the public value of e-government.

4.4.2.2. Value proposition Over peer pressure

In the IREMBO case studied, there were complaints from citizens that the situation was worse than the situation before the adoption of the platform. The citizens said that they would prefer to get back to the legacy system because for them it is better to have a physical queue in front of local government offices and get the services the same day or the day after, rather than being in a digital queue risking high costs in terms of both time and money.

4.4.2.3. Transformation Over Digitalisation

In the IREMBO case studied, a project for digitalising G2C and G2B in Rwanda, the findings revealed that there is no such thing as the transformation of the service delivery, rather, something like a transfer of what was used to be done in the physical world to the digital world was experienced. Such Lack of transformation of business processes; the aspect that can be achieved through execution of Business Process Reengineering activities as well as the consideration of success factors in i) and (ii) above; made the new system to look cumbersome and sometimes with more issues than the old system it claims to advance. When business processes in the physical settings are taken online without any changes on the way they are designed would in many cases double the problem because of added complexities in these processes when they are handled online. For example, in the case of IREMBO in Rwanda, citizens experienced increase of cost of services (in terms of time and money spent in trips, scanning documents, etc.) in the place of anticipated decrease. And this was because of that many processes in the application process for a government service were taken without any changes on the way they were designed in the physical world. Hence, Business Process Reengineering (BPR) is important if we want to realise the full value potential of e-government. If there is no BPR designed, with the local context in mind, putting services online for citizens would be putting citizens in lines using the technology.

4.4.2.4. Cultivation Over Duplication

Continuous development of II, and cultivation of its installed base when implementing digital projects is a key success factor for the attainment of the public value of e-government.

In the context of IREMBO when viewed using the lens of II, there have been various innovative ideas to address various contextual challenges. For example, the cultivation of the installed-base of technical and managerial practices proved a catalyst in the development of IREMBO. A good example was the cultivation of the practice of using a public-private partnership (PPP). The government of Rwanda entered into a PPP with a private company Rwanda Online ltd through a BOT contract to build and operate the IREMBO single-window portal in Rwanda for 25 years. So far, that partnership has been a catalyst in the development of the existing information infrastructure (Twizeyimana et al., 2018). This partnership has improved possibilities for access and use of government e-services, improved awareness of the project, improved e-skills and competitiveness.

From the IREMBO case, we argue that consideration of the information infrastructure (II), its notion of the cultivation of installed base, is essential for realising the public value of e-government.

The notion of installed base embodies the sociotechnical and practice-oriented aspects such as the physical and social context of work, existing technologies and routines, and the workers' skills and beliefs (Hanseth and Lyytinen, 2004, Aanestad and Jensen, 2011). Thus, the II was proved a reasonable approach as it helped to pinpoint those generally unseen elements of the context which are hindrances and/or are driving forces of realisation of the public value of e-government. And the fact that II is engrained in the context makes it a good perspective by research and practices to address the existing claims that many e-government projects fail because of overlooking the context by which they are implemented or embedded. The II's notion of installed base and its cultivation were seen promising avenue to explain what is there, what works, what is challenging in the implementation of the IREMBO project in Rwanda. That is the II is a reasonable avenue to better understand the implementation of e-government in the Rwanda context. It is maybe not a surprise because as we learnt from study 3, many challenges to e-government implementation in Rwanda and the context of LDCs relate to the level of information infrastructure development in these regions, more specifically, to the installed base of socio-economic, and technical context by which e-government is implemented or embedded. That is many challenges in these regions are to do with the socio-technical context over there.

In this case, they are related to the Rwanda context by which the IREMBO is implemented or embedded.

This finding would suggest that one of the major success factors in the attainment of the public value in the implementation of e-government project in the LDCs has to do with consideration of information infrastructure (II) aspects, among others, the cultivation and advancement of the installed base.

It is important to dispose of a sustainable and strategic way for the continuous development of the information infrastructure (II) in a country. Currently, there are good approach to do so, more prominent today is the adoption of IT Enterprise Architecture (EA) frameworks; for example, Government-Wide Enterprise Architecture (GWEA) framework in the scope of an entire country. An Enterprise Architecture (EA) framework, is a conceptual blueprint that defines the structure and operation of an organisation. The intent of enterprise architecture is to determine how an organisation can most effectively achieve its current and future objectives. Hence, in the context of IT, an EA framework is a blueprint or a master plan that show a picture of the current state of IT (as is) and its future state (to be). EA framework is different from EA methodology. EA framework is like the artefact produced using EA methodology. Today, there are various methodologies for EA framework. For example, TOGAF, Gartner, Federal, etc.

