DOI: 10.1002/isd2.12006

WILEY

RESEARCH ARTICLE

The role telecentres play in providing e-government services in rural areas

A longitudinal study of Internet access and e-government services in Tanzania

Bjørn Furuholt | **Øystein Sæbø**

University of Agder, Kristiansand, Norway

Correspondence
Bjørn Furuholt, University of Agder, Kristiansand, Norway.
Email: bjorn.furuholt@uia.no

Abstract

In this paper, we explore the role played by telecentres for providing e-government services in rural areas. We do so by reporting from a longitudinal multiple case from Tanzania, one of the least urbanised African countries with only 23% of the population living in urban areas. Telecentres are proposed to operate as multipurpose community information and communication technology access centres offering e-government services (as well as other services), providing information, transactions, and entitlements. The supply and use of e-government services is in our cases found to remain almost unchanged over the last 5–10 years, and there is still a long way to go to fully use the advantages and strengths of e-governments, due to infrastructure (lack of computers and lack of, or slow and unstable, connections), management (lack of marketing and lack of relevant information and services), and human factors (lack of awareness and knowledge among the citizens). Based on our findings, we argue that telecentres still have a role to play, in combination with personal mobile phones, where simple tasks may be performed by mobile phones, with more complex tasks may be done via Internet from telecentres. This combination will still be the best alternative into the future.

KEYWORDS

e-government, longitudinal study, sub-Saharan Africa, telecentres

1 | INTRODUCTION

An important driver for development is access to information and communication technology (ICT) (Walsham, 2010). Information and communication technology is a primary input to economic processes, and it is crucial for enterprises, communities, and individuals to successfully participate in the global economy (Hollifield & Donnermeyer, 2003). While ICT access is rapidly being provided through mobile phones (Furuholt & Matotay, 2011), people in poor, rural areas are still restricted financially from buying expensive phones with Internet capabilities. Hence, they mainly use their mobile phones for voice calling and person-to-person SMS (Hellstrom, 2010). We argue that facilitating public Internet access points (PIAPs) is still important for accessing the Internet in developing countries (Wahid, Furuholt, & Kristiansen, 2006). Public Internet access points, variously referred to as information kiosks, telecentres, cybercafés, community technology learning centres, and the like, experience varying degrees of success with a variety of approaches in service provision to their customers (Bell, 2006), and more work is still needed to understand their role and influences. We address this issue by exploring the role of PIAPs in several case studies across Tanzania, with the focus on their role in providing e-government services.

Good quality e-government services are a prerequisite for global development, and it is utterly important for governments to provide universal access to public services (United Nations, 2016). While there seems to be a relationship between the lack of access to information, corruption, and bad governance (Kristiansen, 2004), effective e-government services are instrumental in achieving efficiency, transparency, and responsiveness (Avgerou, 2010). While the adoption of e-government has increased in most countries, developing countries are still lagging behind, with Tanzania and its East African neighbours at the low-end of the scale (United Nations, 2016).

E-government services need to be accessed and used by ordinary citizens, which is still to happen in rural areas through PIAPs. Traditionally, PIAPs have had minimal influence on the use of e-government services (Gomez & Baron-Porras, 2011). After studying various telecentre projects in India, Gollakota et al. (2012, p. 189) conclude the following:

> *In most cases there is a sense that public access venues in rural locations are underutilized, especially by those considered most disadvantaged or those who could benefit the most.*

According to Rajalekshmi (2014), Indian telecentre projects have different sets of proposed activities and business models, and almost all of them explicitly portray integrated e-government services delivery as a key activity of the centres. He further claims, however, that while empirical and theoretical research in the area has been growing over the last years, information on the fundamental aspects of telecentres is scarce in the literature. For example, the links between telecentres, governance, and development do not seem to have undergone substantial scholarly research (Rajalekshmi, 2014, p. 26).

The results introduced in this article are based on several case studies in Tanzania, in which we have been involved for more than 15 years. While Tanzania is an underdeveloped country with huge economic and developmental challenges, it is noteworthy that Tanzania is among the more politically stable countries in its region of Africa (Melchioly & Sæbø, 2010). Studying Internet cafés across Tanzania 10 years ago, we found very few traces of e-government use (Furuholt & Kristiansen, 2007). Since then, we have revisited the research field regularly, providing us with the opportunity to explore the role that PIAPs play in providing e-government services in rural areas. Our findings are based on a longitudinal study of several PIAPs from 2009 to 2015. We aim to improve the understanding of how PIAPs may remain sustainable, and contribute to good governance and development in poor regions.

The paper is organised as follows. After this introduction, we present the theoretical foundation in Section 2 and the methodology used in our study in Section 3. Section 4 describes the 5 cases and their contexts, while our findings are presented and discussed in Section 5. Section 6 provides our conclusions and recommendations.

2 | THEORETICAL BACKGROUND

Our work has its origins from two core concepts that we briefly introduce here: public Internet access and e-government. These concepts are both to be discussed within the context of ICT for development. Hence, we will first like to establish what is meant by development. In general, development is about creating and enabling an environment for people to enjoy long, healthy, and creative lives (UNDP, 2008). Information and communication technology has the potential to support development in developing countries, mainly by providing access to information and building communication lines between people (Sein & Harindranath, 2004). In recent ICT4D literature, the concept of development is often understood as human development (Andersson & Hatakka, 2013). More specifically, development is related to freedom, where development is the result of an increase in an individual's choices through the expansion of their capabilities. This is known as the capability approach or CA (Sen, 1999). Walsham (2010) studied case examples of ICT-based initiatives, such as telecentres, mobile phones, and e-government direct services and grouped them into 4 broad development categories: better lives for the poor, improved government services, enhanced internal economic activity, and improved civil society.

We have reviewed the literature to identify research dealing with PIAPs in rural areas of developing countries, as well as the extent to which they are used for e-government services. We identified literature in two rounds—the first in 2009 to 2011, identifying 25 articles, and the second in 2014 to 2016, resulting in 35 more articles relevant for our study.

2.1 | Sustainability and the impact of PIAPs

Internet cafés and telecentres are two main sources of public Internet access in developing countries. Telecentres operate mostly as not-for-profit organisations, relying on sources of external funding, including government institutions, multilateral agencies, and nongovernmental organisations. They have an explicit objective to support the community, which often includes efforts to support development among underprivileged populations. Internet cafés, on the other hand, are normally private enterprises, owned by local entrepreneurs with the primary purpose of generating profits for their owners.

In recent years, our observations in places where we have closely studied PIAPs—Wahid et al. (2006) from Indonesia and Furuholt and Kristiansen (2007) from Tanzania—indicate that Internet cafés have either been closed down or changed into game centres or ordinary cafés with Wi-Fi services, while telecentres are still spreading into rural areas, albeit slowly in most developing regions. Hence, while the role of Internet cafés has been reduced, there is still a wide variety of telecentre models being implemented. Two distinct models seem to be most common: UNESCO's community multimedia centre (CMC) model and the Indian common service centre (CSC) scheme. The CSC scheme was a strategic cornerstone of the e-governance plan in India, with the aim of establishing 300 000 rural Internet kiosks across the country, providing a platform that enabled government and private sector organisations as well as non-governmental organisation (NGO)'s to empower the rural populations through a combination of IT and non-IT services (Prasad & Ray, 2012). In general, these CSCs are small telecentres, with 1 or 2 PCs and various input/output devices, in contrast to the CMC model created by UNESCO in 2001. The CMC combines local radio with a broad selection of digital and nondigital

telecentre facilities, with the aim of serving as a communication and information platform for the local community's development needs (UNESCO, 2004). According to UNESCO (2004, p. 5),

> *… in rural and remote areas of developing countries, we presume that the integration of various technologies in CMCs, in particular the radio and Internet components, offers an effective gateway to the Information Society for marginalised communities.*

Sornamohan (2012) has examined these two different telecentre models, and his conclusion was in favour of the CMC model. He states that the major success factors associated with the CMCs were identified as stronger socio-economic and cultural community bonding and acceptance.

