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Minding the Design Reality Gap: An Empirical Evaluation of Telecentre Initiatives in Rural Ghana

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Abstract

This paper focuses on evaluating an information and communication technology (ICT) intervention promoted as a pro-poor telecentre initiative in rural Ghana. Our evaluative tool is the Design Reality Gap (DRG) framework used to analyse the Community Information Centre (CIC) initiative in Ghana. Data were collected through a qualitative multi-site case study. By tracing the linkages between the investment and outcomes, we found a worrying trend of failed implementations and sustainability, although implementers did sustain efforts at planning new initiatives. Based on the findings, we argue that the CIC initiative in Ghana is a failing ICT intervention. We also found that the tailored DRG approach allowed us to tease out the nuances that account for the CICs' status. We conclude by proposing gap closure measures for the failing intervention. This paper contributes to ICT evaluations by demonstrating the utility of the DRG framework in evaluating one of the most significant pro-poor ICT initiatives in lower-to-middle-income communities: telecentres. This research also contributes to the current ICT literature by enhancing our current knowledge about publicly accessible ICT facilities in an under-investigated setting, and further offers an approach to telecentre evaluations in similar contexts inspired by the DRG model.

Keywords: community information centres; design-reality gap; Ghana; ICT; information and communication technology; evaluation; telecentre

Publication Type: research article

Introduction

Information and communication technology (ICT) interventions help alleviate poverty by supporting social, economic, and political progress (Walsham, 2012). These interventions' primary aim has been to modernize the state and help citizens in lower-middle-income countries (LMICs) (Lin et al., 2015; Furuholt & Sæbø 2018). Through the diffusion of public information systems (IS) to deprived communities, governments have sought to bridge the ICT gap and allow such groups to participate in decision-making activities (World Bank, 2008). The objective of these initiatives has been broadly threefold: (1) to ensure citizens are not unduly excluded from the benefits of ICTs (Madon et al., 2009); (2) to alleviate poverty in deprived communities (May & Diga, 2015) and; (3) to deliver government services to the broader society (Cordella & Tempini, 2015).

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Arguably, a pervasive ICT intervention deployed widely in LMICs to support rural communities' development efforts has been telecentres (Pick et al., 2014). Telecentres are strategic facilities where ICT-based services and applications are accessible to the public (Mukerji, 2008). Telecentres seek to help integrate marginalised citizens into the wider community and empower them with information and growth opportunities (Chawinga & Ngwira, 2015). These initiatives aim to give beneficiary communities the chance to improve their well-being while also enabling them to increase their levels of relative social change, cohesion and empowerment (Kapondera, et al., 2019; Yasya, 2020).

Enticing as the benefits may be, along with the unparalleled support telecentre initiatives in emerging economies have received from governments, international institutions and non-governmental organisations, evidence suggests that their implementation has been fraught with significant levels of failure (Chaudhuri, 2012; Toyama, 2010). For instance, Gollakota and Pick (2020) suggest that although India set out to establish over 250,000 telecentres in rural India, only a few (notably e-Choupals and eKutir) have been successful. The literature is replete with several of these failures (see Best & Kumar, 2008; Attwood et al., 2013; Wamuyu, 2015; Kante et al., 2017). Irrespective of the significant number of failed ICT interventions in LMICs, a substantial amount continue to implement such projects. Governments' difficulties in implementing public services come to light because of the significant investment of resources in systems to increase efficiency (Heeks, 2002; Avgerou, 2008). Hence, there is the need to evaluate the viability of implemented ICT projects and justify their continuity (Heeks, 2009). According to Uys and Pather (2020), the evaluation of public access ICTs, like telecentres, is necessary to determine whether socio-economic development goals have been achieved.

Telecentre evaluations can serve several purposes: for example, they can recognise benefits, appraise value, measure success, draw lessons from past interventions, and use the evaluations to improve future interventions (Stockdale & Standing, 2006). Evaluations can also bring different perspectives to policy-makers and practitioners, facilitating their decision-making through improved understanding of the interventions' possible implications (Sampson, 2007). With sufficient rigor and consistency, evaluations can support stakeholders with “local learning” (Clements et al., 2008, p. 207) and broaden our knowledge of how successful or failed initiatives derived their outcome (Pade-Khene & Sewry, 2011).

We undertake an in-depth study of the apparent failure of a telecentre initiative in rural Ghana, which was initially seen as successful in granting universal access to ICTs in underserved communities. Telecentres (known as a Community Information Centre (CIC) in Ghana) have been in existence since 2005, spearheaded by a government initiative (GIFEC, 2013). The CICs were established with multiple objectives, as an inclusive drive and to bridge the gap between marginalised and unserved communities/groups (i.e., bridging the diversity gap) by providing access to ICT facilities, and relevant information in communities that do not have any form of libraries or information centres. The design inscription of the CIC was to make room for a diverse group of individuals who by virtue of their socio-economic and cultural backgrounds, were marginalised. The value of these centres must be brought into consideration to justify their continued existence. Therefore, this study, at one level, is to empirically establish the current status (regarding success or failure) of CICs in Ghana and to discover why the evaluated situation (success/failure/partial failure) exists. The following questions will be investigated in the present study: What is the current status of Ghana's CIC initiative? Why does the evaluated situation exist?

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The following section reviews the literature on telecentre evaluation, then proposes the Design-Reality-Gap framework as our evaluation methodology. The study context and research approach are then described, followed by the study findings, analysis and discussion. The final section concludes the paper with an indication of limitations and future research.

Literature Review

Telecentre (TC) Evaluation

To some extent, telecentres have become an unfortunate exemplar of information and communications technology for development (ICT4D) failure (Best & Kumar, 2008). One of the critical issues highlighted about these telecentre ventures' failure is that they were essentially developed to help bridge the digital divide of Internet access between rural and urban communities, and between the socially advantaged and disadvantaged. With this emphasis on access, common telecentre evaluation methods would focus on quantitative measures of "success" such as numbers of people served by the facilities, the number of facilities commissioned, and the amount of infrastructure installed. Related studies have also revealed that simply making telecentres available and accessible is not enough to address the many levels of the digital divide as they are now understood (Chaudhuri, 2012; Joseph & Thomas, 2021; Kumar & Kumara, 2018).

Some telecentre evaluation studies have attempted to address these difficulties. The International Development Research Centre (IDRC), for example, developed an approach to telecentre evaluation based on participatory design, which reflected some guiding principles developed from IDRC-sponsored studies of telecentre impact in Asia, Africa, and Latin America. The IDRC's guiding principles include being useful, financially responsible, building local capacity, and enabling shared learning. The Acacia[1] framework for evaluating telecentres is based on similar principles, where success is measured based on "financial sustainability, service performance and community benefits" (Whyte, 1998, p. 5) and various methods, including user surveys, focus groups and participatory research, are used as evaluation approaches. Acacia is deployed at the telecentre operation's design and implementation stages to guide pre-hoc and post-hoc evaluation.

First-order and second-order levels of access (Riggins & Dewan, 2005) have also been subsequently explored in the Global Impact Study (Sey et al., 2013) project, which investigated the potentially continuing relevance of public access computing venues (including telecentres) by surveying and studying their usage in eight different predominantly lower-middle-income countries. One of the issues identified by this project was the difficulty of measuring direct and indirect socio-cultural impacts of usage. The researchers resorted to using self-assessments of these impacts from surveys answered by the respondents. Several other cross-sectional evaluation methods were used in the study because it was also deemed too difficult to obtain historical data to understand path dependencies, if they existed. In-depth case studies further supplemented the research since the researchers found that country contexts differed and that any study about the impacts of the public access computing venues needed to consider the differences in usage that had emerged in these different contexts and to study them in detail. Through the Global Impact Study, Sey et al. (2013) identified nuances and complementarities in how public access computing supported its users' day-to-day lives. This work and several other supporting studies (Sey & Fellows, 2011; Sey et al., 2015; Siefer, 2014; Guijt, 2014) also

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demonstrate the importance of various stakeholders' multiple views in establishing a shared understanding of these complex issues.

To address this research's objective, we lean more towards applying a practical evaluation tool–Design Reality Gap (DRG) framework–which draws on contingent factors to assess IS in context. The following section gives an in-depth exposition on the DRG framework, clearly defining the rationale and its utility for telecentre evaluations.

Analytical Framework

Design-Reality Gap (DRG) Framework

The focal point of Heeks' (2002) model is to interrogate how any socio-technical system (in this paper equated to an ICT initiative) fits meaningfully into the environment of implementation. In essence, the system must be in harmony with the environment in which it is implemented to succeed. The reasons for success or failure are multifactorial.

Using a contingency approach, Heeks (2006a) argues that there needs to be a fit between an organisational system and its environment. Hence, design inscriptions for a system should not depart from the context. Recognising that information systems are socio-technical in nature, the framework employs multiple factors (seven dimensions) to investigate a phenomenon (See Appendix A for a description of the seven dimensions). The assumption is that there is a gap between design requirements and current implementation (Heeks, 2008). The magnitude of the gap between design and the outcome determines whether the project will succeed. The smaller the gap, the higher the project's likelihood of success, while a large difference indicates the probability of failure. Heeks (2002) suggests that the DRG framework is much more useful in assessing information systems in LMICs than in advanced economies. In LMICs, it is thought that the context of design is often divorced from the context of implementation (Heeks, 2002; Avgerou, 2008, 2010).

The framework is grounded theoretically from "literature on the social construction of technology" and that of "contingency in organisational change" (Bass & Heeks, 2011, p. 5). The Design-Reality Gap (DRG) framework is intended to explicitly rate a particular information system (IS)'s success/failure status. Its underlying assumption is that there is no single avenue to determine this status in any given IS, but rather the success or failure of a system is influenced by its context. The DRG has the advantage of simplicity, yet is endowed with methodological rigor in its application. It allows researchers to evaluate an ICT initiative (such as telecentres).

