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E-government in Rwanda: Implementation, Challenges and Reflections

Jean Damascene Twizeyimana^{1,2}, Hannu Larsson¹ and Åke Grönlund¹

¹Örebro University School of Business, Örebro, Sweden

²College of Science & Technology University of Rwanda, Kigali, Rwanda

damascene.twizeyimana@oru.se

Hannu.Larsson@oru.se

ake.gronlund@oru.se

Abstract: E-government is currently high on the agenda in many developing countries (DCs). While e-government is well-established in many developed countries it is new to least developed countries. Countries that start implementing e-government today can benefit from easy import of modern technologies, but adaptation to local conditions and the organizational change that is required cannot be imported, but must be developed at home. By using examples of an ongoing initiative by the Government of Rwanda to digitalize all G2C and G2B into a single window platform, the current study investigated the important challenges in the implementation of e-government in Rwanda. An interpretive case study was followed. Data was collected through interviews and participatory observations during August to December 2015. Data analysis was inductive, the analysis method was content analysis, and the coding followed open-coding. NVivo software has been used to handle data and facilitate the analysis. The study found six overarching categories of aspects that challenge a successful implementation of e-government in Rwanda. They include information infrastructure for e-government, social inclusion, governance, management, trust in the new system, and languages. However, challenges to e-government implementation should not be taken as of the same extent, neither their degree of mitigation. Rather, they influence and are influenced by various contextual factors which include political support, nature of the e-government project, implementation strategies, human and socio-economic development, existing information infrastructure, and operational capabilities. Having said this, we also argue that countries should learn from one another of their experiences, success stories, and mistakes. Despite a number of associated challenges, the adopted public-private partnership (PPP) approach to e-Government implementation in Rwanda might indeed seem as a suitable catalyst for e-government success in the country.

Keywords: information infrastructure, e-government, implementation, public-private partnership (PPP), least developed countries (LDCs), sub-Saharan Africa, Rwanda.

1. Introduction

E-government is commonly defined as the use of Information and Communication Technologies (ICTs) by government agencies for a better government (Field et al., 2003, p.61). Today, e-government is seen as a technology innovation and is expected to help governments' achievement of, inter-alia, improved administration, internal efficiency, delivery of public service (Heeks, 2002, Field et al., 2003, Ndou, 2004, Grönlund and Horan, 2005, Guida and Crow, 2009, Rose et al., 2015) and increased opportunities for citizens to participate in democratic institutions and processes (Fang, 2002, Field et al., 2003).

While several high-income countries have seen more than two decades of e-government development; e-government initiatives have also increased considerably in less developed countries (Ndou, 2004, Nkohkwo and Islam, 2013, Amagoh, 2016). The hopes are that developing countries could benefit from following experiences and implementation models of developed countries (Shin, 2008, Nabafu and Maiga, 2012). However, so far this leapfrogging has been of limited use since such models and experiences are more suited for the developed countries with up-to-date technology and where there is a higher level of public awareness and e-readiness (Ghapanchi et al., 2008). Rather than being one-size-fits-all, the challenges and determinants of a successful e-government implementation to a great extent depends on the context (Shin, 2008, Nabafu and Maiga, 2012). Hence, despite high hopes to quickly gain a plethora of benefits, there are several reports of challenges to e-government in developing countries (Bhatnagar, 2002, p.2).

Challenges in implementing e-government in developing countries relate to the specific conditions in these differing contexts. More specifically several issues have to do with Information Infrastructure development in developing countries. It is based on approaches like the cultivation of installed base and gradual or state-wise transition in the implementation of large-scale information systems, for example, e-government system (Hanseth and Lyytinen, 2004, Hornnes et al., 2010, Aanestad and Jensen, 2011). The 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 (Hanseth and Lyytinen, 2004, Aanestad and Jensen, 2011).

In this paper, we argue that while questing for a successful implementation of an e-government project, there is a need to understand its installed-base and how to move ahead from there. The literature on e-government in the sub-Saharan Africa region of the LDCs raise several issues, relating to IIs as well as to other issues. In the next section we look into these issues.