Telecentres provide substantial benefits for the local, often poor, communities where they are introduced. The approach has, however, generally been one of pilot projects, and the main problems have been the sustainability and replication of these projects (James, 2003, p. 470). Therefore, to support permanent development, telecentres need to be sustainable (Furuholt, 2009) and successfully maintained over long periods with appropriate resources, including money and people (Walsham & Sahay, 2006).

Discussions on sustainability often refer to financial or commercial self-sustainability, regarded as a necessary condition for the continued existence of the centres (Furuholt, 2009). While "commercial sustainability" denotes an initiative that relies on revenue generated solely from its operations to sustain itself, "financial sustainability" simply indicates that operations are sustained through funding derived from a variety of sources. Most telecentres have embraced a variety of strategies in their efforts to become financially sustainable, including both local support and external support from government and international donors (Bell, 2006).

Since the telecentre concept has an explicit development objective, the focus on financial sustainability as a success criterion has been subject to discussion. UNESCO (2004) asserts that it would be very disappointing if economic sustainability were the primary objective of a CMC. Therefore, sustainability cannot thrive on funds alone. Rather, sustainability depends on social, institutional, and financial viability. Furthermore, they conclude that community participation and commitment, ie, the social dimension, are the fundamental conditions for the sustainability of CMCs.

Sustainability has both a supply side and a demand side in a telecentre context. To maintain financial sustainability, the telecentre is dependent on enough users who are willing to pay for the services over a long period. To study how the use of e-government services in telecentres changes, we must explore which factors generally influence people to use the telecentres—demand sustainability.

Furuholt (2009) has developed a model for the sustainability of PIAPs. Unlike other similar models, this model gives a more detailed description of the individual sustainability elements and their interrelationships, with an emphasis on both supply and demand sustainability. An overview of the model is presented in Figure 1 below and shows that supply sustainability is grouped into two main sets of elements and demand sustainability into 4, where the various sustainability dimensions are, to some degree, related to each other. The full model is further segmented into a large number of subgroups.

2.2 | E-government

E-government can be defined as the use of ICT in the public sector to improve operations and the delivery of services and is directly linked to the term e-governance and the concept of good governance. UNESCO (2010) defines e-governance as follows:

> *… the public sector's use of information and communication technologies with the aim of improving information and service delivery, encouraging citizen participation in the decision-making process and making government more accountable, transparent and effective.*

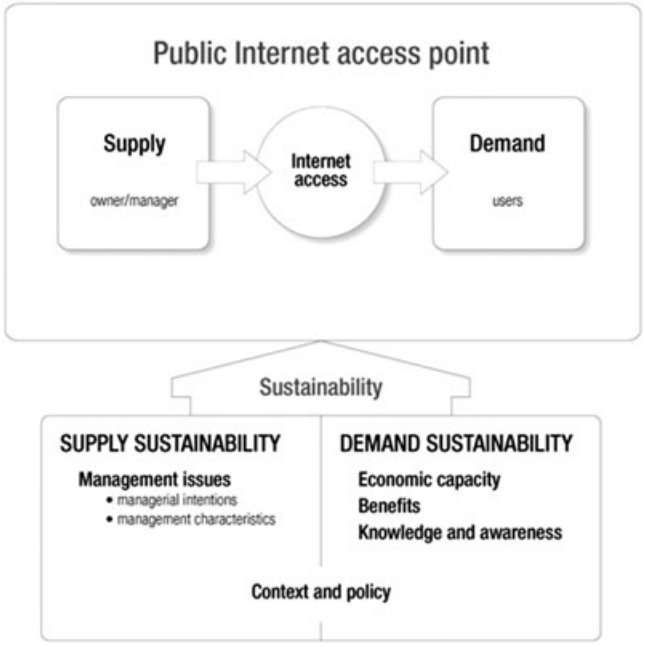

FIGURE 1 Supply and demand sustainability (source: Furuholt, 2009)

E-governance is a critical component in two global shifts changing the way society works and the way that society is governed: the information revolution and the governance revolution (Heeks, 2001). Only those with have access to ICT and information benefit from e-governance initiatives, resulting in an "e-governance divide," which separates developed and developing countries and elites from other citizens within developing countries.

Researchers, eg, Seifert and Bonham (2003); Grönlund, Andersson, and Hedström (2005); Andersen (2009); and Grönlund (2010), have looked into the opportunities and challenges of e-government in developing countries. They argue that general opportunities, such as cost reductions, improved efficiency, and quality of services, also apply to projects in developing countries and that these initiatives are also motivated by the need for reforms, including transparency, increased citizen participation, and attracting economic development. A common theme is the focus on transparency and fighting corruption, with some e-government systems being designed specifically to combat corruption. The Bhoomi project in India, for example, was designed to facilitate the online delivery of land records so that citizens could challenge arbitrary bureaucratic actions if they deemed them unfair (Chawla & Bhatnagar, 2004).

3 | METHOD

The goal of this study is to explore the role played by telecentres in providing e-government services in rural areas. The study is exploratory in nature, emphasising the understanding of phenomena within their real-life contexts (Yin, 2009). We use a longitudinal multiple case study approach, which typically provides a stronger theoretical base for theory building than a single case study (Benbasat, Goldstein, & Mead, 1987; Yin, 2009). From a theoretical and methodological stance, there is a need for more longitudinal studies from developing country contexts, because they are complex and change processes are often slow, taking place over a number of years (Walsham & Sahay, 2006). The instability of political contexts can impede or delay the maturing of projects; thus, longitudinal studies, with visits and possibly interventions in field sites taking place on several occasions spaced out over time, are obviously relevant here. Another obvious argument for using a longitudinal approach is the sustainability aspect, since telecentre services, like e-government systems, have to be long-term sustainable to support development.

Multiple case studies may establish patterns of relationships between constructs within and across cases with their underlying logical arguments (Eisenhardt & Graebner, 2007). The method consists of selecting multiple cases, triangulating data during data collection, and analysing the data both within cases and across cases (Yin, 2009), where the data are investigated in many divergent ways (Eisenhardt, 1989).

Previous studies on public Internet access (eg, Furuholt & Kristiansen, 2007) and e-government (eg, Sæbø, 2012) in Tanzania form the backdrop for our work. Our longitudinal case study of e-government services from telecentres started with a literature review and field studies in 2009 and continued with further visits to the research sites, data collection, and literature studies until 2016. The data collection details are presented in Appendix A. The first stage of the work was documented in a research-in-progress publication from 2011 (Furuholt & Matotay, 2011).

In the analysis work (see Section 5 below), we have combined data from interviews, observations, and discussions in the field with information from relevant current literature. Thus, we have obtained a combination of primary and secondary data, which mutually complement each other.

4 | CONTEXT AND CASES

Tanzania, a multiparty democratic republic, which gained its independence from the United Kingdom (UK) in 1964, has a population of 45 million. Within an area of 945 000 km^2, Tanzania remains one of the least urbanised African countries with only 23% of the population living in urban areas. While Kiswahili is the official and common language, all teaching from the secondary school level takes place in English, the second official language of Tanzania (Furuholt, 2009).