DRG can explain and predict occurrences of failure or success. Although a relatively new assessment tool, its application is increasing due to its ease of use in the assessment of IS in LMICs (Macias-Garza & Heeks, 2006; Lessa et al., 2012). Several researchers recognize its benefits in IS evaluations (Syamsuddin, 2011; Hewapathirana & Rodrigo, 2013; Baraka et al., 2015; Afolayan, 2016). Palvia et al. (2015) suggest that the DRG's expediency lies in its ability to identify dimensions of design and reality.

Critiques of the DRG

While the framework is useful in assessing ICT initiatives, it must be emphasised that it has certain shortfalls. The DRG is a standard metric that classifies an ICT4D intervention using a

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defined set of parameters. Practical implementations of the framework have measured these dimensions in isolation. This efficiently acknowledges the reasons that caused the failure or success of an ICT4D initiative, but since such an evaluation is static, the DRG fails to allow insight into the processes that have led to the assessed result. A concern is whether researchers have undue influence in the scoring of the various DRG dimensions, since the assignment of scores is subjective. Researchers and assessment teams often choose to score each dimension on research findings (Heeks, 2008). Heeks (2003) suggests a workshop for key stakeholders to increase the number of participants in the assessment process. In reducing subjective bias, workshops would be considered a broader resource base to increase bias.

The DRG is good at identifying constraints that prevent the successful implementation of projects, but not the drivers that push for success (Heeks, 2006). Strong project drivers have the potential to overcome constraints that can cause the failure of projects (Heeks, 2006). Additionally, the framework cannot justify the implementation of unsuccessful ICT4D initiatives in developing countries. Bass and Heeks (2011), in calling for an extension of the original framework, suggest that it is limited in application, especially in non-IT evaluations and propose that perhaps the framework needs a review.

Application to Telecentre Evaluation in this Study

We chose to use the DRG framework for our telecentre investigation for multiple reasons. Stakeholder involvement is critical to the DRG approach, as each stakeholder is actively involved in the evaluation. The involvement of stakeholders increases the probability of beneficiaries accepting the assessment outcome. Guijt (2014) suggests that the participation of stakeholders in evaluation produces "better data, better understanding of the data, more appropriate recommendations, better uptake of findings" (p. 2). The presence of stakeholders ensures that gap scores are derived through a systematic and empirical process.

The ease in which we can comprehend and adapt DRG to investigate IS promotes a more flexible incorporation of new techniques and approaches (in the form of 'gap closure' measures) to avoid failure, unlike the "traditional methodology" (Heeks, 2006, p. 135). A one-size-fits-all implementation approach has often been shown to be ineffective.

Even though the seven components of DRG reflect characteristics that earlier studies have taken into account, their research outcomes mainly deal with only one or two factors of the framework. For example, Heeks and Arun (2010) worked with the context of implementation, Bailey and Ngwenyama (2009) dealt with the lack of digital skills/illiteracy, Ramírez et al. (2014) focused on quality data/information, Fillip and Foote (2007) examined financial constraints, and Souter (2011) examined technology and strategy. However, the DRG does incorporate all these factors into a single measurement category to keep track of ICT initiatives throughout a project's duration (Hawari & Heeks, 2010). This method helps countries avoid the one-size-fits-all approach common to ICT implementations in developing countries (Hawari & Heeks, 2010). To undertake a longitudinal analysis of the CIC, we were interested in undertaking a project evaluation to assess the gaps between the design inscriptions of the CIC as inscribed by the implementers of the system, and the reality at the time of assessment (Bass & Heeks, 2011).

From this review, it is clear that DRG is theoretically grounded, incorporates intangible aspects and multi-stakeholder perspectives in the evaluation method, as well as sensitising the assessor

ISSN 2574-3430, jps.library.utoronto.ca/index.php/ijidi/index
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to the situated nature of the ICT4D intervention being evaluated by representing and interpreting the "gap" between the context of design and the context of reality.

Methodology

This research adopted a qualitative multi-site case study approach (Grimes & Warschauer, 2010) consisting of eight different telecentres to appreciate the broader perspective of the phenomenon under investigation. We use the case study approach to evaluate a phenomenon in its natural context of use.

Data Collection Methods

The DRG framework served as a guide for the formulation of the data collection protocols. The study participants needed to be drawn from community members in the catchment area (Boyce & Neale, 2006). For this study, the participants were selected purposively. This sampling strategy is often employed when a particular issue, such as the CIC, is being studied. The stakeholders were carefully selected because they had detailed knowledge and were informative (Creswell, 2012) because they were involved in its usage and management. The selected stakeholders were assembly officials and managers of the facilities (see Table 1).

Snowball sampling (Browne, 2005) was also employed to recruit a section of participants (centre users) who were 'heavy users.' This method started by talking to well-known individuals in the research community. To start with, the centre managers informed the researcher of the frequent users of the facility. They, in turn, pointed us in the direction of other users they frequently encountered. An appointment was then scheduled for those who agreed to take part in the study.

Data Collection

Data was drawn from multiple sources/stakeholders. In-depth interviews were conducted with centre managers to allow participants to express their thoughts and experiences in an unconstrained manner (Boyce & Neale, 2006). It should be noted that the various centres' managers had indicated that they were familiar with the design inscriptions of the CICs through workshops and seminar presentations organized by the Ghana Investment Fund for Electronic Communications (GIFEC). Similarly, assembly officials (owners of the CIC) as implementers of the project were familiar with the CIC design inscriptions. As such, both groups could aid in the collection of adequate data.

The third category of stakeholders were users of the various facilities. Personal experiences of users of the facilities could prove invaluable, especially in assessing the impact of the CICs on beneficiaries. They were asked questions mainly structured around the seven dimensions. The content of their responses illustrated their working relationship with the system and gave researchers insight into the benefits derived from its use. At the end of the interview, respondents (assembly officials, managers, and users) were then instructed to evaluate the seven dimensions with the scale given.

The CIC Blueprint document, *Community Information Centres (CICs) in the Age of ICT: Ghana's Blueprint for Action,* was useful in the research process (Ministry of Communications, 2004). The benchmark for comparison between design and actual reality at the time of the study was derived from the CIC project objectives stipulated in the CIC Blueprint. This was the main source

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document consulted since it was the official implementation document. Palvia et al. (2015) suggest that the expediency of the DRG also lies in its ability to identify dimensions of design and reality, that is, "…dimensions of design can be derived from legal/policy documents" (p. 4). The adoption of multi-stakeholder involvement in collecting data allowed for triangulation of data to validate the information gathered.

Table 1: Interviews and Role of Interviewees

People Interviewed	Profile	Content of Interviews	Number Interviewed
Assembly officials	The main officials here were the District Coordinating Director (DCD) or the CIC schedule officer. The DCD is the administrative head of each district. They are usually civil servants without political affiliations.	Implementation and management of CICs	8
GIFEC official	Technical advisers to the implementing organisation with direct responsibility of planning, implementing and monitoring CICs in various communities	The history of GIFEC and its involvement in the design and implementation of various CICs	1
Centre Managers	Staff of the district assembly recruited to manage CIC and under the direct supervision of the DCD or schedule officer.	User/patron information needs, management issues, services offered and Service delivery	11
Beneficiary /Users	Users who frequented the CICs	Use and Impact	30

Data Analysis-Evaluation Using the DRG Framework

We adopted a descriptive approach to data analyses. Data were analysed through a deductive thematic approach where existing concepts or ideas influenced coding and theme development. Thematic analysis is pattern recognition (themes drawn from data gathered) (Braun & Clark, 2006). Using the DRG framework implied, we had a predetermined set of themes (the seven dimensions) to use as our basis for analysis.

Using the qualitative software NVivo 10, a priori themes were created as nodes for relevant data to be coded. The research followed a systematic process to ensure that all data were coded to the appropriate theme. A transcript was selected and read while coding to the various themes related to the selected text and continued until the author was satisfied that all relevant data had been adequately coded to matching themes. Duplicates were removed and similar codes

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were consolidated into one number. This was done systematically for each theme. The research followed a systematic process to ensure that all data were coded to the appropriate theme.

Deriving the DRG Score

During the interviews, participants were acquainted with the rating scale and then responded to it on a rubric. The rating was done through a scale between 0 and 10, with 0 representing no gap at all (system addressed intention) and 10 being the most likely cause of failure. The result was then summed up and compared with the table devised by Heeks (2003) (see Appendix C). An interpretation was given as to whether the project was a success or failure. A sum of all dimension scores was computed and a weighted average was calculated (see Table 2). The average total scores were then summed up to produce the final DRG score for the CIC initiative. A numerical rating is obtained, which reflects a qualitative judgement of the extent of success and failure. It is qualitative in nature because it does not measure the dimensions, but rather allows a ranking to be applied, thus revealing the relative importance of a specific dimension.

The rating process was slightly different from the original approach (Heeks, 2008). In the original approach, researcher(s) determine the rating based on the assessment of the project under study and sometimes organise workshops with key stakeholders where the rating was also done with researchers facilitating the process. In this study, we asked assembly officials, managers of the centres, and participating users to rate the DRG dimensions individually, explaining the rating scale. Lastly, we interpreted a gap score to be small if it is rated from 1-4, medium gap if rated 5 and a large (sizable) gap if rated 6-10.