Hence, EA frameworks would guide the development of current II within a country, and the cultivation of the installed base of the current II is crucial in the implementation of IT projects. That is, it is a strategic implementation of IT projects (e.g., e-government) in a country if there is an EA for IT in the country that would describe the current state (as is), describes the future state (to be), and of course would inform a state-wise transition from practice A to B, from technology A to B, and cultivation of the installed base (Aanestad & Jensen, 2011; Hanseth & Lyytinen, 2010).

In the context of IREMBO, the findings revealed that

The cultivation of the installed-base of technical and managerial practices proved a catalyst in the development of IREMBO. A good example was the cultivation of the practice of using a public-private partnership (PPP). The government of Rwanda entered into a PPP with a private company Rwanda Online ltd through a BOT contract to build and operate the IREMBO single-window portal in Rwanda for 25 years. So far, that partnership has been a catalyst in the development of the existing information infrastructure (Twizeyimana et al., 2018). This partnership has improved possibilities for

access and use of government e-services, improved awareness of the project, improved e-skills and competitiveness.

From the IREMBO case, we argue that consideration of the information infrastructure (II), its notion of the cultivation of installed base, is essential for realising the public value of e-government. The notion of installed base embodies the sociotechnical and practice-oriented aspects such as the physical and social context of work, existing technologies and routines, and the workers' skills and beliefs (Hanseth and Lyytinen, 2004, Aanestad and Jensen, 2011). The II was proved a reasonable approach as it helped to pinpoint those generally unseen elements of the context which are hindrances and/or are driving forces of realisation of the public value of e-government. The fact that II is engrained in the context makes it a good perspective by research and practices to address the existing claims that many e-government projects fail because of overlooking the context by which they are implemented or embedded.

4.4.2.5. Contextualisation Over Importation

Finally, this research argues that the context plays a great role in the determination of which steps the service delivery would undergo. For example, in the context of LDCs, a digital solution that is to be introduced would need consideration of the installed base of human, socio, economic, and technical context in this context. For example, because of lack of adequate skills in general and in IT, because of lack of adequate infrastructure for citizens to use digital systems, etc. thus for a successful implementation of digital system in these regions you should, among others, designers of those digital systems should think of the use of intermediaries for making digital transactions possible. Hence, cultivation of the installed base of the agent-based framework, that is, using evangelists who would play the role of interface between the digital systems and those citizens who do not have access or skills, who are digitally divided. Also, you should cultivate the installed base of mobile technologies which are on rise in these regions.

5. Concluding Remarks

This thesis investigated the phenomenon of value creation through e-Government.

The thesis answered the research question "how do we create value through e-government?"

From the findings, this is how we create value through e-government:

(I) understand the value you want;

(II) Understand the context in which e-government is implemented;

(III) Understand the process and the context of value creation through e-government

This thesis supports the trend that the discussion of value creation of e-government within the realm of the government or public administration system. That is, an understanding of value creation of e-government should be related to the value creation of any other government entity because, with e-government, we are talking about the government.

Based on the existing literature in the field of value creation for e-government, this thesis, throughout Study 1, investigated the meaning of value creation and types or dimensions of the value of e-government. The findings in Study 1, reveals that the public value theory is a reasonable theory to better explain the value from actions, decisions, policies, initiatives, and projects of public sector institutions including government and e-government.

The public value is understood as "citizens' collectively expectations from government actions, decisions, and policies". In the context of ICTs and e-government, citizens expect better services, voice (more opportunity to participate in decision making), and happy life. Citizens to be understood as people in their different stakeholder roles. This thesis has as object of study the government because it is about e-government. Consequently, the value of e-government is measured and discussed using the notion "public value". In other words, value creating of public affairs including e-government should be measured in terms of the public value.

This thesis suggested a framework of six areas of e-government for the public value. They are: improving public services; improving administrative efficiency; improving Open Government (OG) capabilities; improving ethical behaviour and professionalism; improving trust and confidence in government; and improving social value and well-being. In other words, the public value is created through e-government when, with support of e-government systems, the public experiences improved services, more efficient

and responsive government, more open (transparent, and or inviting) government, improved professionalism (and stewardship), improved trust, and finally well-being. The alternative formulation would be that e-government would create the public value through advancing the following six areas: public services, administrative efficiency, Open Government (OG), ethical conduct and professionalism, trust in government, social value and well-being. An argument that sees ICT use by governments, not as an end tool towards a better government in itself, but, as an element of process to get there.

This thesis through study 4 has found five critical success factors that can be cultivated in our quest for advancing those six areas of e-government for the public value.

The five critical success factors include stakeholder involvement over user acceptance testing (UAT), value proposition over peer pressure, transformation over digitalisation, cultivation over duplication, and contextualization over importation.