The Sengerema Community Multipurpose Community Telecentre (STC) was implemented as part of a national telecentre initiative supported by UNESCO and coordinated by the Tanzania Commission for Science and Technology (COSTECH), which is the national advisory organ of the government on all matters of science and technology for development (COSTECH, 2018) [Correction added on 9 January 2018, after first online publication: this citation has been changed]. The STC in the Mwanza region in Northern Tanzania was then chosen as our primary case, and also because it is known as a model and a pilot telecentre in Tanzania. The other cases are the broadband networks in the Bunda and Serengeti districts in the Mara region, and the Soma Book Café in Dar es Salaam—all in all, 3 very different types of not-for-profit Internet access points. In addition to these, we have also included 3 Internet cafés to reveal a change in e-government use in this type of venue. The map in Figure 2 below shows the locations of our cases.

4.1 | The Sengerema Telecentre (STC)

Sengerema district is 1 of 7 districts in the Mwanza region with a population of 663 000. The main economic activities in the district are agriculture, livestock keeping, timber work, fishing, mining, business, and small-scale industry. The main cash crops are cotton, bananas, maize, rice, cassava, and paddy (Mbangala & Samzugi, 2014).

The STC is the result of UNESCO's CMC projects for Africa (introduced above). The overall objective is to make ICT accessible at affordable rates to rural communities, farmers, livestock keepers, fishermen, entrepreneurs, disadvantaged groups, and institutions. The STC was initiated to become a model for the government of Tanzania and international ICT practitioners to learn and replicate such facilities in other rural settings. It was established through collaboration between international partners, including UNESCO, ITU and IDRC-CANADA, ICT practitioners in Tanzania

FIGURE 2 Cases in Tanzania

led by COSTECH, and local partners comprised of Sengerema District Council, Sengerema Secondary School, Sengerema Folk Development College and individuals (Ncheye, 2010).

The STC offers a wide variety of IT-related services with many community development aspects, such as a computer centre where staff are instructed to help customers operate the computers and search for relevant information and services. They run their own library and community radio station, and ISP services to the local and district government and various organisations such as NGOs. They also offer a variety of IT consultancy and secretarial services, including desktop publishing and Web design, and they have a conference room with video conferencing equipment for rent. The ISP services are their main source of income, together with the computer centre. Only 5 people have fixed positions out of 18 employees. In addition to relying on volunteers and paid staff, the centre also gets assistance from local NGOs, such as women who belong to the Sengerema Women Information and Communication Group, to create awareness and promote the telecentre.

4.2 | The Bunda and Serengeti networks

Serengeti and Bunda are two districts in the Mara region, north of Tanzania, with a total population of 437 000 and are among the poorest districts in the country (Nungu, 2011). Here, *the Bunda and Serengeti networks* were initiated with support from the Swedish government, which connects 12 villages in these two districts with the national electric grid (Mascarenhas & Kimasha, 2007). A fibre optic cable was included in the electrical overhead cables provided for this project, primarily to monitor the supply of electricity. However, the capacity allows other forms of data transfer and Internet connectivity using broadband. It is part of a wider project called ICT4RD, initiated to explore the possibilities of having affordable Internet

connectivity in the rural areas of Tanzania. The essence of the project is to test different infrastructures, technical solutions, and different business models and to investigate the usage and impact of the connectivity.

The networks connect the headquarters of the two municipalities, the Serengeti district in Mugumu and the Bunda district in Bunda. The primary focus of the network is to connect the two local government authorities, some educational institutions, and health facilities in the two municipalities. The network hosts a website where its content management is done in Bunda, a local e-mail server, telecommunication services via voice over IP, and a wireless LAN across and between the connected centres.

4.3 | Soma Book Café

Soma Book Café in the Kinondoni area of Dar es Salam was established in 2008. It is run by Soma, a nonprofit organisation with a vision to fight poverty by transforming Tanzania into an informed society that values knowledge, creativity, and independent thinking. The café premises house a bookstore, a library, a number of computers with an Internet connection, and a wireless network for rent to visitors bringing their own devices. They run various educational and networking forums and publish a quarterly literary magazine. The Soma organisation receives some external financial support from the Swiss Development Cooperation and other donors. Over time, their web page (www.somabookcafe.com) has been less and less active, and their main communication channel today is their Facebook account (https://www.facebook.com/Soma-Book-Cafe-91630451429/). In 2016, however, a new web page was created and has been regularly updated.

4.4 | Twins Internet Café and Secretarial Bureau

Twins Internet Café is a private entity, localised in the Mwenge area of Dar es Salaam, and surrounded by educational institutions (university, colleges, and schools). Their users are mostly students, especially from secondary schools, but workers (public and private), doctors, and lawyers are also regular customers. On average (in 2010), Twins was visited by 50 customers daily, and the average time spent by the customers was 1 hour. The 1-hour fee was Tsh 1000 (approximately USD 0.65). When we visited the area in 2014, the café was closed.

4.5 | Chalinze ICT

Chalinze ICT is the only Internet café in Chalinze, a town at a road junction 120 km west of Dar es Salaam. The owner is also the manager and operator. He has hired two employees to help him run the business. He opened his café in 2008, inspired by the telecentre model promoted by the Tanzania Telecentre Network Organisation, led by Mr Ncheye (the STC manager).

In 2011, there were less than 10 Internet access customers per day, paying Tsh 1000 per hour. The café also offers other services, such as faxing, copying, and typing. The 6 computers were initially donated by COSTECH, and the rest of the start-up capital came from the owner's own savings.

In 2015, the café was still running. The turnover has increased, which allows the owner to pay salaries, rents, and taxes while still generating surplus.

5 | FINDINGS AND DISCUSSION

5.1 | Developments in the use of PIAPs in Tanzania

Until 2009, one of the major constraints on ICT development in Tanzania was the lack of an adequate communication infrastructure. East Africa was one of the last regions in the world to be connected to international submarine cable networks. When the first submarine cable opened in 2009, access to telephone and Internet services strongly increased (Souter, 2009). Access to communication infrastructure varies dramatically between urban and rural areas (Furuholt & Kristiansen, 2007), suggesting that subsidised telecentres are needed in the rural areas to provide Internet access to poor people. Examples of these include the STC, the Chalinze ICT, and the Bunda and Serengeti networks.

Above, we reflected on the fact that Internet cafés have decreased in number and importance and are therefore becoming less important for the development of rural areas in developing countries. However, many countries have continued to support the spread of telecentres. In Tanzania, this has been a slow process, even if the government has presented ambitious objectives for establishing rural telecentres across the country (Lwoga, 2010; Mahegere, 2010; Mbangala & Samzugi, 2014; Tan, 2007). Until 2015, only a handful of centres have been initiated, and the only sustainable CMC has been the STC (studied here). A couple of other PIAPs still in operation are either based on private initiatives, such as the Chalinze ICT, or are part of educational institutions.

James (2010) claims that it is especially difficult to bring the Internet to rural areas of developing countries, because of the severe lack of affordability and skills constraints. The focus of the telecentre projects is on rural areas. In many cases, telecentres have become a means of delivering public and private services to rural and remote locations and have impacted positively on the socio-economic development of the target communities. According to Farjallah (2007), the process of establishing telecentres helps to develop rural and remote infrastructures, generate

employment, bring the hitherto isolated communities into the national mainstreams and international information network, promote knowledge-sharing among communities in a number of areas, eg, agriculture, give local producers access to market information, remove the middlemen, and increase rural incomes.

In Bunda and Serengeti, growth in access to the Internet has been modest. Nungu (2011) found that most individuals in the region could not afford to own a computer and, therefore, the ICT4RD project initially offered connectivity mainly to groups. In the pilot phase, they started with a few selected groups, such as public offices, schools, and health facilities. Also, a few businesses and private users connected, and the users had to pay a small fee. Gradually, new users were connected. In April 2011, three telecentres were operating, in which two were owned by NGOs and the third was a family-owned business run by a retired civil servant.