Context and Case

Ghana is divided into 16 administrative regions. According to the Ghana Living Standards Survey Round 7 (GLSS7)[2], the Upper East region is the third poorest and underserved area of the country (Ghana Statistical Services (GSS), 2018). The Upper East region is also the least urbanised area of the country. We conducted our study in this part of Ghana because the region has some of the oldest CIC telecentre facilities, with the first centre opening in 2005 and the most recent centre having opened in 2009 (see Appendix B for telecentre profiles). Given the centres' longevity, their outcomes while providing information services over the years would inform researchers of significant hurdles CICs have faced and why some of the centres have closed. Also, there has been minimal research on information services of telecentres at this depth of analysis in the Ghanaian context. The above considerations further justify the current investigation.

This research was conducted in eight separate centres (see Appendix B for telecentre profiles). These sites are all located in the Upper East Region of Ghana. As previously indicated, these centres were established by the government of Ghana using the same blueprint (in terms of concept, structure, and equipment) applied to telecentres throughout the country, and thus share similar characteristics in terms of mission, vision, and services provided.

Three out of the eight centres were operational at the time of the study (Appendix B). We were equally interested in the five closed centres because we wanted to understand the multi-layered reasons for their closure from a tri-lensed managerial, staff, and user point of view. We appreciate that the closure of a centre might not necessarily imply failure of the project, hence their inclusion in this study. The map below (Figure 1) indicates the locations of CICs in the Upper East Region.

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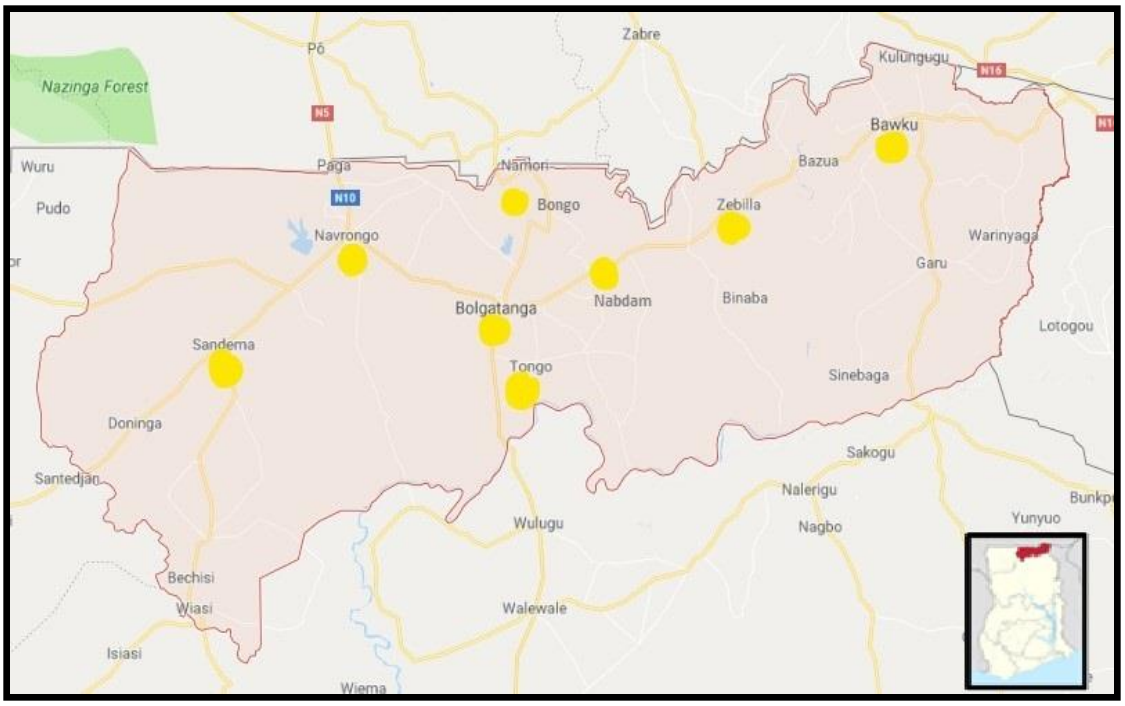

Figure 1. Map showing CIC sites (not drawn to scale). (Google, n.d.).

Table 2. Summary of Gap Scores (See Appendix D for detailed gap score)

DRG Dimensions								
Respondents	Information	Technology	Processes	Objectives and Values	Staffing and Skills	Management Systems and Structures	Other Resources: time and money	DRG Score
Users	6.6	6.6	5.9	5.6	6.6	6.7	7.1	45.0
Assembly Officials	6.6	6.8	6.2	7.1	6.3	6.9	7.4	47.2
Managers	6.3	5.9	6.2	5.6	6.5	6.7	7.3	44.6
Researchers	7	6	5	5	5.5	7	7	42.5
Total Average DRG Score	6.6	6.3	5.8	5.8	6.2	6.8	7.2	44.8

Findings

In this section, a qualitative analysis using the seven dimensions of the DRG is presented. The format of this presentation is two-fold: first, stating the researchers' interpretation of the design expectations of the system as envisioned by implementers of the project (documented in the CIC

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Blueprint) and second, describing respondents' perception of reality as it was discovered at the time of the research. This analysis is presented under the seven dimensions of the DRG framework. A summary of gap scores for the various dimensions is presented in Table 2 below, while an interpretation of the overall gap is discussed at the end of this subsection where we present the intended design for telecentres that were to meet the particular DRG dimension, along with an analysis of the reality of the specific DRG dimension in action within the community.

Information

The information dimension's objective was to elicit insights into the information needs of users of the CICs and determine whether these information needs were met. This theme was vital in that it fulfilled the primary mandate for the establishment of the CIC initiatives: to provide relevant information for beneficiary communities, to enhance their ability to participate favourably in the growth of the local economy and consequently allow users to make informed decisions based on the knowledge acquired from centres (Ayoung, 2016).

Design. The centres' principal goal was to assist the users to get the most value out of the information provided. As part of the design, therefore, users' information requirements primarily focused on specific kinds of information; government information, food and other commodity prices, and the current weather and disease information. Online portals for the district assemblies were also to be developed and linked to the CICs to promote online communications, thus becoming an integral part of the Ghana e-government strategy. Further, it was to provide useful information to users that was relevant to their daily livelihood. Therefore, content developers were encouraged to create content that was appropriate to user needs and cater to all sectors of the community. To be more successful, managers were required to anticipate the information needs of users and synthesize this information for local consumption.

Reality. Evidence from the study is, however, contrary to this position. The centres had little to no locally sourced information. Neither did the centres provide any information on market prices for agricultural products, HIV/AIDS, for civic groups, or small businesses that cater to women.

A small number of people visited the CICs searching for government information, crop prices in nearby markets, weather information, extension services, and public health information. However, users' information-seeking behaviour suggests that most people came to the centre to communicate via email with friends and for secretarial services. One user commented "I live not far from the CIC. I mostly come here to check my mails or print documents and sometimes do photocopies" (User9).

One manager stated that the information provided is dependent on the information needs of users. No conscious effort was put in to make certain kinds of information accessible. Nevertheless, an attempt was made to meet customer needs when searching for specific information. Therefore, information delivery was demand-driven. Information demand was skewed towards employment, education, and to a lesser extent, health-related information. Linkages with other government institutions such as the Information Services Department were not apparent.

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Design-Reality Gap. For the information dimension of the DRG, the reality at the telecentres was far below the design expectation. Design intentions were nowhere near what occurred, thus creating a sizable design-reality gap.

Technology

ICT projects such as CICs tend to be focused on technological and infrastructural efforts. Such efforts include the deployment of computers and accessories, reliable internet setup, wider telecommunication infrastructure and electricity. The CICs must have these resources available and be sufficient to operate efficiently.

Design. A major condition for a community to qualify for a telecentre was easy and reliable access to electricity in various forms. Based on the design, each telecentre was meant to have about 30 networked desktop computers, to serve users and for training purposes, installed in two adjoining rooms. One section is intended for browsing and the other designated for training sessions. Additionally, internet connectivity is a crucial component of the CIC to facilitate access to consistent internet services so that users have multiple opportunities for quick information and to facilitate efficient communication. Radio stations were to be established in each centre to complement the centre's activities with regards to the broadcast of information to the local community. Ultimately, the CIC and radio station's convergence was to be a novel strategy to integrate new and traditional ICT systems to propagate local content to community folks. The notion is that when these two modalities are combined, they offer excellent opportunities for community engagement and information dissemination. Lastly, multimedia facilities offered video capture and editing of various programmes for a fee as well as access to fax machines, printers, telephones, televisions and copy facilities.

Reality. The findings show that although these amenities were present at some centres, they were unreliable. Only three centres had working, reliable internet connectivity. Most users that frequent the CIC mainly use the internet. Therefore, the loss of internet connectivity led to a decrease in usage and the subsequent closure of some centres.

When the internet breaks down, nobody comes here again. On a normal day, the number of people who come for services like printing, photocopying is not that much like those who come to access information from the internet and at the close of the day the highest revenue received is from internet services. (Manager10)

Some CIC users complained about the poor quality of the internet connections. Frequent power outages and the installation of prepaid electricity metres were issues of concern, accounting for the closure of the three centres due to unpaid electricity bills. One manager stated: “We use the prepaid system to purchase credit for electricity. Whenever we run short of credit, it takes me close to two to three days to buy credit after the request has been sent to the District Assembly” (Manager3). For the majority of CICs investigated, computers had not been replaced since they were installed at the inception of the CICs (i.e., between 2005 and 2007). At the time of the administration of the survey, the community radio station, which is another critical implementation, had still not been realised.

Design-Reality Gap. A large design-reality gap emerged on the technology’s dimension. Although pieces of equipment were supplied to centres at their inception, no conscious effort was made to repair or replace them over time. This was prevalent at all CICs investigated. In most cases,

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centres were handicapped in delivering their mandate, due mainly to the inadequate availability of ICT equipment.