1.1 Background

This study is positioned in the field of challenges in the implementation of e-government in the LDCs, in particular, sub-Saharan. The existing literature has been adopted to position and to discuss the findings from this study. Considered literature include literature reviews on challenges to e-government in developing countries (Dzhusupova et al., 2011) —, and (Alshehri and Drew, 2010); a literature review study on challenges to e-government in sub-Saharan Africa by Nkohkwo and Islam (2013) ; and other relevant studies which include Shin (2008), Nabafu and Maiga (2012), and Mutula (2008).

Though there is also a progressing and promising adoption of e-government in developing countries (Ndou, 2004, Nkohkwo and Islam, 2013) , research on e-government in developing countries has indeed identified some relevant issues that seem pervasive to several different contexts.

In a review of literature on challenges to e-government in developing countries (Dzhusupova et al., 2011) identified seven overall challenges which are: ownership; leadership; lack of management commitment; institutional capability; design versus reality; capacity and awareness; and dependence on external assistance such as the common reliance on donors for running projects.

In another literature study on challenges in e-government implementation, Alshehri and Drew (2010) grouped e-government challenges into four overarching categories: technical (e.g., ICT infrastructure, security); organizational (e.g., top management support, resistance to change, lack of qualified personnel and training); social barriers (e.g., digital divide, culture); and financial barriers. The authors argued that ICT infrastructure and lack of qualified personnel and training are more experienced in developing regions.

However, research is still lacking details as to what these general issues might imply for different contexts. In this paper we aim to investigate a Sub-Sahara African context, since there is generally a lack of reliable data about the status of e-government in this context (Mutula, 2008, p.247).

Previous research in this context has for instance pointed to challenges concerning the gap between existing e-government implementation models and the local context in these countries (Nabafu and Maiga, 2012, p.31) . Others have shown that countries in this region face various challenges, where ICT infrastructure, human resources, the legal framework, and the digital divide are core issues (Nkohkwo and Islam, 2013). Compared to other countries, e-government in Sub-Saharan Africa is severely lagging behind where the major barriers are infrastructure, policy, legal and skillfactors, which all act as barriers for Sub-Saharan African use of e-government services (Mutula, 2008, Nabafu and Maiga, 2012). For example in Uganda, e-government has faced challenges with financial resources, building ICT infrastructure, awareness and social political factors (Nabafu and Maiga, 2012, p.32). In Nigeria the most populous country in Africa, the challenges to e-government are the lack of basic infrastructures, high rate of corruption and a large digital divide with is a significant gap between who have access to ICTs and those do not have (Amagoh, 2016). Also, Nigeria faces issues of poor organizational skills attitudinal problems, inadequate infrastructural support, and poor or unavailable human capital resources (Ifinedo, 2006, p.22). 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 due to overreliance on donor support (Bwalya, 2009, p.9). In Botswana, reported as one of the ICT usage power in the Southern African Development Community (SADC) region (Bwalya and Healy, 2010, Nabafu and Maiga, 2012, Nkwe, 2012), 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, p.10). In Kenya reported challenges to e-government were the lack of ICT policies, poor information infrastructure, entrenched graft, the digital divide, inadequate human skills and low IT literacy (Kamar and Ongo'ndo, 2007,

Nabafu and Maiga, 2012). Challenges and determinants of a successful e-government implementation may vary between countries and regions where the determinants depend on the unique environment at hand (Shin, 2008, Nabafu and Maiga, 2012). The environmental factors may entail political stability, legal framework, trust in government, government structure (Basu, 2004, p.112), population size and economy, IT infrastructure development and skilled manpower to run the digital system (Shin, 2008). Thus, the issues identified so far are corresponding with issues in the broader literature on e-government in developing countries. However, the amount of research in the Sub-Sahara African context is still scarce, and little contextual understanding exists. In order to avoid treating developing countries as one unit there is need for more research that focuses on in-depth understanding in this context.