In Chalinze, the manager told us that, when he started the business in 2008, only two people in the village had e-mail addresses. They started to train teachers and students on how to open an e-mail account and use it for personal communication. Now, Internet browsing is commonplace and the business runs itself. In 2015, however, he registered a declining demand, because

> *Currently, the Internet is everywhere in mobile phones. Consumers who used the Internet café for searching information and reading newspapers can now get the services from their phones. But still there are customers who should remain with the Internet café because they download large files and sometimes require printing services.*

5.2 | What role do PIAPs play in providing e-government services?

To be effective, e-government projects, like information systems in general, must focus on the social contexts into which they are introduced. This is even more important in developing countries, many of which are African countries, with great cultural differences from the "Western" world where the technology and systems normally are designed and developed. Schuppan (2009) addresses the different institutional and cultural contexts that must be considered when implementing e-government in sub-Saharan Africa. Although e-government is a global phenomenon, simply transferring IT solutions and related organisational concepts from developed to developing countries seems inappropriate. More than in developed countries, the different initial institutional, cultural, and wider administrative contexts must be considered to avoid unintended effects. Therefore, especially for African countries, a context-oriented approach seems to be a more promising route to the successful implementation of e-government.

Telecentres are proposed to operate as multipurpose community ICT access centres offering e-governance, e-commerce, and other ICT services. The usually envisaged e-governance services include

1. Providing information, eg, about health, education, and agriculture;
2. Transactions between citizens and government; and
3. Providing entitlements, including certificates and licenses.

The possibility that non-state actor–owned telecentres can offer a range of e-governance services in an integrated manner fascinates many governments today (Rajalekshmi, 2007).

The Government of Tanzania has made some efforts to use e-government as part of serving its people in different public services units, like the Tanzania Revenue Authority; the National Examination Council; and the Ministry of Lands, Housing and Human Settlements (Mbwete & Bhalalusesa, 2011). However, there is still a long way to go if the country is to fully use the advantages and strengths of e-governance, and the major reasons behind this are the lack of collaboration between government units and political will power.

A thematic report by Tan (2007) describes lessons learned from setting up and managing rural communication access centres in Tanzania, including the STC. He presents a long list of lessons learned and derived, without even mentioning the role of these centres as e-government service providers, which clearly illustrates the need to make up for this shortage and study more closely their potential as e-government intermediaries. Back in 2009, STC had just started providing Internet services to the local governments as an ISP to make them capable of offering e-government services. This was their first attempt to help the local government to develop e-government services. Back then, they planned to support the governments by developing their Web presence and to make services available to citizens by running the computer centre services and by supporting Internet cafés in the region with supplying Internet-based services.

In 2014, we found a few traces of the use of e-government services from the demand side, which were limited to access to static web sites with governmental information. The management, however, had a clear vision of providing relevant content in collaboration with the local authorities and educational institutions and emphasised that they only produced localised information in Kiswahili, unlike other radio stations and the Internet.

Over the years, the services at STC have been extended. The ISP services have been offered to several new institutions, such as schools, local government agencies, a clinical college, NGOs, and individuals. The STC has established a "knowledge room" for courses, demonstrations, and presentations for use by individuals and organisations. This service was highly appreciated by some of the users interviewed and was found to impact on the local community. The STC manager was particular proud of their services supplying agriculture and farming information, including national market surveys, and advice of where and when to sell the farming products, which were supported by the Ministry of Industry and Trade.

The Sengerema District Council is collaborating with STC, mainly through their radio services, to reach out to people in this poor, rural, and sparsely populated area. The head of a department there told us: "STC is a good partner for development activities in order to mobilise the communities." Further examples of this local governmental office use of the local telecentre are announcements, where they try to find parents or relatives of lost children, and information that enables mothers to know the times to take their children for vaccinations.

One important area is associated with the issue of albinism. In Tanzania, the country with the highest rate in the world, 1 in 1400 is born albino. In Africa, stories have grown over hundreds of years around people with albinism, attributing supernatural powers to them. In Tanzania, they are described as "zeru-zeru," immortal spirits, and people with albinism have been persecuted based on the belief that certain body parts of albino people can transmit magical powers, while they are also presumed to be cursed and bring bad luck. According to the UN, the most dangerous country for albinos worldwide is Tanzania. In our interview at Sengerema District Council, they told us that, together with STC, they have launched a radio programme specifically aimed at this issue and that awareness of the albinism issue has increased.

In 2006, a baseline study (Nungu, 2011) revealed that the local actors in the Bunda and Serengeti district had ambitious expectations of how the ICT4RD project could contribute. Through access to broadband, the educational sector (with a shortage of teachers and a lack of textbooks) hoped for e-learning opportunities to improve the quality of education. The health care sector, facing a lack of trained staff, poor communication channels, and insufficient facilities, expected access to telemedicine services to allow the few available medical doctors to provide online consultations to primary health centres. The ICT4RD projects, therefore, started by helping the district councils deploy internal local area networks before connecting them to the community network. Two district hospitals and two primary health centres were connected, as well as 7 secondary schools with the objective of allowing the schools to share courses via the network.

In 2009, when we interviewed ICT4RD staff, the use of the Internet was low in the Bunda and Serengeti districts. There was no local ISP and not a single Internet café or telecentre. Within the local government offices, however, there was adequate equipment and many of the district staff had been trained in the use of computers. There was also some use of the Internet by departments in district councils, by the district hospital in Bunda district, and by businesses like Varrian Tanzania and the Bunda Oil Mills. However, website information updates and changes were poor. It took, for instance, 9 months to change or update information on the website. Moreover, one informant revealed

> *… still there is a problem of community awareness of this important community project. People don't own the project; they perceive it as a government project for the government and not the community; only students and youth see it as an opportunity.*

The establishment and deployment of the technology in between and across these two municipalities had in mind the whole aspect of enhancing e-government in the municipalities. Yet thus far, it is only government institutions that are connected (G2G). One informant claimed

> *… if you serve these municipal councils and their respective health and education institutions very well, then the community will benefit through improved services, and you have served the people.*

Nungu (2011) performed an analysis to find out who used the network and for what purposes. The main use included Internet surfing, and only a few cases included e-mail exchanges for communication within and between the local governments. The local government authorities said that there was some search for agricultural information and the use of information from central governmental institutions downloaded and hosted on local servers. Information searches from outside the local network were very slow. Within the health care sector, a pharmacy used the Internet to find information on the use of drugs and medicines online, specifically from the British National Formulary. The most frequent educational uses were university applications and admissions results for potential students. One village had initiated an "ICT Club" where secondary school students came together to learn how to use a computer and the Internet.

Still, back in 2011, main challenges were related to the instability of the power supply, the slowness of the Internet connection, and the lack of trainers and training materials for basic computer skills. Only a few people used the Internet for personal purposes, since computer illiteracy was high while trained staff had moved.

Informants, both in the health care and educational sectors, still saw great potential for local content that could be accessed as an alternative to the lack of printed information. Health workers, for example, had a great demand for updated knowledge about preventing and treating common diseases, and doctors needed updated best practices on how to perform certain surgical operations. To fulfil these needs, the ICT4RD project copied the Wikipedia for Schools into the local servers, providing offline accessibility. They have also obtained digital materials on HIV/AIDS from the national HIV control programme and made them accessible locally via streaming. More content requires coordination with the responsible ministries, as they must conform to the national curriculum, adhere to the ethical rules (health), and be produced (or permitted) by responsible authorities.