Processes

This theme depicts various work and information flows throughout the entire CIC operations. Well-planned and well-intentioned processes only yield good results if applied.

Design. Stakeholder participation was to serve as the bedrock for the implementation of the whole project. The design principle of the system took into consideration the user community's need for an ICT centre. As such, its siting, furnishing, and information/content needs were conditioned on stakeholder input. Therefore, steps were to be taken to organise stakeholder meetings in beneficiary communities to solicit relevant information to this end.

Reality. The reality from the data indicates that there was hardly any stakeholder involvement regarding decision-making and information dissemination from the CICs. Assembly officials indicated that they were not directly involved, which explains why there were doubts about the ownership of some centres. Expressing lack of participation, one assembly official from a closed centre stated that:

> Yes, it is in principle in our hands but the way the whole setup was carried out came with its problems, I must say it was not properly done. It looks like the stakeholders were not properly involved in the policy framework to understand it to know their roles and responsibility which has been carried through to let the assembly know who owns the project. (Assem.Off.5)

Concerning the establishment of new CICs, an official from the GIFEC explained how some politicians circumvented established practice: "Some politicians have used their clout to influence the location [siting] of some of these centres in their constituencies even though they have CICs. As a result, needy communities are neglected" (Assem.Off.3).

Such interventions met the political aspirations of local politicians and incumbent governments but failed to fulfil the objectives and rationale for establishing the CICs in deprived communities.

Design-Reality Gap. The procedure for establishing a CIC for any given community involves several processes including the period of feasibility study through to the handing over to the Assembly responsible from which point it is open to the general public for use. However, major stakeholders such as users, community leaders, and some government agencies like the Information Services department were not involved. Thus, this dimension yielded a medium gap since design inscriptions were partially fulfilled.

Objectives and Values

This theme represents the pivot of the CICs mandate that became essential to the survival of the whole initiative. CIC objectives and values demonstrate the rationale for the establishment as a poverty-targeted initiative to support underprivileged communities. The CIC system was designed to cater to a context with cultural and social values that recognised structure and authority situated in the local government system. It was thus projected that such structures, when used in this manner, would yield positive outcomes for beneficiary communities.

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Design. The telecentres were designed to operate within the local government system as an additional unit. Therefore, their operation and sustainability were to be subsumed under the organisational culture that emanates from the assembly. Consequently, CICs were to inherit the value system or norms (such as structure, authority, maintenance culture and political nuances) of the local government. The objectives of the CICs include: bridging the digital divide between rural and urban areas; helping to empower women by providing them with training and information for establishing micro-enterprises; improving governance and inclusiveness at the local level towards national integration; creating ICT awareness in the rural areas; disseminating information, especially in areas of health, local government, environment, agriculture; providing an opportunity for ICT training for users; supporting community-based organisations through the promotion of workshops and publication resources; and ultimately, serving as a mechanism for poverty reduction.

Reality. The values and norms which inspired the GIFEC to transfer ownership to assemblies were, however, not apparent in the CICs studied. Instead, the mission of the centres was overshadowed by a political culture that favoured the use of power vested in political appointees at the assemblies to subvert due process in managing CICs with a preference for political affiliation.

Despite the efforts that had been made to include and empower women, gender inequalities still remained. Women made up a smaller proportion of the clientele in the centres. On average, managers agreed that three out of ten centre users were women. There was no strong evidence of empowerment of beneficiaries to improve their economic and social status significantly. As a facility built to close the diversity and exclusion gap, it was problematic that this vision was far from reaching the ideal. Case in point, one centre manager reflected: “How many of users even know that this centre exists, let alone use it to empower themselves" (Manager2).

Despite these difficulties, the reality was that the objectives of the CICs had been partially completed. For instance, it was observed that the facility was in use by nearby schools for their lessons at a point in time. The managers of these centres had scheduled timetables so that during ICT periods, teachers visited the facility to augment the training given in class. Also, some centres provided an internet point of presence, albeit sporadically, to community members, which facilitated computer skills learning.

Design-Reality Gap. For those who frequently used the CICs, it facilitated bridging the digital divide, created an ICT awareness in the rural areas where they were established, although marginally, and provided an opportunity for ICT training for users. Therefore, this dimension yielded a medium gap since design inscriptions were partially fulfilled.

Staff and Skills

This dimension looks at the manpower requirements necessary to run an efficient CIC.

Design. The design of the CICs anticipated the presence of staff possessing information technology, managerial, and business/entrepreneurial expertise to operate the centres successfully. The CICs recruited specialized professionals based on the expectation that the project's success hinged on the quality of staff trained or engaged to effectively manage the information centres. The design made provision for a centre administrator (manager) with

ISSN 2574-3430, jps.library.utoronto.ca/index.php/ijidi/index
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sufficient ICT skills to facilitate smooth service delivery in the centre and additional support staff.

Reality. In reality, all centres except one had a permanent staff person to handle the facility. Occasionally, entities such as the GIFEC, the United Nations Development Programme (Ghana), and other agencies trained the staff and supplied equipment to operate the centres.

Staff attrition has been a problem since the centres were established. All but one of the centres have experienced the turnover of several managers. Based on interviews, some of the staff members who left for better-paying positions elsewhere cited that the skills attained in their role as CIC managers were the primary catalyst for obtaining their new jobs. When patronage was high, managers reported that they were often overwhelmed with the number of clients. In many cases, frequent requests were made for additional staff, but some assemblies were not able to send specialized staff, deploying employees they considered 'redundant' or 'idling' to support CIC managers. One previous CIC manager states:

> The centre usually has only the manager as the main staff but when there is pressure, we send any staff of the assembly who is idling to support him. We know it is not the best but that is what we can afford to spare." (Manager1)

Another relevant issue was the remuneration of centre managers and volunteers. An assembly administrator gave a picture of the financial difficulty they face and why they are unable to pay the centre manager in the following statement:

> Some of the small assemblies are in financial crises. We are hardly able to fulfil all our obligations financially. It is true that we are always behind in the payment of the CIC manager, sometimes about eight to nine months' arrears. (Assem.Off.3)

Some of the managers who left the CICs attested that they were being paid better in private establishments. The lack of pay at the CIC was demoralising, considering it often took several months before they could be paid. To survive, most of the CIC managers worked additional jobs in the area of computer repair, homework support for pupils, and technical support for other organisations. Schedule officers of the CICs confirmed that various assemblies did not have salaried CIC managers. The schedule officers' claim was that the centres were operating at a loss, and thus it was not sound financial planning to reward managers for the poor (Schedule officer, personal communication, November 26, 2019). Ironically, the only fully operational CIC centre had its manager on the assembly's payroll.

Also, it was discovered that political influences on managerial hires were significant. Similarly, some centre managers complained they were hounded out of their positions because they were branded as belonging to an 'opposition party' (Managers 2, 3, and 6). Often these conditions led to the departure of dissatisfied staff, unable to perform their duties. Conversely, assembly officials complained that some managers did not feel accountable to schedule officers because of their political affiliations leading to a clash of egos.

Design-Reality Gap. Overall, staff capacity relates directly to managers' ability to evaluate information for localised usage according to the Information dimension. The gap between project design and actual reality was exacerbated by political manipulation, interpersonal friction and staff attrition, resulting in a huge design-reality gap for the staff and skills theme of the DRG.

ISSN 2574-3430, jps.library.utoronto.ca/index.php/ijidi/index
DOI: 10.33137/ijidi.v5i3.36213

Management Systems and Structures

The management theme of the DRG has to do with the management and reporting of processes and structures within the assembly and its CIC.

Design. The CICs' administration was conceived on the principle of decentralization implemented by the local government of Ghana. This approach was to encourage more structured decision-making with the assembly taking ownership and direct responsibility for the CICs. The management style was fashioned along the decentralisation concept which advocates participatory governance. In line with this notion, the frontline management structure was made of nine representatives from diverse stakeholder groups to form steering committees. The steering committees were assigned to manage the telecentres on a day-to-day basis and required to follow sound management practices. Periodic meetings were to be organized by the committees' chairpersons to evaluate the centres' progress and streamline their activities to ensure financial value. Ultimately, the vision was for these committees and assemblies to devolve authority of running the centres to a broad community-based steering committee to consolidate a sense of ownership by the community in which the centres operate.

Reality. The findings indicate that most of these committees were never established. Most facilities never created steering committees and those that did barely functioned as such. Case in point, one assembly official stated:

> Our [steering committee] was not formed from the beginning and that is why I said that the way [the CICs] were rolled out, it was when they finally engaged the assembly to let the assembly understand that [the CIC] was its project, and we should see to the maintenance of the place, that management decided to form a three-member committee. (Assem.Off.8)

Probing further, it was revealed that the said committee never actually executed its mandate because members hardly met as a team to deliberate.

Another negative trend was the delay in responding to requisitions from managers. Managers complained that when they made requisitions for stationery or repair of damaged equipment, it often took several weeks to fulfil such requests. This usually disrupted service delivery to customers. A manager of a closed centre lamented: "There is no respect for our work. When we ask for materials to manage the centre, they ignore us, making our work difficult" (Manager7).

This proved to be the case with some managers, who demonstrated an inability to determine where their loyalties lay between the implementing agency and the facility owners (the assembly officials). One instance of this conundrum can be seen in the following quote from a previous centre manager: "Our mother organisation [GIFEC] from Accra came and installed phone booths" (Manager7).

During our interview, Manager7 was asked to substantiate what he meant. He explained that the assembly did not care about the state of the CICs and often referred the centre managers to the GIFEC to inquire about equipment replacement and in-service training. To a number of Manager7's colleagues, external organisations were more interested in the survival of the CICs than their owners.