1.2 Objective of the study

This study investigated important challenges in the implementation of e-government in Rwanda. The findings would inform further research and efforts on a successful implementation of e-government in Rwanda and in the context of a LDC. This is done through a case study of the IREMBO project; the initiative by the Government of Rwanda to digitalize all government services to citizens and businesses into a single window platform.

Hence, this paper addresses the research question: What are the important challenges and the lessons from the implementation of the "IREMBO" single window for e-government services in Rwanda?

In the next section we discuss e-government in Rwanda and then we describe the IREMBO project which is the case study for this research. After that, the method is presented. Thereafter the results are presented. Finally, the findings are discussed, the conclusions are summarized, including implications for research and practice, and suggestions for further research are made.

2. E-Government in Rwanda

Rwanda is a country with high ambitions regarding ICTs and where e-government is one of the priority areas. According to the Ministry of Information Technology and Communication (MITEC) previously designated as the Ministry of Youth and ICT (MYICT), ICTs in Rwanda are expected to enable the country in achieving its Vision 2020 of transforming the country from a Least Developed Country to a middle-income country (MITEC, 2015, MYICT, 2015). The approach is to adopt ICTs as a mean to facilitate access to information and services which in turn would yield a dynamic and knowledge-based economy MITEC (2015;2016;2017), MYICT (2015), and Twizeyimana (2017, p.172). As Rwanda is concerned, considerable efforts have been put in place for ICT and its development in the country. These efforts are documented in policy documents such as the National Information Communication Infrastructure plan [2000 – 2015] and the Smart Rwanda Master Plan [2016 – 2020]. In the NICI Plan I to III [2000-2015] the target was to put the legal and regulatory framework in place and build a basic ICT infrastructure MITEC (2015;2016;2017) and MYICT (2015). The major infrastructure consists of telecommunication networks, a national fiber optic backbone, a submarine cable, and an integrated national data center. In the current era of the Smart Rwanda Master Plan [2016 – 2020], the focus is on digitalizing the government towards a 24/7 self-service, "cash-less" and "paper-less" government; with 95% of all government services are transacted online by 2018 MITEC (2015;2016;2017), MYICT (2015), and Twizeyimana (2017).

At the time of writing, the IREMBO platform is considered the core platform for e-government in Rwanda and this platform will be described next.

2.1 IREMBO Project – Building Rwanda's single window for e-government

The IREMBO project is an initiative by the Government of Rwanda envisioned to digitalize all public services into a single window platform called "IREMBO" (a local term that would mean "Gateway" in English or "Porte d'entrée" in French). In their wish for a solution to inefficient manual processes, delays in service delivery, long queues and bottleneck in service delivery, 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). The private partner - ROL is given a BOT (Build, Operate, and Transfer) agreement for the IREMBO platform that is envisioned a one-stop-shop for G2C and G2B e-government in Rwanda (Twizeyimana, 2017, pp.174-175). According to the BOT agreement, the company ROL is expected to build and operate the IREMBO

platform for 25 years (Ibid.). In this PPP, as per the BOT agreement, the government expects to reap the benefits from the private partner's capacity to design, finance, procure, build, and maintain the platform. The company ROL is paid through a commission fee framework, a percentage taken from the service fee paid by citizens when they transact with the government services via the platform (Ibid.).

The services to be digitalized include services related to life events (birth, marriage, and death), land management, driving licenses, doing business licenses, road traffic, motor vehicle inspection, etc. (Ibid.). The first 100 e-services are planned to be available by the end of 2017; and a visit to the IREMBO platform¹ in March 14, 2017, showed that IREMBO was hosting 44 services online (Ibid.).

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 under the responsibility of each government agency in the IREMBO project (Ibid.).

3. Method

The study presented in this paper adopted an interpretive methodology (Myers, 1997), and a case study method (Yin, 2017). The interpretive methodology suggests that knowledge is socially constructed (Myers, 1997, p.5).