In 2011, three telecentres were operating in the area, providing access to the Internet, even at a slow speed and high cost. A survey showed that users, especially from the education and health sectors, in the same way as the office users above, were calling for local hosted information to complement the lack of printed resources and to remedy the slow communication. Internet customers were mostly students searching for information or applying to universities and higher learning institutions; newspaper reporters sending their reports; and the general public reading news, sports, chatting with friends on Facebook or Skype, or personal use. The main challenges were computer viruses and slow Internet connections, particularly during the university application season (Nungu, 2011).

Altogether, in the Bunda and Serengeti region, there has been a positive trend towards the use of social networks, visiting news sites, and personal Internet use. Professional use of the Internet was reported but not to a great extent, compared to personal use.

While the two first cases are mainly supply–side-oriented in their e-government approach, Soma Café has been focusing on the demand side (citizens). Their vision is to empower people by giving them access and to inspire them to use it for knowledge development and e-participation. People are coming to the café both for pleasure and work, and the manager told us that they (the Soma organisation) look at the café as a "community knowledge centre," recognising that "information is power." They promote lifelong learning and aspire to take the role of "intermediary," to proactively support their clients in debating, networking, and building up an active reading culture on the Internet.

In 2009, we met with Herry, a secondary school student and a native Maasai. He was a regular customer at Soma, using the net mainly for surfing and e-mailing. He was not aware of the term or the concept of "e-government," but when we asked him what sort of information he was looking for, he mentioned secondary school results and college and university applications:

> *… once my sister, who resides in a rural area, sent me exam numbers of her and her neighbours' children, so that I could help them search for their secondary school results. I usually come here at Soma, and then send the results to my relatives.*

and

> *I usually visit the website that secondary school students used this year to apply to their universities' and colleges' admissions.*

To find this and other information, he uses Google:

> *When we want to search for websites like Tanzania Commission for Universities and the National Examination Council of Tanzania, we usually Google, which helps us a lot.*

During our next two visits to Soma, we noted that there was very little activity there, which also was reflected by their Web presence (see Section 4.3 above). It turned out that their financial situation had become very difficult after 2 years due to the lack of funding and skilled employees. The manager told us that she

> *… needs young, eager people, good with social media, for promotion, advertising, etc. You can't run anything these years without that! Young people are on social media, that's most important to them.*

To attract more users to engage in the Soma network, she called for "not-so-smart-phones that are cheap enough for young people." These problems have resulted in a changed focus, and their role today is more to act as a cultural centre for young people, and less as an active supplier of the Internet and e-government services.

We found the same ignorance about e-government when we visited the Internet cafés. In Twins Internet Café in Dar es Salaam in 2010, we met with Stellah, the café supervisor. She had only recently heard about "e-government," and had to look at Wikipedia to learn more about it when we asked her. After that, she told us that the most popular e-government services among her customers were

> *… the download of forms for joining colleges and universities, applications for loans from the higher education loan board, school and university admissions results, midterm results from universities like the University of Dar es Salaam, and applications for international universities. … Some people also come here to check for information in the Ministry of Tourism, Industry and Trade, the local government, and the Ministry of Land. I presume to check for information that is business-oriented, though I'm not very sure of it.*

In the mid-2000s, more than 60 Internet cafés were operating in Dar es Salaam, with a large number of users and high activity (Furuholt & Kristiansen, 2007). When we did our data collection in 2009/2010, we still found many of the same cafés operating. However, in 2014, the number had decreased dramatically, and it was difficult to find similar institutions (see Section 5.1). Also, Twins Internet Café had closed down, and people had to find other venues for e-government services, at least in the most urban areas.

John is a former teacher and is now the owner and manager of Chalinze ICT. When we visited his Internet café in 2011, he was not aware of the concept of "e-government." However, after a while, when we were discussing his customers' use of the Internet, he told us an interesting story about farmers who needed information about a chicken disease and how this initiative led to an information exchange between farmers, local agricultural agencies, and central authorities, with all communication over the Internet. In other words, this was a relevant e-government service for rural farmers. Also, Herry in Soma Café (above) mentioned the need for agricultural services, such as information on contour farming, irrigation, and new equipment, as one of the most important possible e-government services in Tanzania.

In 2015, we found an increase in e-government use when we visited Chalinze ICT. Many students went there to download teaching materials, and some of them also registered themselves online with the National Examination Council of Tanzania. During registration, students are able to download forms and submit them online. After registration, they receive IDs from the examination centre.

Transporters (truck drivers) of imported goods use Internet services to comply with customs regulations. They normally file all their documents online (for the Tanzania Revenue Authority) before they reach the next customs checkpoint. For example, drivers normally submit their documents at Chalinze, and when they reach the next customs checkpoint before entering Zambia, they find all documents already processed. So they avoid waiting time.

Like Soma, Chalinze also had difficulty obtaining qualified personnel. The manager told us

There is a good market for such people in Dar and they are well paid there. So, it is expensive to hire skilful people to help me run the business here at Chalinze.

When summarising our findings, we found that even if all 3 telecentres had explicit development objectives, and high ambitions regarding the use of e-government services and e-participation for their clients, thus far, very few traces of the active use of such services were evident when we visited them. What we found was more random use initiated by the users themselves when they were looking for various types of information, using search engines like Google.

As far as we understand, the reason for this lack of a systematic use of e-government services is due to infrastructure, ie, the lack of computers and the lack of, or slow and unstable, connections, as well as management, ie, a lack of marketing, a lack of relevant information and services, and human factors, ie, a lack of awareness and knowledge among the citizens.

This is supported by John Mahegere who works for COSTECH and is responsible for a governmental project aimed at creating a telecentre in each of the country's 114 districts. In a study from 2010, he presents a brief review of the technologies, the rural ICT projects, and the associated impacts with the use of ICTs and telecentres, particularly for rural e-governance applications. His report shows very few traces of actual e-government use, and he concludes that, so far, a large number of rural ICT applications have slipped in performance and are facing acute problems of sustenance after their successful launch by the dynamic project champions (Mahegere, 2010). Heeks (2002) explained that information system failures typically occurred in developing countries when "donor funds are withdrawn, key IS staff quit, or senior-level champions move on to another cause." From our cases and the current literature 15 years later, we see that this obviously still affects the telecentre service level in general, and the e-government services in particular.

Within two specific areas, however, public access of the Internet for e-government services seems to be increasing. One is agricultural market information, mainly demanded by farmers, and the other is education-related information demanded by individual students, parents, and schools.

Gollakota et al. (2012) claim that the real purpose of a rural telecentre is to provide information related to improving farming techniques and to provide market-based information to farmers to improve their productivity and possibly increase their revenue. From Nigeria, Elijah (2010) reports that, to increase information dissemination from federal agricultural government research institutes to smallholder farmers in a village in South-eastern Nigeria, a special-purpose telecentre was established in 2007. The knowledge centre is dedicated to agricultural knowledge and information and comprises a customised website, computers with Internet access, and a full-time on-site staff. It is positioned as a social hotspot for people in the village to exchange ideas and to obtain information and assistance from each other.

Currently, all college and university applications in Tanzania are centralised under the TCU, and all students are required to channel their applications through online systems. In addition, exam results for university students, and secondary and primary schools are all accessible online, and educational loan applications are centralised under the Higher Education Students' Loans Board.

From the literature, we see that such an adaptation of the PIAP services, where the local users find locally relevant information, is vital for their sustainability (Furuholt, 2009; Masiero, 2011). Prado (2010) shows that the longest continuous-running independent telecentre in the Dominican Republic (established in 1997) has been sustainable just because of local adaptation and access to relevant public information (health care, farming, etc). From rural areas in India, Gollakota et al. (2012) report that only a few telecentres have been financially sustainable and have increased the livelihood of farmers in the community. A large number of telecentres have closed down due to the lack of demand from the rural community.

