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Suggested citation (APA, seventh edition)

Chauke, F., Twinomurinzi, H., & Joel-Goyayi, M. L. (2025). Rethinking sustainability in ICT4D initiatives through implementation outcomes. *Revista Sociedad & Tecnología*, 8(2), 194-213. DOI: <https://doi.org/10.51247/st.v8i2.519>.

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Rethinking sustainability in ICT4D initiatives through implementation outcomes

ABSTRACT

Information and Communication Technology for Development (ICT4D) community initiatives tend to “fizzle” out after a few years. This study, therefore, investigated alternative ways in which these initiatives can be sustained for longer. The study drew on the Implementation Outcomes framework from the public health sector which holistically assesses the ability of public health initiatives to survive beyond their inception. With the objective to identify how improvements can be made on ICT4D initiatives so they are sustainable the study employed the qualitative-interpretive case study paradigm using three well-known South African ICT4D initiatives, namely, the Siyabuswa Educational Improvement and Development Trust (SEIDET), the Siyakhula Living Lab (SLL) and the Council for Scientific and Industrial Research (CSIR) Cyber Security Awareness Project. Findings reveals how individuals and the community for whom these initiatives are intended, sooner or later relocate or move on, as does ICT. Additionally, findings highlights the importance of ensuring a dynamic skills transfer from the founders of the initiative to later champions. The study makes a theoretical and practical contribution to Information Systems (IS) and ICT4D research by using a framework from the public health sector for IS and ICT4D initiatives. It conceptualises a framework to guide the implementation of more sustainable ICT4D.

Keywords: ICT for development (ICT4D); open development; implementation outcomes; project sustainability; information systems (is)

Replanteamiento de la sostenibilidad de las iniciativas de TIC para el desarrollo a través de los resultados de la implementación

RESUMEN

Las iniciativas comunitarias de Tecnologías de la Información y la Comunicación para el Desarrollo (ICT4D) tienden a "desvanecerse" después de unos pocos años. Por lo tanto, este estudio investigó formas alternativas en las que estas iniciativas pueden mantenerse durante más tiempo. El estudio se basó en el marco de Resultados de la Implementación del sector de la salud pública que evalúa de manera holística la capacidad de las iniciativas de salud pública para sobrevivir más allá de su inicio. Con el objetivo de identificar cómo se pueden realizar mejoras en las iniciativas de TIC4D para que sean sostenibles, el estudio empleó el paradigma de estudio de caso cualitativo-interpretativo utilizando tres iniciativas de TIC4D sudafricanas bien conocidas, a saber, el Siyabuswa Educational Improvement and Development Trust (SEIDET), el Siyakhula Living Lab (SLL) y el Council for Scientific and Industrial Research (CSIR) Cyber Security Awareness Project. Los hallazgos revelan cómo las personas y la comunidad a las que están destinadas estas iniciativas, tarde o temprano se reubican o se mudan, al igual que las TIC. Además, los hallazgos resaltan la importancia de asegurar una transferencia dinámica de habilidades de los fundadores de la iniciativa a los campeones posteriores. El estudio realiza una contribución teórica y práctica a la investigación sobre sistemas de información (SI) y TIC para el desarrollo utilizando un marco del sector de la salud pública para iniciativas de SI y TIC para el desarrollo. Conceptualiza un marco para guiar la implementación de TIC para el desarrollo más sostenible.

Palabras clave: TIC para el desarrollo (ICT4D); desarrollo abierto; resultados de la implementación; sostenibilidad del proyecto; sistemas de información (SI).

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Repensando a sustentabilidade em iniciativas de TIC4D por meio de resultados de implementação

RESUMO

Iniciativas comunitárias de Tecnologia da Informação e Comunicação para o Desenvolvimento (TIC4D) tendem a "fracassar" depois de alguns anos. Este estudo, portanto, investigou maneiras alternativas pelas quais essas iniciativas podem ser sustentadas por mais tempo. O estudo se baseou na estrutura de Resultados de Implementação do setor de saúde pública, que avalia holisticamente a capacidade das iniciativas de saúde pública de sobreviver além de seu início. Com o objetivo de identificar como melhorias podem ser feitas em iniciativas de TIC4D para que sejam sustentáveis, o estudo empregou o paradigma de estudo de caso qualitativo-interpretativo usando três iniciativas de TIC4D sul-africanas bem conhecidas, a saber, o Siyabuswa Educational Improvement and Development Trust (SEIDET), o Siyakhula Living Lab (SLL) e o Council for Scientific and Industrial Research (CSIR) Cyber Security Awareness Project. As descobertas revelam como os indivíduos e a comunidade para os quais essas iniciativas são destinadas, mais cedo ou mais tarde, se mudam ou seguem em frente, assim como a TIC. Além disso, as descobertas destacam a importância de garantir uma transferência dinâmica de habilidades dos fundadores da iniciativa para os campeões posteriores. O estudo faz uma contribuição teórica e prática para a pesquisa de Sistemas de Informação (SI) e TIC4D usando uma estrutura do setor de saúde pública para iniciativas de SI e TIC4D. Ele conceitua uma estrutura para orientar a implementação de TIC4D mais sustentável.