A case study strategy is an empirical enquiry adopted when there is a desire to investigate a contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and context are not clearly evident (Yin, 2017, pp.13). Like each of its competitors (e.g., surveys, experiments, archival analysis), case study strategy can be used for three purposes: exploratory, descriptive, and explanatory (Ibid., p.3). The case study strategy is also suitable to investigate the "what" questions which aim at exploratory purposes (Ibid., p.5).

Interpretive approach facilitates an understanding of phenomena from the point of view of actors directly, rather than using a priori constructs (Cavaye, 1996, Klein and Myers, 1999), and an understanding of process whereby information systems influences or is influenced by the context (Walsham, 1993).

We have selected the case study strategy and the interpretive approach through content analysis and open coding technique as the suitable strategies to address the objective and the research question as they are described in section 1.2. Indeed, that approach has facilitated us (i) to investigate contemporary challenges encountered by direct actors in the IREMBO project, and (ii) that the findings emerged from the data itself. In addition, the existing literature has been used to discuss the findings for conclusions and recommendations. On the other hand, the IREMBO project (described in section 2.1) was identified as a suitable case to understand e-government in Rwanda today, as it is a large-scale and complex project meant to act as a central driving force for e-government in the country.

3.1 Data Collection

Data was collected by the first author through extensive participatory observations, as well as semi-structured interviews. The study was conducted over the period of August to December 2015. During this time the first author spent at least one day a week at ROL, with the purpose of having colloquial interaction and discuss with project managers to get a deeper understanding of the project. Further participatory observations took place during regular visits at the company, especially during training sessions where each session lasted around 3 hours on average, and during a two-day retreat. Two questions have informed the data collection for this research: (i) in relation to the project IREMBO, what are the major challenges and experiences so far? and (ii) what measures are in place in order to address those challenges?

During observations and interviews, data was captured through note taking. Note taking was chosen over its competitors such as the audio/video recording due to the fact that employees would refrain from elaborating and speaking openly if they were audio/video recorded. Hence, when compared to its competitors (audio/video recordings), the advantages with note taking would include, but are not limited to, a comfortable environment for informants to feel more free in their interactions with the researchers. Notwithstanding the shortcomings with note-taking, including difficulties in writing while paying attention, making sense of notes,

¹ <https://irembo.gov.rw/rolportal/web/rol>

recording the exact words used by the informants (Piolat et al., 2005, Kiewra, 1985), we have also acknowledged meaningfulness of note taking to the note-taker which relate to a better recall performance when reviewing self-produced notes (Kiewra, 1985, p.25). As in our previous study, Twizeyimana (2017), the challenges to note-taking have been addressed through (i) listening first and take notes after (during dialog 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. 11 with employees at ROL and 5 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 1 and Table 2 respectively, present a generalized profile of participants in participatory events, and summarized profiles of interviewees.

Table 1: 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 sector level.
	15th October 2015	Kigali e-ICT Center		
	19th October 2015	Rulindo District- BDF Center		
	16th December, 2015	Gicumbi District - BDF Center		
Retreat organized 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 2: 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	Trainings & Capacity Building
	Management	Integrated Call center / Customer care services
	Technical	IT security
Interviewees from the government	Legal counsel	Legal Affairs Office
	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

3.2 Data Analysis

Data analysis followed an inductive approach, the analysis was content analysis, and the coding followed open-coding. That is, we have followed a bottom-up approach for moving from the specific to the general, the codes to categories, and they have emerged from the data. Starting from data transcripts to code, from code to sub-themes, and then from sub-themes to themes. Through open-coding; we read the transcripts line-by-line. Hence a code (word or expression) was assigned to representing the meaning of the entire line or paragraph (group of lines). Thus, initial codes stayed close to the informants own formulations (Benaquisto and Given, 2008). Following the initial coding, we 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 many codes whenever it was suitable. This was done iteratively, as codes were revised, and scrutinized for overarching relationships (Dwivedi et al., 2011). In the final stage of coding the overarching categories (as presented in Table 3, below) 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, organize, and analyze the codes. Finally, the findings have been positioned and discussed by means of the existing literature on implementation of e-government in the LDCs and the sub-Saharan Africa. That discussion has led to some conclusions and recommendations.