In Section 2.1 (above), we presented the issue of telecentre sustainability and specifically pointed to the social sustainability dimension and demand sustainability. These two concepts are closely linked, and to the local context where the telecentre is operating. Masiero (2011) defines social sustainability as the capacity to be coherent with the needs and characteristics of the local population in a given context, and she claims that that social sustainability, in its development-oriented sense, is intrinsically context based.

Furuholt (2009) showed that the demand for public Internet access services will remain sustainable as long as the customer gets sufficient benefits from these services and that their experience of benefits is the strongest encouragement for continuing as customers. For example, for a large group of customers like students, information relevant to their studies gives them this benefit, and for citizens in need of a specific public service, an efficient e-government system is useful to them.

Many demands can be met in a PIAP, and there are substantial differences in the perception of benefits among groups of customers searching for information. We have pointed out the importance of context-specific information. This does not necessarily mean that they are mainly local applications. For some of the larger customer groups, such as students and business people, the information generally has to have a wider scope to return the required benefits.

6 | CONCLUSIONS AND RECOMMENDATIONS

This paper describes a longitudinal study, starting in 2009, studying the role of rural Internet access points within the e-government context in developing countries, with the focus on Tanzania in East Africa. While Internet cafés have been gradually decreasing drastically in number, or have changed into game centres, telecentres have become more important as information providers in poor and rural areas. As it appears from the cases described above, the supply and use of e-government services from these PIAPs has, however, remained almost unchanged over the last 5 to 10 years and is still highly limited, if at all. The reason for this has several explanations, from both the supply side and the demand side, based on a number of factors.

From the supply side, we note that radio, an old and widespread technology, still is the most important information disseminator in rural Africa and that integrated solutions, based on the interaction between Internet and ICT, mobile phones, and radio are becoming increasingly important for bridging the digital divide. Simple systems based on robust technology that work in harsh conditions succeed. In our eagerness to promote new technology, the ICT community has had a tendency to forget or disregard the radio as a major information disseminator. Mr Ncheye, the manager of STC, reminded us of this, and he claimed that the radio addresses one of the biggest hindrances to information delivery to most of the rural areas in developing countries. In Tanzania, radio is the most available technology in rural areas, where more than 90% of families have at least one radio at home. For STC, Radio Sengerema has been vital for information dissemination, as well as in creating awareness of the availability of the Sengerema Telecentre in the district.

A few initiatives have been started to build up extended mobile phone–based livelihood services in these areas, such as platforms for information sharing, marketing, and financial transaction services, but they are still in their pilot phases (Donner, 2009). One such initiative was recently launched by the tobacco industry in Tanzania, where tobacco growers are offered a mobile phone–based service for accessing critical agricultural data and making business decisions from their phone devices (Daily News, 2011). Another example from Tanzania is a newly launched nationwide program where parents can register their newborns with their mobile phones (Bistandsaktuelt, 2016). In addition, during our fieldwork, we have seen that new and innovative solutions, like mobile phone–based banking, and flight and ferry tickets have emerged and spread rapidly in some limited, mainly urban areas.

Given the widespread use of mobile phones in the region, one would expect that plans for sub-Saharan African countries to engage their citizens would start with the massively subscribed mobile phone and steadily expand to include such available technologies like the Internet. Regrettably, the potential of the mobile phone for digital government remains largely unexplored in the region, and according to Kyem (2016), mobile phone–aided e-government programs in sub-Saharan Africa seems to be neglected.

However, while mobile access to the Internet is enormously valuable to build awareness and foster digital skills, in addition to providing access to a host of applications and content, the most viable way to provide basic services like education and health to remote locations is through telecentres equipped with fixed line broadband access, large monitors, and the necessary support staff (Prasad & Ray, 2012).

We would argue that precisely a combination, where simple, limited functions are performed by mobile phones, while complex tasks, eg, university applications and medical queries, are done via the Internet from PIAPs, is still the best alternative in the future. This means that comprehensive e-government solutions, based only on Web portals and Internet access in PIAPs, may be a dead end.

From the demand side, on the one hand, we see that people (both ordinary citizens and PIAP staff) do not know about e-government; they do not know the concept, and they are not aware of what services governmental agencies can offer. On the other hand, we have found a demand among people. Farmers find useful agricultural information and services through the Internet, and pupils and students as well as teachers, doctors, and lawyers find relevant information and services when they need it. From the literature, we know that PIAPs have to adapt to this local demand to be sustainable tools for development.

One interesting example of local adaptation, and an idea worth trying out on a larger scale, is special-purpose telecentres, like the Nigerian agricultural knowledge centre described in Section 5.2. Similarly, Lwoga (2010) suggests that the Tanzanian telecentres should cooperate with village leaders, farmers, and other public and private organisations in the rural areas in content generation to bring a sense of ownership, and improve the use of ICTs for capacity building and agricultural development in these areas. From the literature, we know that local adaptation of PIAP services is particularly important to achieve community participation and to make them sustainable.

Naik (2011) claims that the experience with the roll out of the Indian national e-governance plan (see Section 2.1 above) has not been encouraging, as many of the telecentres are closing down due to the weak business model. An alternative model could be an adaptation of the Nigerian model (above) and build e-governance–embedded rural telecentres. In this model, e-governance is an important service to provide in the centre at low service charges so as to make them affordable to a large number of the rural poor.

There is pressure from international organisations and national NGOs to offer e-government services in developing countries. This pressure is forwarded from central governments to local government agencies. As a general experience, however, it seems like the G-side in the G2C context has focused very little on how the citizens may achieve access to the services. They offer it and that is it. It seems to be the citizens' own responsibility, or up to "intermediaries" like telecentre staff, to arrange the access and to make efforts to use the information and services. Bailur (2010) points out that many PIAPs remain underused and subsequently shut down because not enough attention is paid to the information intermediaries —the centre or kiosk manager and staff.

In our cases, we saw many examples of useful *informal* intermediary functions in the PIAPs. However, organised intermediary functions have, to a large degree, been neglected and must be heavily emphasised, to develop telecentres into important actors in the distribution of e-government and in development in general. Sein (2011) has shown that intermediaries can play an important role in PIAP use in general and in e-government use in particular, and in our opinion, the public sector has to take responsibility also for the demand side. This can be done through a public/private partnership with these potential intermediaries.

Some research contends that because PIAPs make an important contribution to the community, they should even be regarded as a "public good," and as such, these services should be offered for free or for a nominal price (Bell, 2006, p. 14). In this regard, Simpson, Daws, and Pini (2004) and Bailey (2009) suggest that the provision of public access points in rural communities needs to be reconceptualised as an essential community infrastructure, like schools and libraries, rather than as an economic development strategy. A radical change in viewing Internet access in regard to this policy issue would obviously have a great impact on the sustainability of PIAPs. We agree with these ideas and suggest that

governments should consider Internet access an essential part of the local, community infrastructure, like electricity or schools. To this end, governments could collaborate with private companies or international organisations and could provide the infrastructure for access and financial support, as we saw some signs of in our cases, and particularly in Sengerema. Mr Ncheye told us that, because the STC has close links with the community and is serving ordinary people locally, it does not pay tax.

According to Dombeu and Rannyai (2014), during the last few years, African governments have followed the worldwide trend towards establishing e-government with the aim of improving public service delivery to citizens through the use of ICT. Our research, however, shows that Tanzania is still lagging behind in this regard. Also, Mbwete and Bhalalusesa (2011) claim that there is still a long way to go for the country to fully use the advantages and strengths of e-governance. Firstly, the government has to set up efficient collaborations between government agencies. Secondly, the government has to fully adopt ICTs 100%, rather than partly using ICT and continuing to use paper-based systems, which encourages bureaucracy and corruption. Finally, the civil servants themselves in the government offices have to accept that ICT is not going to replace them but rather help them to perform better and work in a result-oriented environment.