ISSN 2574-3430, jps.library.utoronto.ca/index.php/ijidi/index
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A major observation was the lack of, or inadequate records-keeping culture at all centres investigated. Although the CIC managers all admit they have been given some training on records-keeping, it was not immediately apparent why such practices were not being practiced. Another critical concern was evidence of ways in which traditional bureaucracies and hierarchies had made it difficult for centre owners to get third-party collaborators to manage their facilities. It was apparent from the accounts of assembly officials that external support was necessary for the survival of the CICs in the face of dwindling funding. Despite interest from the private businesses to invest in the initiatives, bureaucratic inertia limited investor enthusiasm.

Design-Reality Gap. The constant conflict between staff and management and the inherent red tape delayed service delivery and thus created a medium to large design-reality gap with a score of 6.8 (see Table 2).

Other Resources: Finances/Revenues/Time

This theme represents other factors apart from any of the themes above, but also essential for evaluating the status of the CIC, such as finance and timetable.

Design. The centres were established to cater to the underprivileged and needy in the community. Therefore, service and product charges, especially secretarial services, were supposed to be affordable for everybody in the community. The sustainability of the CICs was a vital component for the roll-out of the initiative. This depends not only on financial stability but also a conducive environment.

The Ghana government, through its implementing agency (GIFEC), recognised the most challenging factor would be sufficient long-term funding to sustain the initiative. As a design inscription, the government envisioned domestic resource mobilisation rather than donor-led support. One such approach was to shift ownership to the community, which could then mobilise community-based funding to achieve sustainability by building local capacity to operate and maintain the centre under the District Assembly's supervision.

Reality. The CIC managers and clients interviewed agreed that the cost of services at the CICs were the lowest compared to privately-owned ICTs. Irrespective of these seemingly 'cheap' charges, the CICs were expected to generate sustainable revenue.

In general, the respondents felt that opening hours were inconvenient. According to managers, a significant proportion of users were school children and working individuals. It was only when students finished school or adults completed their workday that they could make good use of the facility. Nevertheless, these centres were set to close by 5 pm each working day. CICs were also officially closed on weekends and holidays. One user commented: "I wish the manager could extend the opening hour to say 7 pm. I close at 5 pm, so I will be able to browse for at least two hours and hopefully get some work done" (User13).

Space was also a concern. The following are statements from two users of two separate centres:

> The place is not big. So, if you even encourage people to come, you cannot contain them. So, I proposed that they introduce a wireless service which can cover a wide area so that if you have a laptop, you can browse even outside the centre by coming to buy time you need. Now look. I am using a laptop, but I am covering space which another could have used. (User7)

ISSN 2574-3430, jps.library.utoronto.ca/index.php/ijidi/index
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> They should have a schedule so that we know when the students are coming so we don't have to come when they are here. We don't have to be waiting when the students have their classes. (User2)

However, the facility's management had no immediate plans to expand the structure to accommodate more users or provide Wi-Fi services for individuals with mobile devices.

There was a constant conflict between the centre managers and assembly officials regarding the release of funds for day-to-day activities. This condition was prevalent with most CICs. It was observed that there was no separate facility account as required by management procedures. The managers were instructed to deposit money in the mother company's main accounts instead. In a setting such as the local government, administrative systems tend to be slow to respond to day-to-day requirements. A significant financial constraint was the irregular release of funds by the central government to the assemblies. With minimal internally generated funds, assemblies cannot spend adequately on their core duties and see the CICs demands as peripheral.

Design-Reality Gap. The resulting inefficiencies and poor resource management resulted in insufficient service delivery levels and thus produced a large design reality gap on this theme.

Interpretation of DRG Scores

Table 2 summarises the individual responses and aggregates the average score for each of the seven dimensions of the DRG obtained from the study. The scoring was relatively consistent across the various respondent groups, thus demonstrating some common interpretation of their perception of the CIC implementation reality. The DRG Score for the CIC initiative comes to **44.8** which, when interpreted using the 'Likely Outcomes' table (see Appendix C), indicates that the: "ICT project may well fail unless action is taken to close design-reality gaps." Thus, the evaluation results are an assessment of partial failure.

Discussion

Gap Closure Measures

For many users, managers, and officials of the telecentres of the Upper East Region, the CIC initiative has fallen short of intended objectives. We argue, based on the findings, that the CIC initiative in Ghana is a failing ICT intervention that needs urgent attention from the government and respective district assemblies.

This study reasoned that though CICs disseminated traditional, relevant, local content to beneficiaries (community users), the dearth of access due to inadequate hours of operation, low administrative efficiency, and inadequate staffing discouraged the continuous use of the centres and consequently led to the minimal adoption and adaptation of the CICs to support daily endeavours. This means that future CIC design and implementation should look beyond stakeholder-inscribed needs for communities, and realise the importance of information needs assessment by incorporating participatory mechanisms where potential user needs are captured and integrated into the design process (Siefer, 2014). This kind of approach can lead to improved community buy-in for the telecentres.

ISSN 2574-3430, jps.library.utoronto.ca/index.php/ijidi/index
DOI: 10.33137/ijidi.v5i3.36213

As Mutula (2008) observed, community members will not hasten to utilise the most modern and fully equipped ICT facility merely because they view other necessities (electricity, potable water, toilets, and health services) as more critical to improving their wellbeing. To make telecentres in Ghana just as vital of a community resource, CICs should be built upon community-led participatory processes coupled with the support of local and national governmental agencies (Mutula, 2008). Community ownership allows telecentres to evolve and meet the changing needs of users. Thus, a community will be able to embed specifications that allow them to find a way to fulfill their local needs. The question then becomes, "Who in the community would or could take up this charge? Who will fill this institutional void?"

Khanna and Palepu (2010) describe institutional voids as the absence of efficient intermediaries in an organisational environment whose supporting roles are critical in implementing an institutional mandate. A criterion for success lies in acknowledging that there are voids (i.e., design gaps) in an institution and devising ways to exploit them to one's advantage. This study discovered a severe deficiency in the CIC initiative's governance that needs immediate attention from the stakeholders of the CICs. To plug the gap, the governance models currently in place within the CICs must be revised and the private sector brought in to deliver services (Mukerji, 2020). Public-private alliances may exploit these facilities to engage younger and more innovative users in these disadvantaged communities. There could be CIC locations where budding entrepreneurs can nurture and foster their dreams or receive education to initiate new businesses. Institutional structures are in place to support these initiatives.

In Ghana, as with all developing countries, resource constraints inhibit growth and consequently adversely affect any indications of sustainability. It is significant to note that the CICs did not fail because they were not fit for purpose; their failure was largely due to a lack of commitment on the part of implementers/owners of the system (the assembly officials) which relates to a lack of budgetary support from the government, the main financier of the CIC centres. As a social intervention, the CICs in the Upper East Region of Ghana needed political will and financial support to survive in most cases. The assemblies that own the CICs were themselves under-funded. Therefore, as observed in the findings, it was challenging to pay CIC staff meaningful wages and to maintain much needed ICT equipment. In essence, the funding model was weak for sustainability purposes. For the initiative to survive, the funding model needs to evolve to a more sustainable form, like a public-private partnership model (PPP)[3] we are suggesting based on the outcomes of this study. There is sufficient evidence to demonstrate that private ownership or a collaborative, community-led (public) initiative with private support, a PPP model, is a more viable governance model.

Two examples of the PPP model in action include the e-Choupals of India (Mukerji, 2020) and the Union Digital Centres in Bangladesh (Faroqi et al., 2019). Similarly, telecentres in Ghana need to be empowered to adequately provide for the needs of the clients. It is apparent from this study that Ghanaian facilities and staff in the Upper East Region were not empowered to provide adequate and sustainable information services for the communities they served.

Finally, a major failure factor observed was the widespread lack of good record-keeping practices from both the CICs' managers and owners. There were scant or no records on usage patterns, maintenance regimes, and income generation. It was difficult for both parties to adequately assess and identify relevant design gaps that might lead to unsustainability in the absence of records. As a gap closure measure, records keeping and management must necessarily be practiced within the scope of a stringent monitoring regime.

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A Critical Assessment of the DRG for Telecentre Evaluation

Although we argue that the DRG helped evaluate the CIC telecentre initiative, we must admit that we identified three main limitations. The first two emanate from an inherent design problem with the DRG framework itself (requiring future applied modification of the framework), while the third is explicitly concerned with our study and similar applications. We now proceed to discuss these limitations.

Multiple Designs and Reality Scenarios

We realised that although design inscriptions depicted the design inspirations of implementors of the CIC initiatives, users also had their impression of design conceptions which they felt should have inspired the design of the entire project. The DRG fell short in accommodating multiple scenarios as it was not feasible to create two designs (expectations of designers and users) against which the realities of system use could be compared.

Static vs. Dynamic

The DRG does not explicitly offer a means of establishing a relational analysis of the actors, entities, settings, and technologies constituting the context of implementation, although such information is probably captured in rating the dimensions. Such an examination would give insight into the development processes underlying the outcome evaluated by the DRG method. Secondly, related to this point, the DRG also fails to offer explanations for the reasons for the outcome of the evaluation of success, failure, or partial failure, a finding also argued by Masiero (2016). For instance, the DRG seeks to unearth gaps that lead to failure while neglecting to appreciate the reasons for those gaps. The initial evaluation is therefore static, not giving insight into procedural issues underlying a contextual understanding of the reasons for success or failure. Without this understanding, telecentre projects could continue to suffer sustainability failure with actors continuing to invest in the same failing efforts. As a remedy, we propose a further analysis that considers interesting and relevant emerging themes from the coding process: the root causes underlying design reality gaps should be as important as the gaps themselves (Masiero, 2016). Our critique supports Masiero's emphasis on the notion that these gaps interact dynamically with processes that eventually result in an initiative's failure or success by performing causal analysis for those gaps. She concurs with the argument that the failure of information systems in LMICs is not simply a malfunction of the technological centre, but a disjunction between the telecentre and its social environment. Such an approach resonates with Hayes and Westrup's (2012) assertion that contexts of ICT implementation are dynamically co-produced with actors, entities, settings, and technology in an initiative's development processes. Furthermore, it is in the understanding of the relationships between these aspects that the contingent and provisionally natured telecentres can be made visible by assessing what counts as success, failure, or partial failure based on community resourcefulness, use, and engagement.