4. Results

The analysis of data led to the creation of the following six overarching categories of aspects challenging a successful implementation of e-government in Rwanda. They are: information infrastructure, management, governance, social inclusion, trust in the new system, and languages. The categories of challenges and their descriptions are listed in Table 3. Those challenges are

Table 3: Categories and sub-categories.

Category of Challenges	Descriptions	Mentioned in No. of interviews
1. Information infrastructure		
1.1. <i>Data/Information management</i>	<i>database, documentation, use of standards</i>	6
- <i>Database and/or use of standards</i>	Lack of standardization required for data retrieval, reuse, sharing, and for interoperability of systems	5
- <i>Documentation and/or service template</i>	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. <i>Computer systems</i>	The availability of computers (hardware, software, and equipments), printers, applications such pdf readers, image readers in organizations.	4
1.3. <i>Electricity</i>	Lack of access, availability, stability, reliability of electricity	6
1.4. <i>Internet</i>	Lack of availability/access to internet, and high cost of internet	9
1.5. <i>Regulatory environment</i>	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. <i>Awareness</i>	Lack of project awareness in concerned institutions and stakeholders	4
2.2. <i>Collaboration</i>	Lack of a collaboration plan and framework within stakeholders in the project	6
2.3. <i>Communication</i>	Poor communication between stakeholders in the project, especially on who is doing what, how, and when.	5
2.4. <i>Stakeholders' engagement</i>	Lack of involving stakeholders in the process from the early stages of implementation.	2
2.5. <i>Operational capabilities</i>	resources and innovations in the financing of the project, involving users, IT staff/ Human resource, etc.	4
3. Governance		
3.1. <i>Project staff and structure</i>	Although a PPP, it was unclear who composed the project team in concerned government organizations.	2
3.2. <i>Roles, responsibilities, and accountability Enforcement, and leadership</i>	Lack of who does what, how, and when. Who is the government	2
3.3. <i>Distributon of power</i>	Conflict due to mandate or who is eligible and legitimate to do what?	2
4. Social inclusion		
4.1. <i>Digital divide and digital inclusion</i>	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. <i>ICT illiteracy and/or digital exclusion</i>	Lack of general ICT skills, computer skills, and/or IT security skills ...	6

Category of Challenges	Descriptions	Mentioned in No. of interviews
5. Trust in the new system		
5.1. <i>Capability & reliability</i>	Concerns and Skepticism of capability and reliability of the new system when compared to the existing system	4
6. Languages		
6.1. <i>Usability and translation for the Rwandan context.</i>	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

In the following sections the challenges are presented and analyzed.

4.1 Information infrastructure

The identified information infrastructure challenges include lack of computer systems and their maintenance, laws and policies required for the execution of IREMBO, issues of accessibility and availability of electricity and internet, lack of IT personel for system upkeep.

As is the case in many developing countries, there are significant concerns about the use of IREMBO in some parts of the country, especially, in high mountains where access to basic infrastructure such as electricity and internet connectivity are not in place. One respondent from the government institution in a remote area criticized the ambitions of the project:

"You have said that six months after that the service is running online, the manual delivery of that service should be stopped and the services be fully offered online. How this could be possible? Remember, here we live in rural areas sometimes in high mountains where access to internet, PCs and even tele-centers is not possible, modems here are not working. Even if you use those private agents, I think they will be located in centers where there is access to infrastructure!"

One of the major concerns for government users also relates to this. In the strive for a 24/7 working system, obstacles such as the lack of mobile tools to be used when out of office (such as laptops and modems for wireless connectivity), lack of and/or unstable electricity and internet, and the cost of internet are central. For instance, one public servant stated that

"There are some sector offices with no electricity. Internet is a common issue here. We have 21 sectors, but only 15 sector offices are ready to start using IREMBO. If the government could solve some issues like electricity and internet it could help".