ACKNOWLEDGEMENTS

We want to thank our two colleagues from Mzumbe University, Mr Edmund Matotay and Dr Muhajir Kachwamba, for valuable support and facilitation during our field work in Tanzania.

REFERENCES

Andersen, T. B. (2009). E-government as an anti-corruption strategy. *Information Economics and Policy*, *1*(3), 201–210.

Andersson, A., & Hatakka, M. (2013). What are we doing?—Theories used in ICT4D research. In N. Hayes, R. Lèbre La Rovere (Ed.) Into the Future: Themes, insights and agendas for ICT4D. *Proceedings of the 12th International Conference on Social Implications of Computers in Developing Countries (pp. 282–300). Ocho Rios, Jamaica*.

Avgerou, C. (2010). Discourses on ICT and development. *Information Technologies & International Development (ITID)*, *6*(3), 1–18.

Bailey, A. (2009). Issues affecting the social sustainability of telecentres in developing contexts: A field study of sixteen telecentres in Jamaica. *The Electronic Journal on Information Systems in Developing Countries*, *36*(4), 1–18.

Bailur, S. (2010). The liminal role of the information intermediary in community multimedia centres. *Proceedings of the 4th ACM/IEEE International Conference on Information and Communication Technologies and Development (ICTD '10)*, Article No. 5

Bell, T. (2006). Village computing: A state of the field. Project report. Grameen Foundation, Washington DC, USA.

Benbasat, I., Goldstein, D. K., & Mead, M. (1987). The case research strategy in studies of information systems. *MIS Quarterly*, *11*(3), 369–386.

Bistandsaktuelt (2016). Fødselsregistrering med mobil I Tanzania. bistandsaktuelt.no, Oslo, Oct 10. (In Norwegian). Retrieved from: http://www.bistandsaktuelt.no/nyheter/2016/fodselsregistrering-med-mobilen-i-tanzania/

Chawla, R., & Bhatnagar, S. (2004). Online delivery of land titles to rural farmers in Karnataka, India, *Scaling Up Poverty Reduction: A Global Learning Process and Conference*, Shanghai, May 25.27, World Bank. Retrieved from: http://documents.worldbank.org/curated/en/209541468774682650/pdf/308280IN0Bhoomi01see0also0307591.pdf

Daily News (2011) Airtel eases tobacco growers access to agricultural data. *Daily News online edition*, June, 13, Dar es Salaam, Tanzania. Retrieved from: http://www.dailynews.co.tz/business/?n=20699&cat=business

Dombeu, J. V. F., & Rannyai, N. (2014). African e-government research landscape. *The African Journal of Information Systems*, *6*(3), 2.

Donner, J. (2009). Mobile-based livelihood services in Africa: Pilots and early deployments. In M. Fernández-Ardèvol, & A. Ros (Eds.), *Communication technologies in Latin America and Africa: A multidisciplinary perspective* (pp. 37–58). Barcelona, IN3: Retrieved from: http://in3.uoc.edu/web/IN3/communication-technologies-in-latin-america-and-africa.

Eisenhardt, K., & Graebner, M. (2007). Theory building from cases: Opportunities and challenges. *The Academy of Management Journal*, *50*, 25–32.

Eisenhardt, K. M. (1989). Building theories from case-study research. *Academy of Management Review*, *14*, 532–550.

Elijah, O. A. (2010) Effects of the emerging information communication technologies (ICTs) on agricultural knowledge transfer to smallholder farmers in Nigeria. *IFIP WG 9.4 Newsletter* 20:2.

Farjallah, S. 2007. Global assessment and review of ICT access points, ESCWA, United Nations, ESCAP. Retrieved from: http://css.escwa.org.lb/ictd/17-19DEC08/bg3.pdf

Furuholt, B. (2009). Bridging the digital divide: Sustainable supply and demand of internet access in developing countries. In *Publication No. 49*, *Department of Computer Science*). . Denmark: Aalborg University.

Furuholt, B., & Kristiansen, S. (2007). A rural-urban digital divide? Regional aspects of Internet use in Tanzania. *The Electronic Journal of Information Systems in Developing Countries*, *31*(6), 1–15.

Furuholt, B., & Matotay, E. (2011). Supply and demand of e-government services in developing countries: Cases from Tanzania. *20th International Conference on Information Systems Development (ISD2011)*, August 24–26, Edinburgh, Scotland.

Gollakota, K., Pick, J. B., & Sathyapriya, P. (2012). Using technology to alleviate poverty: Use and acceptance of telecenters in rural India. *Information Technology for Development*, *18*(3), 185–208.

Gomez, R., & Baron-Porras, L. F. (2011). Does public access computing *really* contribute to community development? Lessons from libraries, telecentres and cybercafés in Colombia. *The Electronic Journal on Information Systems in Developing Countries*, *49*(2), 1–11.

Grönlund, Å. (2010). Using ICT to combat corruption—Tools, methods and results. In *SPIDER: Increasing transparency & fighting corruption through ICT*, SPIDER ICT4D Series no.3). Stockholm, Sweden: Stockholm University.

Grönlund, A., Andersson, A., & Hedström, K. (2005). NextStep e-government in developing countries, *ProjectReport*, Örebro University, Sweden.

Heeks, R. (2001). Understanding e-governance for development, *iGovernment Working Paper Series*, Institute for Development Policy and Management, University of Manchester, UK, 2001.

Heeks, R. (2002). Information systems and developing countries: Failure, success, and local improvisations. *The Information Society*, *18*(2), 101–112.

Hellstrom, J. (2010) The innovative use of mobile applications in East Africa. *SIDA Review* 2010:12, SIDA, Stockholm, Sweden. Retrieved from: http://www.sida.se/publications

Hollifield, C. A., & Donnermeyer, J. F. (2003). Creating demand: Influencing information technology diffusion in rural communities. *Government Information Quarterly*, *20*(2), 135–150.

James, J. (2003). Sustainable Internet access for the rural poor? Elements of an emerging Indian model. *Futures*, *35*(5), 461–472.

James, J. (2010). Mechanisms of access to the Internet in rural areas of developing countries. *Telematics and Informatics*, *27*(4), 370–376.

Kristiansen, S. (2004). Information asymmetry, corruption and governance. *The Norwegian Network on ICT and Development Annual Workshop: e-Governance, e-Democracy and Development*, October 11–12, 2004, Kristiansand, Norway.

Kyem, P. A. K. (2016). Mobile expansion and opportunities for e-governance in sub-Saharan Africa. *The Electronic Journal of Information Systems in Developing Countries*, *75*(6), 1–15.

Lwoga, E. L. (2010). Bridging the agricultural knowledge and information divide: The case of selected telecenters and rural radio in Tanzania. *The Electronic Journal of Information Systems in Developing Countries*, *43*(6), 1–24.

Mahegere, J. J. E. W. (2010). ICTs and e-governance for sustainable rural development in Tanzania: The case of rural multi-purpose community telecentres. *Symposium on "ICTs and Development: An International Workshop for Theory, Practice and Policy"*: IIT Delhi, 11–12 March.

Mascarenhas, O., & Kimasha, E. (2007). A baseline study for assessing the impact of fiber optic broadband in Bunda and Serengeti Districts, March 2007. Retrieved from: http://www.ict4rd.ne.tz/files/docs/ICT4RD_Baseline_MainDoc.pdf

Masiero, S. (2011). Financial vs social sustainability of telecentres: Mutual exclusion or mutual reinforcement? *The Electronic Journal of Information Systems in Developing Countries*, *45*(3), 1–23.