Time Frame/Lapse

The time frame of an evaluation is relevant in research to justify the validation of findings. For Ghana's Upper East Region CICs, therefore, the argument is if the DRG can handle the significant time difference between the design of the first telecentre in 2004 and the time of evaluation for CICs that had closed by 2019. The juxtaposition of this timeline was problematic because it was difficult to contact some officials and managers for those centres. However, we could get around

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this issue by spending ample time to locate managers and assembly officials of the closed centres. For the assembly officials, most of those in active service had been transferred to other district assemblies within the local government service, working in other non-ICT capacities. Through contact tracing though, we were able to interview these knowledgeable informants. Admittedly, it could be argued that the interview approach might also suffer from recall and memory bias because of the time-lapse, as the interviewees might not correctly recall design inscriptions that occurred in 2004. To mitigate this variance, we relied on other documents and reports (such as the CIC Blueprint) to construct a timeline of events and activities to triangulate and validate findings.

Conclusion

This study reviewed literature on the evaluation of telecentres in Ghana's Upper East Region, and brought to light several methods used to evaluate those telecentres. Following this broad-based critique, the paper established an approach by which a pragmatic evaluation of telecentres in Ghana could be approached.

The problem of context and its relation to the failure of ICTs to produce relevant development outcomes has been highlighted many times in the ICT4D literature (Avgerou, 2010; Hayes & Westrup, 2012; Heeks, 2002). Further analysis of these processes would probably reveal systemic, institutional, and other structural factors.

This study helps to understand the state of Ghanaian telecentre facilities and their use in the Upper East Region. Data outcomes allow for recognising situation-specific factors that determine the success and failure of the design, management, and use of eight Community Information Centres (CICs) in the Upper East Region of Ghana. Specifically, this research gives a deeper insight into how a wide design reality gap (DRG) occurred in the CICs, and how such deficiencies subsequently affected the users who participated in the study. Our findings are more context-specific, thereby giving a deeper understanding of the Ghanaian context for identifying and meeting information needs in LMIC communities. The findings provide a lens for stakeholders and policy-makers to view the CICs' performance and usefulness as a means of granting universal access to ICTs.

This paper contributes to the ICT4D literature in three forms. First, it demonstrates the utility of DRG in evaluating by far one of the biggest pro-poor ICT initiatives in LMICs–telecentres. It further demonstrates that the evaluation method used here unearthed meaningful insights into the Upper East Region's CICs' problematic status and serves as a first attempt, to our knowledge, to use the DRG framework to evaluate a telecentre initiative. Second, this research contributes to the current ICT4D literature by enhancing our current knowledge about public access to ICT facilities in an under-investigated setting. Third, we further offer an approach to telecentre evaluations in similar contexts inspired by the DRG framework while highlighting the DRG's strengths and limitations.

This study successfully determined the status of the CICs of the Upper East Region of Ghana as a failing initiative, but did not surface the underlying reasons for the reported failure. Future research should investigate the rationale for the sustained launch of new CICs in the face of the evaluated situation.

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Endnotes

[1] The project by International Development Research Centre (IDRC) was named after the Acacia tree which is found throughout sub-Saharan Africa.

[2] Since 1987, the Ghana Statistical Service (GSS) has been conducting the Ghana Living Standards Survey (GLSS) with the aim of measuring the living conditions and well-being of the population. The GLSS has been useful to policymakers and other stakeholders as it provides timely and reliable information about trends in poverty and helps identify priority areas for policy interventions that aim at improving the lives of the population. Previous rounds of the survey were conducted in 1987/88, 1988/89, 1991/92, 1998/99, 2005/06, and 2012/13.

[3] See the World Bank's website at: https://ppp.worldbank.org/public-private-partnership/overview/what-are-public-private-partnerships for more information on the PPP model.

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Appendix A: A description of the seven DRG dimensions

DRG Dimensions	Constituent Features
Information	Information needs of patrons, how information is used, sources, information flow from managers to patrons
Technology	ICT equipment availability e.g. computers, printers, internet, power, scanners, photocopiers, etc. (hardware and software)
Processes	Work, managerial and institutional processes necessary for successful implementation of a project
Objectives and Values	The goal of establishing the initiative, organisational politics, organisational context in which it operates, cultural values of users
Staffing and Skills	Adequate number of staff and requisite IT and managerial skills
Management Systems and Structures	Ownership of centres, reporting structures
Other Resources: time and money	Time frame for implementation, adequate financial support, remuneration

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DOI: 10.33137/ijidi.v5i3.36213

Appendix B: Profile of CICs

CIC Name	Year of Establishment	Population of Catchment Area	Resources/Services	Service Delivery Models	Status at the time of Evaluation
Bawku	2005	98,538	-20 LAN points, 10 Workstations, Server, Printer and Scanner, No Internet, No Electricity (Disconnected) -Secretarial, IT training	Hybrid for-profit	Closed
Bolgatanga	2005	131,550	-20 LAN points, 15 Workstations, Server, Printer, Scanner, Photocopier, Projector, -Internet, Secretarial, IT training	Hybrid for-profit	Operational
Bongo	2008	84,545	-20 LAN points, 10 Workstations, Server, Printer and Scanner, No Internet, No Electricity (Disconnected) -Secretarial, IT training	Hybrid for-profit	Closed
Nabdam	2008	33,826	-20 LAN points, 15 Workstations, Server, Printer, Scanner, Photocopier -Secretarial service	Hybrid for-profit	Closed
Navrongo	2005	109,944	-20 LAN points, 15 Workstations, Server, Printer, Scanner, Photocopier, Internet connection -Internet, Secretarial, IT training	Hybrid for-profit	Operational
Sandema	2005	56,477	-20 LAN points, 15 Workstations, Server, Printer, Scanner, Photocopier, Internet connection -Internet, Secretarial, IT training	Hybrid for-profit	Closed
Tongo	2009	81,194	-20 LAN points, 20 Workstations, Server, Printer, Scanner, Photocopier, Internet connection -Internet, Secretarial services	Hybrid for-profit	Operational
Zebila	2007	94,034	-20 LAN points, 10 Workstations, Server, Printer and Scanner, No Internet, No Electricity (Disconnected)	Hybrid for-profit	Closed

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Appendix C: ICT Projects Likely Outcomes table (adapted from Heeks (2003))

Overall Rating	Likely Outcomes Table
57–70	ICT project will almost certainly fail unless action is taken to close design-reality gaps
43–56	ICT project may well fail unless action is taken to close design-reality gaps
29–42	ICT might fail totally, or might well be a partial failure unless action is taken to close design-reality gaps
15–28	ICT project might be a partial failure unless action is taken to close design-reality gaps
0–14	ICT project may well succeed

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Appendix D: Detailed DRG scores for all categories of participants.

		DRG Dimensions						
	Respondents	**Information**	**Technology**	**Processes**	**Objectives and Values**	**Staffing and Skills**	**Management Systems and Structures**	**Other Resources: time and money**
DRG Scores	User1	6	7	6	5.5	6	6	7
	User2	6	7	6	6	6	7	7
	User3	6	6	5	5	7	6	7
	User4	7	7	6	5.5	6	7	6.5
	User5	7	7	5	5	6	6	7.5
	User6	6	6	6.5	6	7	6	7
	User7	7	6	6	6	7	7	8
	User8	7	6	5	5	7	6.5	7.5
	User9	6.5	6	5	5	7	6.5	7.5
	User10	6.5	6	5	6	7	6	7
	User11	7	6.5	6	6	7	7	7
	User12	7	6	6	5.5	6	7	7
	User13	7	6	7	6	7	7	8
	User14	7	6	5.5	6	6	6.5	6.5

ISSN 2574-3430, jps.library.utoronto.ca/index.php/ijidi/index
DOI: 10.33137/ijidi.v5i3.36213

User15	6	7	6	6	6	6.5	6.5
User16	7	7	7	6.5	6.5	8	7
User17	6.5	7	6	5	7	7	7
User18	6	7	7	5.5	6	7	6.5
User19	6	7	6.5	5.5	6	7	6
User20	6	6.5	6	6	6	6.5	7
User21	6.5	6.5	6.5	6	6.5	6.5	7
User22	7	7.5	5.5	6	7	6	7
User23	7	7	5.5	5	7	6	8
User24	7	6	6	6	8	7	8
User25	7	7	5	5	7	6.5	7.5
User26	6	6	5	5.5	7	6.5	7.5
User27	6.5	7	6	5	7	7	7
User28	6.5	7	6	5.5	6	7	6.5
User29	7	7	7	6	8	8	7
User30	7	6	5	5	6	7	6
Average Score	**6.60**	**6.57**	**5.87**	**5.60**	**6.63**	**6.70**	**7.07**

ISSN 2574-3430, jps.library.utoronto.ca/index.php/ijidi/index
DOI: 10.33137/ijidi.v5i3.36213