Also, other required office equipments and tools are missing. They include computers, regular maintenance, printers, basic applications such as pdf readers, image editors. Futhermore, the existing management processes entail a number of challenges. There are also issues with existing data management routines, especially poor use of database standards, and the lack of service templates (i.e., information on available services such as the name, type or category of service, cost, delivery location and time, entities involved, etc). Also, a lack of a regulatory framework (e.g., policy documents, laws, and regulations regulating PPP projects) was reported.

Although the adopted PPP entailed various challenges, the approach was seen as a suitable catalyst for e-government development in the country. The clause that the private partner is paid through a commission fee framework instigated the private partner to do more in maximizing the adoption and use of the system because they could maximize the benefits if, and only if, many users are using the platform. For example, 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.

4.2 Management

Poor management is a key challenge in the implementation of many e-government projects. Management is understood as organizing and operating the project, or to put it more simply - getting the work done. A core challenge was the lack of awareness in terms of information sharing which influenced the stakeholders' engagement in the project. A respondent from the government argued that the implementation team did not communicate what they were doing in the early stages of the project. He said: "[t]here is a need for

awareness to share what they are doing with all involved stakeholders". This lack of awareness also concerned the communication between clients and contractors, as highlighted by members of the implementation team in statements such as:

"We were expecting government institutions to be prepared to work with us. But in some cases we go to institutions to showcase of what we want to achieve with them. Surprisingly some are not aware of who we are and about the solution we are bringing to them! Probably it is our fault, or our partners".

The second issue in this category concerns collaboration - especially collaborating with direct stakeholders in the early stages of the project. Respondents from the government highlighted that the developed system did not respond to their actual needs. This was seen as being due to a lack of involvement with the clients (government institutions) in a detailed requirements analysis and business process reengineering. For example, the manager in one government institution said

"The analysis conducted did not take every details on how we work and how we offer services to citizens. I mean the whole process starting from how citizens apply until they get the services.", and that "There should have been a detailed analysis instead of we (as clients) to show them that their proposed system is not fulfilling our needs! They missed the ability to involve the client in value proposition".

There are also concerns of operational capabilities including, but not limited to, human resources in the project. For example, a participant in a training session pointed out:

"We CROs we have many tasks to deal with! Ask ROL if they will appoint a staff to deal with IREMBO platform issues at UMURENGE, we have many responsibilities and tasks to deal with, you did not provide us with equipments to use, electricity is not reliable, internet issues ..."

4.3 Governance

In the case studied, the implementation of e-government followed a PPP approach. There are challenges related to the created PPP institution due to the complexity of the government and the complexity of such a PPP framework which entails strong partnership and dependencies. Initially, one organization was set to represent the government with the mission to play the role of the government that included mobilizing and engaging concerned organizations. Despite this a major challenge was still related to the unclear role of the government and identifying who should represent the government in that PPP framework for a much more operational and flexible environment.

For example, a respondent from senior management in the company reported that they are facing issues which include the awareness of the project in the concerned government institutions. He said:

"We are expecting that government institutions are prepared to work with us. But in some cases we go to institutions to show case of what we want to achieve with them, but surprisingly some are not aware of who we are and about the solution we are bringing to them!"

He added that they wondered if the institution that represents the government in the BOT deal was backed by the whole government.

Another similar observation from senior management in the company.

He said: *"We are wondering if the current institution representing the government has failed to fulfill its responsibilities in this project or if it is the right institution to represent the government in this kind of deal!"*.

There are also concerns of commitment and accountability. For example, one respondent claimed: *"The government side did not play its role to enforce the BOT as it is in the agreement"*.

On a similar note another respondent said:

"At the backend side there is not yet someone dedicated to approve the services at IREMBO! There should be someone there to play this role if we really work with them! They can claim that they have much work to do on the other agenda, no resources to hire new employee, etc."