Palavras-chave: TIC para o desenvolvimento (ICT4D); desenvolvimento aberto; resultados da implementação; sustentabilidade do projeto; sistemas de informação (IS)

INTRODUCTION

In today's world, Information Communication Technology (ICT) is diffused at an unprecedented rate into almost all facets of human activities. In conjunction with this diffusion, there is an intense debate on the contribution of this technology towards productivity, growth, and human welfare within developed and developing country contexts. Internationally, the spread and appropriation of ICTs have been a key dimension of globalisation, urging societies to build communications systems, manage them well; develop infrastructure and capacity to use it; and implement good policy and regulation.

Digital technologies have varied impacts on human development, both positive and negative (Bar and Toyama, 2021; Masiero and Bailur, 2021). Despite having access to digital technologies, individuals in deprived communities tend to struggle with high rates of poverty, poor economic conditions, lower education standards, and poor quality of healthcare. However, digital technologies facilitate greater access to information, knowledge, and education proving to be more effective for services such as healthcare and social interaction. They not only contribute to job payment but also foster the creation of new business.

Information and Communication Technology for Development (ICT4D) refers to the adoption and use of ICT to achieve development outcomes (Egessa, Ogara and Liyala, 2018). The core components of ICT4D being the ICT and human development. The term "ICT" refers to technology-based systems and platforms, composed of electronic technologies used for communication and information processing. While there are debates among ICT4D researchers on what the term "development" means and for whom, the central interest remains on the emancipation of the human condition (Smith and Turpin, 2017; Coetzee, 2019). As such, a great deal of effort has been directed towards establishing ICT4D communities. However, it is noticed that ICT4D community initiatives tend to "fizzle" out a few years after an often monumental and spirited start (Pade, Mallinson and Sewry, 2008; Walton and Heeks, 2011; Nkula and Krauss, 2014; Mthoko and Khene, 2017).

This study, therefore, investigates the reasons behind this "fizzling out" behaviour in ICT4D projects. It views development within the Capability Approach (CA) and Open Development (OD) and applies the Implementation Outcomes framework to investigate how ICT4D community initiatives can be sustained long after their initial start. The study particularly drew from the Implementations Outcomes (IOs) framework used in public health which focuses on ensuring the long-lasting implementation of public health initiatives.

The study contributes to both the theoretical and empirical literature on ICT4D by applying the concepts from the IOs framework and identifying the enablers for sustainable ICT4D projects. This informs both policy and practice on implementing ICT4D to improve sustainability. Furthermore, the study contributes to the use of a framework from the public health sector for Information Systems (IS) and ICT4D initiatives and offers a means through which the framework can be applied.

This study is structured as follows: the next section presents the literature on the CA, OD, and the IOs framework. The methodological approach adopted for the research is then described, followed by a presentation and discussion of findings. The final section presents the conclusion and various recommendations for policymakers, practitioners and researchers.

LITERATURE REVIEW

Capabilities Approach

The CA, developed by Sen (2000), is one of the leading frameworks used for the assessment and evaluation of the well-being of an individual, and the designing of policies and social change in a community (Egessa, Ogara, & Liyala, 2020). According to the CA, development is simply a process of choice that expands the real freedoms that people enjoy leading the lives they value. Therefore, it equates development to the freedom of choice and defines “functionings” as the various things a person values doing or being, such as being healthy, adequately nourished, or being able to engage in community life. Consequently, a person’s “capability” implies the alternative combinations of functioning feasible to be achieved by an individual. While functioning represents the “outcome” component of development, capabilities represent the “freedom” component that individuals have in a community.

The CA has gained increasing attention, emerging as a holistic lens for theorising development within the ICT4D discourses (Egessa, Ogara, & Liyala, 2020). The CA adopts a more holistic view of development where economic growth is not exclusive and thus focuses on human well-being and capabilities. The CA provides one of the theoretical foundations of the human development model and framework, evaluating and hypothesising the occurrences of desire-fulfilment (Robeyns, 2005). It is widely recognised that the CA brings together people’s capabilities to function, which are held by the basic needs’ theorists, into a single clear framework that extends beyond the analysis of deprivation and poverty to focus on wellbeing (Robeyns, 2005). Studies, however, recognise the most important function of CA as the ability to pursue what people value sometimes without an objective valid reason to value (Robeyns, 2021; Gasper, 2017; Osmani, 2016; Naz, 2016).