DRG Scores	Assem. Off.1	6	7.5	6	7	6	7	8
	Assem. Off.2	7	6.5	6	7	7	7	7
	Assem. Off.3	7	7	6	6.5	6	6	7.5
	Assem. Off.4	7	7	6.5	7	7	7	7
	Assem. Off.5	6.5	7	7	7	6	6	8
	Assem. Off.6	6	7	6	7	5	7	7
	Assem. Off.7	6	6	6	8	7	8	8
	Assem. Off.8	7.5	6	6	7	6	7	7
	Average Score	**6.63**	**6.75**	**6.19**	**7.06**	**6.25**	**6.88**	**7.44**

DRG Scores	Manager1	6	6	6.5	7	7	6	7
	Manager2	7	6	6	6	7	7	8
	Manager3	7	6.5	6	5.5	6	6.5	7
	Manager4	6.5	6.5	7	5.5	7	6.5	7.5
	Manager5	6.5	5	6	5	7	7	7
	Manager6	6	5.5	7	6	6	7	7
	Manager7	6	6	6.5	5.5	6	7	8
	Manager8	6	6.5	6	6	7	7	7

ISSN 2574-3430, jps.library.utoronto.ca/index.php/ijidi/index
DOI: 10.33137/ijidi.v5i3.36213

Manager9	6	6	6	5.5	6	6	8
Manager10	6	5	6	5	6	7	7
Manager11	6	6	5	5	7	7	7
Average Score	**6.27**	**5.91**	**6.18**	**5.64**	**6.55**	**6.73**	**7.32**
Researcher	7	6	5	5	5.5	7	7

References

Afolayan, G. E. (2016). Critical perspectives of e-government in developing world: Insights from emerging issues and barriers. In I. Management Association (Ed.), *Politics and social activism: Concepts, methodologies, tools, and applications* (pp. 1676-1695). IGI Global. 10.4018/978-1-4666-9461-3.ch084

Attwood, H., Diga, K., Braathen, E., & May, J. (2013, December 5). Telecentre functionality in South Africa: Re-enabling the community ICT access environment. *The Journal of Community Informatics*, *9*(4). https://doi.org/10.15353/joci.v9i4.3137

Avgerou, C. (2008, September). Information systems in developing countries: A critical research review. *Journal of Information Technology, 23*(3), 133-146. https://doi.org/10.1057%2Fpalgrave.jit.2000136

Avgerou, C. (2010). Discourses on ICT and development. *Information Technologies and International Development, 6*(3), 1-18. https://core.ac.uk/download/pdf/17133.pdf

Ayoung, D. A. (2016). *Investigating telecentre implementation through the lens of Design-Reality Gap framework and postcolonial theory: The case of the Ghana community information centre (CIC) initiative*. Brunel University. https://bura.brunel.ac.uk/bitstream/2438/13654/1/FulltextThesis.pdf

Bailey, A. & Ngwenyama, O. (2009). Social ties, literacy, location and the perception of economic opportunity: Factors influencing Telecentre success in a development context, System Sciences, 2009. *HICSS'09. 42nd Hawaii International Conference on*. IEEE, pp. 1-11. https://doi.org/10.1109/HICSS.2009.398

Baraka, H.A., Baraka, H.A. & El-Gamily, I.H. (2015, March). Information systems performance evaluation, introducing a two-level technique: Case study call centers. *Egyptian*

ISSN 2574-3430, jps.library.utoronto.ca/index.php/ijidi/index
DOI: 10.33137/ijidi.v5i3.36213

Informatics Journal, *16*(1), 9-22. https://doi.org/10.1016/j.eij.2014.11.004

Bass, J. M. & Heeks R. (2011, August). Changing Computing Curricula in African Universities: Evaluating Progress and Challenges via Design-Reality Gap Analysis. *The Electronic Journal of Information Systems in Developing Countries, 48*(1), 1-39. https://doi.org/10.1002/j.1681-4835.2011.tb00341.x

Best, M.L. & Kumar R. (2008). Sustainability failures of rural telecenters: Challenges from the sustainable access in rural India (sari) project. *Information Technologies and International Development, 4*(4), 31-45. https://doi.org/10.1162/itid.2008.00025

Boyce, C. & Neale, P. (2006). Conducting in-depth interviews: A guide for designing and conducting in-depth interviews for evaluation input. *Pathfinder International Tool Series*, 1-12. http://www2.pathfinder.org/site/DocServer/m_e_tool_series_indepth_interviews.pdf?docID=6301

Browne, K. (2005, February 1). Snowball sampling: Using social networks to research non-heterosexual women. *International Journal of Social Research Methodology*, *8*(1), 47-60. https://doi.org/10.1080/1364557032000081663

Chaudhuri, A. (2012, December). ICT for development: Solutions seeking problems. *Journal of Information Technology, 27*(4), 326-338. https://doi.org/10.1057%2Fjit.2012.19

Chawinga, W. & Ngwira, F. (2015, June 1). The role of the Mzuzu American Corner Information Technology and Communication Centre, Malawi. *Innovation: Journal of Appropriate Librarianship and Information Work in Southern Africa,* (50), 20-43. https://hdl.handle.net/10520/EJC174762

Clements, P., Chianca, T., & Sasaki, R. (2008, June). Reducing world poverty by improving evaluation of development aid. *American Journal of Evaluation, 29*(2), 195-214. https://doi.org/10.1177%2F1098214008318657

Cordella, A. & Tempini N. (2015, July). E-government and organizational change: Reappraising the role of ICT and bureaucracy in public service delivery. *Government Information Quarterly, 32*(3), 279–286. https://doi.org/10.1016/j.giq.2015.03.005

Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Pearson.

Faroqi, M. G., Siddiquee, N. A., & Ullah, S. (2019, April). Sustainability of telecentres in developing countries: Lessons from Union Digital Centre in Bangladesh. *Telematics and Informatics*, 37, 113-127. https://doi.org/10.1016/j.tele.2018.05.006

Fillip, B. & Foote, D. (2007) *Making the connection: Scaling telecenters for development*. Academy for Education Development. https://www.fhi360.org/sites/default/files/media/documents/Making%20the%20Connection%20-%20Scaling%20Telecenters%20for%20Development.pdf

Furuholt, B., & Sæbø, Ø. (2018, January). The role telecentres play in providing e-government

services in rural areas: A longitudinal study of internet access and e-government services in Tanzania. *The Electronic Journal of Information Systems in Developing Countries*, *84*(1), https://doi.org/10.1002/isd2.12006

Ghana Statistical Services (GSS) (2018). *Ghana Living Standards Survey Round 7 (GLSS7): Poverty trends in Ghana -2005-2017*. https://www2.statsghana.gov.gh/nada/index.php/catalog/97/overview

GIFEC. (2013). The community information centers project. http://gifec.gov.gh/index.php?option=com_content&view=article&id=83:universal-access-toelectronic-communications-programme&catid=38:projects&Itemid=248

Gollakota, K., & Pick, J. B. (2020). A resistance to change perspective on nonusers of telecenters. *The Electronic Journal of Information Systems in Developing Countries*, *86*(3), e12127. https://doi.org/10.1002/isd2.12127

Google. (n.d.). [Google map of Upper East Region]. Retrieved November 22, 2020, from https://www.google.com/maps/vt/data=_cszUdEwkcVE5HLD5j7eMcZR3PMzpsBDBzeNOyceQPoT6ZrOXRoLRbEpWsh7HKxWpQutZodC0GmDk7_sSttsRsct30iB02gwNF4t2ey8w_S83sgS2oEIpXsvn6QQfz3GVBIYCBFaFHUNLZSEwFDLW3k5mbRp9aDs4MGNExMFpzq4_GhZ_dtfQwkRwTMK5LSIS63T1iRK5-ba_RPwANQi2P0-Rto6o8XFTCBZWJF051_vTA

Grimes, D. & Warschauer, M. (2010). Utility in a fallible tool: A multi-site case study of automated writing evaluation. *Journal of Technology, Learning, and Assessment, 8*(6), 4-43. https://eric.ed.gov/?id=EJ882522

Guijt, I. (2014) Participatory approaches. *Methodological Briefs: Impact Evaluation* (5th ed.). UNICEF Office of Research. http://dx.doi.org/10.13140/RG.2.1.4948.1768

Hawari, A. and Heeks, R. (2010, February 16). Explaining ERP failure in a developing country: A Jordanian case study. *Journal of Enterprise Information Management*, *23*(2), 135-160. https://doi.org/10.1108/17410391011019741

Hayes, N., & Westrup C. (2012, January). Context and the processes of ICT for development. *Information and Organization, 22*(1), 23-36. https://doi.org/10.1016/j.infoandorg.2011.10.001

Heeks, R. & Molla A. (2009). *Compendium on impact assessment of ICT-for-development projects*. Global Impact Study of Public Access to ICTs. http://hdl.handle.net/1773/25541

Heeks, R. (2002, March 1). Information systems and developing countries: Failure, success, and local improvisations. *The Information Society, 18*(2), 101-112. https://doi.org/10.1080/01972240290075039

Heeks, R. (2003). Most e-Government-for-development projects fail: How can risks be reduced? *iGovernment Working Paper Series*, Institute for Development Policy and Management, University of Manchester. http://dx.doi.org/10.13140/RG.2.2.21845.78560

Heeks, R. (2006). Health information systems: Failure, success and improvisation. *International*

ISSN 2574-3430, jps.library.utoronto.ca/index.php/ijidi/index
DOI: 10.33137/ijidi.v5i3.36213

Journal of Medical Informatics, 75(2), 125-137. https://doi.org/10.1016/j.ijmedinf.2005.07.024

Heeks, R. (2008, October 19). *Success and failure rates of eGovernment in developing/transitional countries*. EGovernment for Development. http://www.egov4dev.org/success/sfrates.shtml.