4.4 Social inclusion

Concerns about digital divide, ICT illiteracy and the ability to design e-government systems for inclusion were raised in the case. Norris (2001, p.4) expressed the digital divide as the gap between, on one hand, them who have, and on the other hand, them who do not have the skills, resources, and the information to engage, mobilize, and participate digitally. According to one of the respondents from ROL *"few are computer literate, as consequence, the project is facing difficulties on how to send credentials to citizens after they register to use the platform"*. He also added: *"Another consequence related to computer illiteracy, is that, the use of the platform is low"*. This illustrates how ICT illiteracy is one of the big concerns for the adoption of IREMBO by citizens, since illiteracy (regarding computer or reading and writing at all) can significantly impair, if not altogether stop, people from using available services.

In relation to ICT illiteracy, concerns about the security culture within the community were seen as central in the upcoming e-government system. According to a respondent from ROL the targeted community is not aware, or possibly ignorant, regarding information security measures:

"We have many challenges. Cyber security awareness or ignorance is a big issue. For example, people could have a strong and complex password but the way they take care of that credential is not fair! For example, people are used to share the credential of their email accounts with their friends to act on their behalf like sending a message to someone on their behalf, etc. This seems to be like the culture out there! In relation to IREMBO we fear this culture out there because people may share or mismanage their credentials in a way that they may fall into arms of unintended person who can use them for bad purposes".

Another concern in relation to the digital divide challenge has to do with what was mentioned with regard to ICT infrastructure. Since electricity and internet connectivity is lacking in several areas of the country, citizens that live there will risk being largely excluded from using e-services.

4.5 Trust in the new system

Lack of trust in the new system when compared to well-established systems was also an issue in the case. For example, a respondent from the ministry of Justice, who are stakeholders in the project, highlighted their concern regarding the security and reliability of the new system. For example, he suggested that the system will be better if hosted by Rwanda National Data Center which they have confidence in. He said:

"we have agreed on to host the system at Rwanda National Data Center which has been in operation for years and we now know it is good to cope with power cut issues, data security, cyber-attack, etc."

In regards to the lack of trust in the new system when compared to the existing system, the respondent emphasized their trust in the existing National Data Center (NIDA). He said:

"in regard to submitting photographs online, we do not trust an applicant photo when submitted online! Unless we get it from a trusted partner such as NIDA. We have also agreed on to use applicants' photos if they directly come from the NIDA".

Other concerns of trust (in terms capabilities and reliability) of the new system have been highlighted by CROs during the training. For example, a CRO asked:

CRO: *"I can see that, when the user applies, fills in information. So what can prove that the applicant has paid the service applied for?"*

Trainer responded that the proposed system provides an automatic service to validate the payment if done via Mobile money, Visa Card, Bank deposit, etc.

CRO: *"What happens if I change the status myself!"*

Trainer responded that the system is integrated with payment systems available on the platform, so that it pulls data directly from those other payment systems.

CRO: "Do the names of parents come automatically or the applicant has to type them?" Trainer answered that the names are coming automatically from the NIDA because the system is connected to NIDA (the National Identification system).

Thus, from these answers and questions, a CRO reacted in a somehow satisfactory manner saying: *"If so, it is good because they will prevent those who can cheat and give false information"*.

4.6 Languages

One important challenge in designing online services in Rwanda has to do with translation. That is, translating local language terms to web terms, or the existing web interface vocabulary, often in English, so as to be suitable to the local language. One respondent from ROL mentioned that *"There are challenges related to content translation in order to build a simple-to-use system, especially for Kinyarwanda language with its vocabulary that changes with time"*. On a similar note, the other respondent from ROL highlighted:

"Translation is not only a challenge in the design of the IREMBO platform, it is a problem for many online platforms in Rwanda. Our mission is to handle translation problem at IREMBO, and also to innovate ways to improve it for other existing e-government portals".

One reported issue was the lack of a common dictionary and language structure for IT terms in the local language (Kinyarwanda). This has affected the design of a user interface that integrates local language content while living up to standards for web usability. For example, the effort it takes to make the interface as simple as possible (short, concise) in one language (say French) will not be the same in another other language (say English).