The notion of success in this thesis follows Heek's mode of success – a project is a success when most of the stakeholder groups attained their major goals and did not experience significant undesirable outcomes.

In fact, value creation is not a matter by a single entity (a person, group, or organization).

In the existing literature, co-creation of value along with other process-based frameworks are suggested as reasonable approaches towards value realization. In the Rwanda case studied, this thesis identified that co-creation is adopted. For example, the government of Rwanda entered into a PPP with a private company Rwanda Online Platform LTD in the digitalization of G2C andG2B services. The main objective of that PPP was co-creation of value where the government of Rwanda has its expected value in the alliance and also, the ROLP has its expected value.

As in other co-creation cases, this thesis identified problems mainly related to the management of the alliance. The problems include asymmetric power affecting decision making that lead to adverse decisions making. The findings from the IREMBO project showed that there were power conflicts between organizations. This issue regarded the service fee collection. One organization was claiming to be the only one eligible by law and the other had the mandate and technology required. The problems also include a lack of strong organization structure to guide the alliance formed through the PPP between the government and the private partner ROLP.

These findings supports the existing literature that alliance governance, technology-related collective strengths, power and politics-related conditions affect the co-creation process of the focal organization and its partners. In the case of Rwanda, a steering committee was put in place to deal with the governance of the alliance that was put in place for developing the IREMBO platform for e-government services in Rwanda. The steering committee comprises with members representing the government on the side of implementation of ICTs, members representing the GoR on the side of IT policy, and members representing the business partner ROLP, and members.

However, some challenges were apparent regardless the existence of this committee. One of the challenging aspects was the role of government vertically and horizontally. The most challenging was related to the question of who should represent the government in such an alliance and that the government will work as a single entity with a clear view about the project, its goals, and its success. This is because the government as it is, comprises of various organizations each having the power, resources and mandate to work on certain specific causes which when put together they make government cause. In fact the big issue here is to mobilize autonomous government institutions with their particular mandates to work towards a common cause.

Also, the findings from this thesis supports that contractual provisions with enforcement for intellectual property protection and informational provisions facilitate required coordination between alliance partners among mechanisms that address governance issues in an alliance. With that this thesis argue that contractual provisions with tangible benefits between partners in the co-creation alliance would be a promising governance mechanism for the alliance to work.

For example, the findings in Study 3 reveal that co-creation in e-government is seen as promising in Rwanda and beneficial for both partners (government and private); mainly, due to the fact that in the signed contract the private partner is paid a commission from the service fee. That clause that the private partner is paid through a commission fee framework instigated private partners to do more in maximizing the adoption and use of the system because they could maximize their benefits if, and only if, many users are using the platform. Thus, through strategic approach such as user training, awareness activities, cultivation of the installed-base of agents, the private partner (ROPL Company) is bridging the digital divide, improving the awareness, access, use and adoption of the IREMBO platform. In this

regard, the country is gaining in aspects including bridging the digital divide, improved IT skills in the population, and efficient delivery of public services.

The findings from study 3, and study 4 reveal the importance of the cultivation of the installed base as a promising avenue to address the challenges to e-government development in the LDCs. In studying value creation of e-government during the implementation of e-government in Rwanda, the information infrastructure (II) was also seen as a promising avenue to investigate the process of value creating of e-government projects while considering the socio-technical context through which they are implemented. Socio-technical context includes but is not limited to work practices, current technology, development, culture, and social values.

This thesis argues that the information infrastructure theory defines the operational environment for IT development in general, and for e-government in particular. It is based on three important components: the framework, the context, and the history of IT development within that context.

5.1. Contributions

This thesis adopted a case study method. Taking that direction, this thesis aimed at contributing to theory development.

Overall, this thesis contributes to the existing theories used in IS including the existing framework of the public value of e-government and its creation, the existing theory of critical success factors of e-government, and the theory of information infrastructure. More importantly, the focus was on an LDC in the sub-Saharan Africa, a region that when compared to the rest of the world, lags behind in the development of IT in general, and e-government in particular.

In this thesis, the existing literature about value creation of e-government is reviewed in order to build on the existing knowledge in this field. From the study of existing literature (Study 1) in this thesis, the existing frameworks were dis-cussed. They range from conceptualizations and taxonomies of the public value of e-government to value generating frameworks. The former are frameworks to explain and/or suggest the public value of e-government, and the latter (value generating framework) are for measuring managing the public value of e-government. In the category of value generating frameworks, this thesis discussed frameworks such as co-creation of value, benefits management, and the strategic triangle framework by Moore. In the case studied, the IREMBO project in Rwanda, co-creation framework (in form of PPP) is guiding the current development of e-services in Rwanda.