Open Development

OD refers to a set of possibilities that enable positive changes, facilitated by a network of international development activities (Smith et al., 2013). It implies a set of possibilities to induce positive transformation through open information-networked activities in international development (Smith & Seward, 2020). Similar to the concept of open source, the term “open” implies information-networked activities that have more information that is relatively freely accessible and modifiable, and more people who can actively participate and collaborate (Smith, Elder & Emdon, 2011). OD is concerned with transforming communities and opening opportunities by providing those individuals who can least afford to pay. OD focuses on networked-collaborative efforts in information creation and sharing, initiatives such as open data, open education, and open healthcare. The process involves a culture of open-sharing, participation, standards, and freely accessible information that encourages active participation and collaboration (Smith & Seward, 2020; Sein et al., 2019). The important aspect of information technology (IT) network development is to give support to knowledge and innovation, the special elements of human development.

Several business sectors and international non-government organisations (NGOs) have dedicated groups that are working on digital development since digitisation has now taken over many domains of development practice (Dearden and Kleine, 2020). With the paradigm shift towards a network society, researchers within the ICT4D field have established their own gatherings to examine contexts in monitoring and evaluation of ICT4D projects. Consequently, the issue of openness permeates and is emphasised in every element of ICT4D, from policies to programmes, from access to use, and from content to creation.

Implementation Outcomes

According to Implementation outcomes (IOs) refer to the effects or outcomes of purposive and deliberate actions to implementing new or a change in the treatments, services, practices or behaviour (Khadjesari et al., 2020; Pallesen et al., 2022). IOs serve three important functions; as indicators for implementation success, proximal indicators for implementation process and equally as key intermediate outcomes for implementation quality and effectiveness (Proctor et al., 2011). IOs are a critical requirement towards the attainment of the desired improvement in service outcomes or project implementation effectiveness. An effective implementation plan must provide relevant information and ensure that the intervention fits the target stakeholders (Cabassa and Baumann, 2020). Having to understand the ability to plan, evaluate, select, and support helps to address the practice that is necessary for successful implementation. Implementation strategies not only improve the implementation, but also facilitates adoption and sustainability of programmes (Pallesen et al., 2022). Thus, IOs deal with the possibilities posed by different service systems and the human challenges related to staff training and day-to-day operational support. IOs consists of eight core dimensions which includes acceptability, appropriateness, feasibility, adoption, fidelity, implementation cost, penetration and sustainability (Proctor et al., 2011; Khadjesari et al., 2020). Figure 1 shows the conceptualised relationship between the IOs dimensions and the research questions that the study investigated.

Acceptability

Acceptability, the perception of agreement or satisfaction over a given service, innovation or practice among implementing stakeholders. Acceptability reflects the ability attain satisfaction with various aspects of an implemented innovation, service or system. A lack of acceptability has long been noted as a major challenge towards implementation and sustainability (Mamuye et al., 2023; Saha et al., 2022). The term “acceptable”, as viewed from an ICT4D perspective, it implies that all stakeholders share a common understanding of the outcomes, that is, the implementation targets are agreeable, palatable, or satisfactory to all (Khadjesari et al., 2020). Acceptability in this context relates to the appropriateness of the content, the appeal and clarity of the mission and vision of the ICT4D projects. This would mean to improve sustainability there should be a fair degree of agreement amongst the stakeholders regarding the precise meaning of the term “development” within their context. The study, therefore, formulated the following sub-research questions (SRQs) against acceptability (Figure 1):

SRQ₁ - Is the development vision and mission of the primary stakeholder/s (e.g., the sponsors, leaders) clear?

SRQ₂ - Do the different stakeholders share a common understanding as to the role of ICT in development?

Adoption

Adoption refers to the initial decision to employ and use the innovation. Proposing a process that embraces ICT in development and encouraging local adaptation will result in a successful delivery and a sustainable framework (Proctor et al., 2023). Careful project management and planning steps including constant communication with stakeholders, in turn, helps to ensure that the benefits of the system’s implementation are well understood by all parties (Da Silva et al., 2013). Consequently, the project legitimacy relies on the relevance of proper project planning, as it enables adoption in the context where information is openly available thus facilitating all stakeholders partaking and participation in development activities. To this end, the following SRQs were examined against adoption (Figure 1):

SRQ₃ - To what extent has the community members tried out the ICT services?

SRQ₄ - What benefits could the ICT initiative render to the community?