5. Discussion

This article investigated the important challenges in the IREMBO project, a project that is envisioned to digitalize all G2C and G2B in Rwanda. The IREMBO project was the suitable case as it goes beyond the existing complexity in the management of e-government project implementation in the LDCs to include the complex nature of a PPP framework.

Six overarching categories of aspects that challenge a successful implementation of e-government in Rwanda were identified. They are information infrastructure for e-government; social inclusion; governance; management; lack of trust in the new system; and languages. These findings add importance to previous studies in developing countries and Sub-Saharan Africa (Kamar and Ongo'ndo, 2007, Mutula, 2008, Alshehri and Drew, 2010, Nabafu and Maiga, 2012, Al-Shboul et al., 2014) which have also reported many of these challenges. These findings would also support (Hanna et al., 2009) that Context matters and there is no single model to fit all countries; and (Basu, 2004, Shin, 2008, Nabafu and Maiga, 2012) that challenges and determinants of a successful e-government vary between contexts and that the determinants depend on the unique environment. For example, in the case studied, governance issues have been intensified by the complexity and new experiences introduced by the PPP approach. The issue was not only leadership, as observed in previous research on developing countries (Dzhupova et al., 2011), but also of co-ordination and need for anchoring decisions. The major challenge was to understand "who is the government?" and/or "who should represent the government?".

Also, the fact that the IREMBO platform is a PPP product has also decreased public managers' trust in the new system. Their concerns were much more on the aspect of the security and reliability of the new system. Hence, confirm (Chircu and Lee, 2005, Rose et al., 2015, Larsson and Grönlund, 2016) by suggesting that the adopted PPP framework would entail value conflicts between governments and private stakeholders who might exercise different views and values.

On the other hand, the adopted PPP approach has entailed some advantages, for example, the clause that the private partner gets paid through a commission fee motivated them to maximize the use of the system through users training, awareness campaigns, and the cultivation of the installed-base of "agent based"

framework. Thus, the adopted PPP has mitigated financial, technical, and managerial challenges, for example, the PPP approach impacted the institutional capabilities of improved ICT skills, social inclusion, bridging the digital divide, and ICT infrastructure development which are among the most important in developing regions (Mutula, 2008, Shin, 2008, Alshehri and Drew, 2010, Nabafu and Maiga, 2012).

6. Conclusions

The aim of this study was to investigate the important challenges in the implementation of the “IREMBO” project, the initiative by the Government of Rwanda to digitalize all G2C and G2B into one single window platform. Through that case studied, this study contributed to the elaboration of important challenges experienced by actors in the implementation of e-government in the context of a LDC. The study found six overarching categories of aspects for a successful implementation of e-government in Rwanda. They include information infrastructure for e-government, social inclusion, governance, management, trust in the new system, and languages.

This study also revealed that challenges to e-government implementation should not be taken as of the same extent, neither their degree of mitigation. Rather, they influence and are influenced by various contextual factors which include, but are not limited to, political support, nature of the e-government project, implementation strategies, human and socio-economic development, existing information infrastructure, and operational capabilities such as resources and innovations.

Although the adopted PPP framework entailed issues of leadership and co-ordination, the approach was seen a venue to address financial, technical, and managerial challenges which are major and common challenges in developing regions. Also, the introduced platform for e-government has entailed the managerial revolution because it would inscribe good staff performance where staff would avoid to delay applications which would make them look incompetent. This study would add importance to the existing research on challenges and critical success factors for e-government implementation in the LDCs, in particular, the perspective of a PPP framework. Finally, the findings would support that implementation of e-government would succeed when the implementation strategies and arrangements would consider the context at hand.

6.1 Limitations and Recommendations

While being a “snapshot” case study E-Government in Rwanda, we recommend comparative case studies on approach, governance, management and development of e-Government in other countries in the region. Another limitation of this study is the focus on the management side. To some extent, a citizen perspective was raised by the CROs. However, there is still a need to understand the project from the view of citizens with focus on the use and impact. Also, 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.

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