Heeks, R. (2009). *The ICT4D 2.0 manifesto: Where next for ICTs and international development?* University of Manchester. Institute for development policy and management (IDPM). Development informatics group. https://dx.doi.org/10.2139/ssrn.3477369

Heeks, R., & Arun S. (2010). Social outsourcing as a development tool: The impact of outsourcing IT services to women's social enterprises in Kerala. *Journal of International Development, 22*(4), 441-454. https://doi.org/10.1002/jid.1580

Hewapathirana, R. & Rodrigo S.S. (2013). FOSS HIS in Public Health Domain: Case study of Design-Reality Gap and local improvisation in global South. *Journal of Health Informatics in Africa 1*(1), 75-82. https://doi.org/10.12856/JHIA-2013-v1-i1-76

Joseph, N. M., & Thomas, P. E. (2021). Are ICT non-users absolute non-users?: Segregation of "potential ICT users" from the non-users' profile. In *Ubiquitous Technologies for Human Development and Knowledge Management* (pp. 225-242). IGI Global. 10.4018/978-1-7998-7844-5.ch011

Kapondera, S. K., Bernadi, R., & Panteli, N. (2019, May). A framework for understanding the empowerment effects of telecentres on rural communities in developing countries. In *International Conference on Social Implications of Computers in Developing Countries* (pp. 104-115). https://doi.org/10.1007/978-3-030-18400-1_9

Kante, M., Oboko, R., & Chepken, C. (2017, November). Influence of perception and quality of ICT-based agricultural input information on use of ICTs by farmers in developing countries: Case of Sikasso in Mali. *The Electronic Journal of Information Systems in Developing Countries*, *83*(1), 1–21. https://doi.org/10.1002/j.1681-4835.2017.tb00617.x

Khanna, T. & Palepu, K. G. (2010). *Winning in emerging markets: A road map for strategy and execution*. Harvard Business Press.

Kumar, B. S., & Kumara, S. S. (2018, April 3). The digital divide in India: Use and non-use of ICT by rural and urban students. *World Journal of Science, Technology and Sustainable Development, 15*(2), 156-168. https://doi.org/10.1108/WJSTSD-07-2017-0021

Lessa, L., S. Negash & Belachew, M. (2012). Steering e-government projects from failure to success: Using design-reality gap analysis as a mid-implementation assessment tool. *IGovernment Working Papers Series No. 22*. University of Manchester. 10.4018/978-1-4666-9814-7.ch086

Lin, C. I., Kuo, F.Y., & Myers, M. D. (2015, September 1). Extending ICT4D studies: The value of critical research. *MIS Quarterly, 39*(3), 697-712.

ISSN 2574-3430, jps.library.utoronto.ca/index.php/ijidi/index
DOI: 10.33137/ijidi.v5i3.36213

https://doi.org/10.25300/MISQ/2015/39.3.09

Macias-Garza, M. & Heeks R. (2006). Analysing the organisational risk and change of CMM software process improvement in a nearshoring firm. *IDPM* Development *Informatics Working Papers*. http://dx.doi.org/10.2139/ssrn.3477745

Madon, S., N. Reinhard, D. Roode, & Walsham G. (2009, April 1). Digital inclusion projects in developing countries: Processes of institutionalization. *Information Technology for Development, 15*(2), 95-107. https://doi.org/10.1002/itdj.20108

Masiero, S. (2016, July 2). The origins of failure: seeking the causes of design-reality gaps. *Information Technology for Development, 22*(3), 487-502. https://doi.org/10.1080/02681102.2016.1143346

May, J., & Diga, K. (2015). Progress towards resolving the measurement link between ICT and poverty reduction. In A. Chib, J. May, & R. Barrantes (Eds.), *Impact of information society research in the global south* (pp. 83-104). Springer. https://doi.org/10.1007/978-981-287-381-1_5

Ministry of Communications. (2004). *Community information centres (CICs) in the age of ICT: Ghana's blueprint for action*. https://www.researchictafrica.net/countries/ghana/CICs_in_the_Age_of_ICTs_-_Blueprint_2004.pdf

Mukerji, M. (2008). Telecentres in rural India: Emergence and a typology. *The Electronic Journal of Information Systems in Developing Countries, 35*(1), 1-13. https://doi.org/10.1002/j.1681-4835.2008.tb00242.x

Mukerji, M. (2020, July). Re-examining strategic and developmental implications of e-Choupal, India. *Electronic Journal of Information Systems in Developing Countries, 86*(4), e12132. https://doi.org/10.1002/isd2.12132

Mutula, S.M. (2008). Digital divide and economic development: Case study of sub-Saharan Africa. *The Electronic Library*, 26(4), 468-489. https://doi.org/10.1108/02640470810893738

Pade-Khene, C., & Sewry, D. (2011, April 1). Towards a comprehensive evaluation framework for ICT for development evaluation–an analysis of evaluation frameworks. In *ICIME 2011-Proceedings of the 2nd International Conference on Information Management and Evaluation*, ICIME 2011 Ryerson University, Toronto, Canada, 27-28 April 2011 (360). https://dora.dmu.ac.uk/handle/2086/19827

Palvia, P., N. Baqir, & Nemati, H. (2015, November). ICT policies in developing countries: An evaluation with the extended Design-Actuality Gaps framework. *The Electronic Journal of Information Systems in Developing Countries, 71*(1), 1-34. https://doi.org/10.1002/j.1681-4835.2015.tb00510.x

Pick, J. B., Gollakota, K., & Singh, M. (2014, October 2). Technology for development: Understanding influences on use of rural telecenters in India. *Information Technology for Development, 20*(4), 296-323. https://doi.org/10.1080/02681102.2013.837806

Ramírez, R., Parthasarathy, B., & Gordon, A. (2014). *Infomediaries: Brokers of public access. Final Report (Global Impact Study Research Report Series)*. Technology & Social Change Group, University of Washington Information School. https://digital.lib.washington.edu/researchworks/bitstream/item/25410/GIS_Infomediaries_final_report.pdf?sequence=1

Riggins, F.J. & Dewan S. (2005, December 1). The digital divide: Current and future research directions. *Journal of the Association for Information Systems, 6*(12), 1. https://doi.org/*10.17705/1jais.00074*

Sampson, A. (2007). Developing robust approaches to evaluating social programmes. *Evaluation, 13*(4), 477-493. https://doi.org/10.1177%2F1356389007082132

Sey, A., & Fellows, M. (2011). Loose strands: Searching for evidence of public access ICT impact on development. In Proceedings of the 2011 iConference (pp. 189-194). ACM. https://tascha.uw.edu/wp-content/uploads/2012/05/p189-sey.pdf

Sey, A., C. Coward, F. Bar, G. Sciadas, C. Rothschild, & Koepke L. (2013). Connecting people for development: Why public access ICTs matter. *Research report; 2013*. http://hdl.handle.net/10625/51520

Sey, A., F. Bar, C. Coward, L. Koepke, C. Rothschild, & Sciadas G. (2015). There when you need it: The multiple dimensions of public access ICT uses and impacts. *Information Technologies & International Development 11*(1), 71-86. https://itidjournal.org/index.php/itid/article/view/1363.html

Siefer, A. (2014). Engaging stakeholders: The first step to increasing digital inclusion. *The Journal of Community Informatics*, *10*(1). https://doi.org/10.15353/joci.v10i1.2667

Souter, D. (2011). Realising the potential of ICTs in Tanzania. Panos Institute. http://panoslondon.panosnetwork.org/wp-content/files/2011/01/panos-london-ICTs_and_tanzania-policy.pdf

Stockdale, R. & Standing, C. (2006, July 1). A classification model to support SME e-commerce adoption initiatives. *Journal of Small Business and Enterprise Development, 13*(3), 381-394. https://doi.org/10.1108/14626000610680262

Syamsuddin, I. (2011). Evaluation of e-government initiatives in developing countries: an ITPOSMO approach. *International Research Journal of Applied and Basic Sciences*, *2*(12), 439-446. https://irjabs.com/files_site/paperlist/r_234_121014152607.pdf

Toyama, K. (2010). Can technology end poverty? *Boston Review, 35*(6), 12-29. https://inworks.ucdenver.edu/jkb/iwks2300/readings/BostonReview_CanTechEndPoverty.pdf

Uys, C., & Pather, S. (2020). A benefits framework for public access ICT4D programmes. *The Electronic Journal of Information Systems in Developing Countries*, *86*(2), e12119. https://doi.org/10.1002/isd2.12119

Walsham, G. (2012, June). Are we making a better world with ICTs: reflections on a future

ISSN 2574-3430, jps.library.utoronto.ca/index.php/ijidi/index
DOI: 10.33137/ijidi.v5i3.36213

agenda for the IS field. *Journal of Information Technology, 27*(2), 87-93. https://doi.org/10.1057%2Fjit.2012.4

Wamuyu, P. K. (2015, April 3). The impact of information and communication technology adoption and diffusion on technology entrepreneurship in developing countries: The case of Kenya. *Information Technology for Development*, *21*(2), 253–280. http://erepo.usiu.ac.ke/11732/307

Whyte, A. (1998) Telecentre research framework for ACACIA. Report to International Development Research Centre, Ottawa, ON, Canada. https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/15574/108351.pdf?sequence=13&isAllowed=y

World Bank. (2008). *ICT: Connecting people and making markets work*. The World Bank Group. https://documents1.worldbank.org/curated/en/878971468316431008/pdf/463150BRI0Box310making0Markets0work.pdf

Yasya, W. (2020). Rural empowerment through education: Case study of a learning community telecentre in Indonesia. *International Journal of Modern Education & Computer Science*, *12*(4), 12-26. 10.5815/ijmecs.2020.04.02

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