Mbangala, B., & Samzugi, A. (2014). The role of telecentres in Tanzania's rural development. The case of Sengerema District Council, Mwanza Region. *Library Philosophy and Practice (e-journal). Paper 1169*. Retrieved from: http://digitalcommons.unl.edu/libphilprac/1169

Mbwete, G., & Bhalalusesa, R. (2011). Assessment of public services e-government initiatives: A case study of Tanzania. In P. Cunningham, & M. Cunningham (Eds.), *IST-Africa conference proceedings*, International Information Management Corporation (pp. 1–7). Gaborone, Botswana

Melchioly, S. R, & Sæbø, Ø. (2010). ICTs and development: Nature of mobile phones usage for SMEs economic development—An exploratory study in Morogoro, Tanzania. *ICT and Development-Research Voices from Africa International Federation for Information Processing (IFIP), Technical Commission*, *9* (4)

Naik, G. (2011). Designing a sustainable business model for e-governance embedded rural telecentres (EGERT), in India. *IIMB Management Review*, *23*, 110–121.

Ncheye, F. (2010). Linking the rural societies with ICTs. *In: UNESCO National Commission of the United Republic of Tanzania, Information Magazine* - Magazine No. 7 / 2010–2011, 140–141

Nungu, A. (2011). Analysis of the Serengeti broadband network. *KTH-technical report*, ISBN: 978-91-7501-088-5, August.

Prado, P. (2010). Lighting up the dark: Telecenter adoption in a Caribbean agricultural community. *Journal of Community Informatics*, *6*(3), 1–14.

Prasad, R., & Ray, R. S. (2012). Critique of the common service centre scheme. *Economic and Political Weekly*, *47*(6), 18–23.

Rajalekshmi, K. G. (2007). E-governance services through telecenters: The role of human intermediary and issues of trust. *Information Technologies and International Development*, *4*(1), 19–35.

Rajalekshmi, K. G. (2014). Multipurpose nature of telecentres: The case of e-governance service delivery in Akshaya telecentres project. *PhD thesis at the Department of Management of London School of Economics*, London, March 2014.

Sæbø, O. (2012). E-government in Tanzania: Current status and future challenges. In H. J. Scholl, M. Janssen, M. A. Wimmer, C. E. Moe, & L. S. Flak (Eds.), *Electronic government* (pp. 198–209). Heidelberg: Springer.

Schuppan, T. (2009). E-government in developing countries: Experiences from sub-Saharan Africa. *Government Information Quarterly*, *26*, 118–127.

Seifert, J.W., & Bonham, G.M. (2003). The transformative potential of e-government in transitional democracies, *the International Conference on Public Administration in the 21st Century: Concepts, Methods, Technologies*, School of Public Administration, Lomonosov Moscow State University, 26–29 May 2003.

Sein, M. K. (2011). The "I" between G and C: E-government intermediaries in developing countries. *The Electronic Journal on Information Systems in Developing Countries*, *48*(2), 1–14.

Sein, M. K., & Harindranath, G. (2004). Conceptualizing the ICT artifact: Toward understanding the role of ICT in national development. *The Information Society*, *20*(1), 15–24.

Sen, A. (1999). *Development as freedom*. Oxford: *Oxford University Press*.

Simpson, L., Daws, L., & Pini, B. (2004). Public Internet access revisited. *Telecommunications Policy*, *28*, 323–337.

Sornamohan, V. (2012). Telecentre matters: Getting the basics right. *Newsletter of the IFIP Working Group*, *9.4*(22), 1.

Souter, D. (2009). Realising the potential of ICTs in Tanzania. *Policy brief based on ICT4D: Facing the challenges Head-on in Tanzania*. Panos, London, UK. Retrieved from: http://panoslondon.panosnetwork.org/wp-content/files/2011/01/panos-london-ICTs_and_tanzania-policy.pdf

Tan, L. (2007). Rural communication access centres in Tanzania. *Thematic Report. The International Institute for Communication and Development (IICD)*. Retrieved from: http://www.iicd.org/files/Rural-Communication-Access-Centres-Tanzania-2007-Liang-Tan.pdf

Tanzania Commission for Science and Technology (COSTECH) (2018). *Home Page*. Dar es Salaam, Tanzania. Retrieved from: http://www.costech.or.tz/?page_id=1593. [Correction added on 9 January 2018, after first online publication: this reference has been changed]

United Nations Development Programme (UNDP) (2008). *Human development reports*. New York: United Nations.

United Nations Educational, Scientific and Cultural Organization (UNESCO) (2004). *How to get started and keep going: A guide to community multimedia centres*. UNESCO, Paris, France. Retrieved from: http://portal.unesco.org/ci/en/ev.php-URL_ID=15709&URL_DO=DO TOPIC&URL_SECTION=201.html

United Nations Educational, Scientific and Cultural Organization (UNESCO) (2010). Web world. Communication and Information Activities. Retrieved from: http://portal.unesco.org/ci/en/ev.php-URL_ID=3038&URL_DO=DO_TOPIC&URL_SECTION=201.html.

United Nations E-Government Knowledge Database (2016). *UN e-government survey 2016*. New York: United Nations.

Wahid, F., Furuholt, B., & Kristiansen, S. (2006). Internet for development? Patterns of use among Internet café customers in Indonesia. *Information Development*, *22*(4), 278–291.

Walsham, G. (2010). ICTs for the broader development of India: An analysis of the literature. *The Electronic Journal on Information Systems in Developing Countries*, *41*(4), 1–20.

Walsham, G., & Sahay, S. (2006). Research on information systems in developing countries: Current landscape and future prospects. *Information Technology for Development*, *12*(1), 7–24.

Yin, R. K. (2009). *Case study research: Design and methods, fourth edition, Newbury Park*. Calif: Sage Publications.

How to cite this article: Furuholt B, Sæbø Ø. The role telecentres play in providing e-government services in rural areas: A longitudinal study of Internet access and e-government services in Tanzania. *E J Info Sys Dev Countries*. 2018;84:e12006. https://doi.org/10.1002/isd2.12006

APPENDIX A

THE LONGITUDINAL DATA COLLECTION PROCESS

Time	Place/Case	Activity
2009-2011		Literature review on public Internet access and e-government in developing countries until 2011.
2009/Sep	Sengerema TeleCentre (STC), in Mwanza region	• Visit to STC, demonstration of premises, services, and operations. • Focus group discussions with the Head of the Operations and the IT manager of the STC, in their premises. • Semistructured interview with the STC manager
2009/Sep	Dar es Salaam (DSM)/ STC, Sengerema, and Serengeti Broadband	• Semistructured interview with the acting director of the Directorate of Information and Documentation at the Tanzania Commission for Science and Technology (COSTECH), and • Semistructured interview with staff from the ICT for Rural Development (*ICT4RD*) research and development programme at the Dar es Salaam Institute of Technology
2009/Nov	Soma Book Café, DSM	Demonstration and semistructured interview with the manager/owner
2010/June	Twins Internet café and Secretarial Bureau, DSM	Semistructured interview with the Supervisor
2010/July	Soma Book Café, DSM	Semistructured interview with a customer
2011/Feb	Chalinze ICT	Semistructured interview with the manager/owner
2011/Feb	Soma Book Café, DSM	Interview with the manager/owner
2014-2015		Literature review on public Internet access and e-government in developing countries until 2016
2014/Sep	STC, Sengerema	Visit to STC, Follow-up interview with the manager/owner, and discussions with the Head of operations.
2014/Sep	Sengerema District Council	Semistructured interview with HOD, Women and children issues, – e-government user.
2014/Sep	Mwanza	Semistructured interview with a taxi driver, local politician and user of STC
2014/Sep	Soma Book Café, Dar es Salaam	Follow-up interview with the manager/owner
2015/March	Chalinze ICT	Follow-up interview with the manager/owner