As original contribution in this field, specifically in the direction of frameworks for understanding and managing the public value of e-government, this thesis suggests a conceptual framework of six areas of eGovernment for the public value and its associated value-generating mechanisms. First, the conceptual framework was developed from a systematic literature review of the existing research in the field of the value of e-Government (in Study 1 of this thesis).

Secondly, the conceptual framework was tested in real case by an example of the IREMBO project in Rwanda (in Study 2 of this thesis).

Testing the conceptual framework with a real case of IREMBO (in Study 2) have contributed to the improvement of the conceptual framework to form now the improved framework.

The suggested conceptual framework, and now the improved framework after testing, proved robust and could be used to study the public value of e-government as an analytical framework and as a framework to measure (at high level) the public value of e-government.

Other important contribution in this regard, this thesis identified five inter-related critical success factors for managing the public value in general, and in an LDC in particular. The last but not the least, the information infrastructure (II) framework, particularly, the notion of the cultivation of the installed-base is suggested as a promising avenue in the management of the public value creation in general, and in an LDC in particular.
The II was employed to study the aspect of creation in the 'value creation' of e-government.

Mainly, the II was used to investigate ongoing arrangements towards realising e-government.

In the II framework, the aspect of installed-base and its cultivation was much helpful to analyse the operational resources at hand, analyse challenging areas, and the last but not the least, the aspect of the installed base and its cultivation was prominent to link arrangements to challenges which they would address.

This thesis argues that the theory of II, mainly, its notion of installed base and its cultivation are robust to analyse the design, deployment, and implementation aspects of ICTs or IS in real mode as well as in a feedback mode. In this thesis, the notion of installed base and its cultivation was robust to studying, conceptualise, and generalise which actions, practical arrangements were put in place to realise implementation of e-government despite various challenges which were at hand. This thesis would argue that the II

theory is a reasonable theory to study ICT or IS by not consider the context; instead, based on the context. In the II theory, the context is embodied in the notion of installed-base, and it is what constitutes the core of II.

The II's notion of "installed base" embodies sociotechnical and practice-oriented aspects, i.e. it includes the physical and social context of work, existing technologies and routines, and the workers' skills and beliefs. This thesis argues that the II is a reasonable avenue to address sociotechnical and practice-oriented aspects in theory and practice.

In a conclusion, e-government would create the public value through advancing the following six overarching and overlapping areas. The six areas of e-government for the public value are: public services, administrative efficiency, Open Government (OG), ethical conduct and professionalism, trust in government, social value and well-being.

In addition, five critical success factors that can be cultivated in our quest for advancing those six areas of e-government for the public value were suggested. The five critical success factors include stakeholder involvement over user acceptance testing (UAT), value proposition over peer pressure, transformation over digitalisation, cultivation over duplication, and contextualization over importation.

ICT use by governments is not as an end tool towards a better government in itself, rather, it is an element of process to get there.

Finally, the research findings in this thesis would inform other e-government projects in quite similar settings and in general. For example, not only this research departed on the existing knowledge in the field of e-government and value creation of e-government, it also conceptualised six overarching dimensions of the public value of e-government, critical performance indicators in each of the dimensions, and critical success factors for realizing the public value of e-government. These findings could be tested in theory and practices in the direction of e-government for the public value.

5.2. Recommendations

The II framework, for example, its notion of cultivation of the installed-base of good practices, methods, and technologies in the context by which IS and/or e-government initiatives are embedded; is a promising avenue for guiding the identification and selection of valuable, rare, inimitable, and non-substitutable (VRIN) resources. In the resource-based view (RBV) framework, VRIN resources are central to the co-creation of value. Through its notions such as design for usefulness or modularity and state-wise tran-

sition; the II framework would be a promising framework in the management and success of IS in general and e-government in particular. However, an interesting venue for future research concerns the alignment of resources in the general framework of co-creation of value and the particular case of this thesis. In the studied PPP framework for e-services in Rwanda, a key difference and interesting venue for future research is the challenges related to setting up such huge PPP initiatives, while still lacking fundamental organizational and technical structures, as well as maturity, to fully support this.

Concerning the public value framework suggested, this thesis would also recommend further studies with a focus on "measurement parameters", those are aspects at a granularity level that would constitute each of the suggested key performance indicators (KPIs).

The use of II theory in this thesis was looking at systems design, deployment, and implementation. Thus, this thesis recommends further studies to use and test the II theory in other settings of IS and/or e-government projects.

The last, but not the least, future research and practices in the direction of e-government for the public value could test and/or use the public value framework and the critical success factors suggested in this thesis. For example, research and practices on value creation and/or benefits management of e-government could utilize the public value framework suggested in this thesis (Table 13), as a basis for the values or benefits of citizens in e-government projects. The entire process should be under the guidance of the five critical success factors suggested in this thesis.

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