Appropriateness

Appropriateness refers to the quality of being suitable for a certain service. It reflects the perceived relevance, fit, or compatibility of the ICT innovations towards developmental goals of a given community. This is only possible when the intended recipient accepts and gives approval that the innovation has the potential to make a positive change (Proctor et al., 2023). An example of appropriateness of ICT innovation is when, for example, an e-mail (as a communication tool) is used to deliver an intended message to a recipient. It is, however, not deemed appropriate to circulate e-mails whose content might offend the recipients. Appropriateness could mean recognising the human capability to participate in transforming the rendered ICT services. In the context of this study it reflects matching the needs of the community and the ICT capabilities. Thus, the following SRQs were investigated (Figure 1):

SRQ₅ - What are the actual needs/problems that the community faces?

SRQ₆ - How does ICT assist in addressing these needs?

Cost

Cost could be a monetary value or effort spent to produce something (Khadjesari et al., 2020). It reflects the decisions by a provider or an organisation to uptake or deliver an intervention. This implies the degree of use of a particular intervention within the population of the intended community. Implementation costs are those costs related to the development and the execution of the plan that targets community, that is the cost impact of the implementation efforts (Gold et al., 2022; Proctor et al., 2011). Therefore, implicitly, the outcomes generated from the resources used determines the amount of money available to translate the capabilities of a given implementation. Having said this, the cost could also involve participating openly to reproduce solutions that will be used by the community at no rate but with good intentions (volunteerism). As predicated by Nicol et al. (2003), it is difficult to identify integrated costing systems that provide information regarding the cost of specific activities in institutions. Examples are not limited to tangible costs (including hardware/software renovation, Internet subscription and infrastructure costs) or intangible costs (such as time invested by unpaid stakeholders who are learning to use ICT and giving back to the community). Therefore, the study formulated the following sub-research question (Figure 1):

SRQ₇ - What is the cost (financial/non-financial) to maintain the ICT?

Feasibility

Feasibility refers to the ease of being achievable, the extent to which an innovation can be successfully used or carried out within a given setting (Khadjesari et al., 2020). In this context it reflects the actual fit or utility, suitability for everyday use and the practicability ICT projects within a given community. Implementation feasibility also entails that the possibility of the new ideas to be put in place in a community in accordance with specific policies that aim to improve social and economic development. These policies are composed of key processes such as planning, educating, financing, managing quality, and attending to policy context. Consequently, there targeted users need to demonstrate certain skill sets in order to derive utility, practicability and sustainability of the ICT projects. The following sub-research question was assessed (Figure 1):

SRQ₈ - To what extent are the users skilled in using ICT?

Fidelity

Fidelity means being faithful to something to which one is bound by responsibility (Khadjesari et al., 2020). In implementation outcomes, it reflects the extent to which the intervention is delivered as intended by its implementors in line with the implementation model. Fidelity entails the level at which an intervention is implemented in the original arrangement recommended by the developers. The fidelity of a project implementation can only be determined after project evaluation. The outcome of the evaluation will determine if the programme has delivered exactly as prescribed and written. As a result of adhering to the project fidelity, it is possible to achieve the essential quality of an intervention and the desired opportunities, which may ultimately determine the quality of the service and its sustainability (Smith, 2018; Thomas, Li & Oliveira, 2017). Therefore, the following research sub-research question was investigated (Figure 1):

SRQ₉ - To what extent are the computers still serving the initial purpose?

Penetration

Penetration refers to making one's way through a service, characterised as follows: (i) the accessibility of a service; (ii) the eligibility of those individuals who receive it; and (iii) the measurement of product utilisation (Khadjesari et al., 2020; Proctor et al., 2023). Having said this, individuals can use ICT systems at their own time and at their own pace to acquire skills that empowers them to become the professionals they want to be. The case could be that a certain system might be moderately operative but preferred by stakeholders only because the existing alternative services are poor; the training process would, therefore, ensure more penetration. The study thus formulated the following sub-research questions (Figure 1):

SRQ₁₀ - To what extent do users of computers/smart devices keep on coming back to the ICT4D project?

SRQ₁₁ - For the users who keep on coming back, why do they keep coming back to the ICT4D project?

Sustainability

Sustainability refers to how a process can exist continually (Proctor et al., 2011). A healthy behaviour can be sustained in an environment by using organisational policies and best practices. For example, the capability of a system depends mainly on the evaluation approach applied, which in turn enables the constant maintainability and health of the system. To ensure that it can be easily upgraded and maintained, the system must remain usable and serves its purpose for a longer period. Therefore, flexibility and emergency amendments are possible, resulting in sustained services. The involvement of system users is crucial to measuring the "expected" and "actual" outcomes by checking the details provided on the performance indicators (Figure 1).

SRQ₁₂ - To what extent are there established routines to manage the daily operations of the ICT4D initiative?

The study therefore argues that the seven IOs dimensions; acceptability, adoption, implementation costs, appropriateness, penetrations, feasibility and fidelity influences the overall sustainability of ICT4D projects (Figure 1).

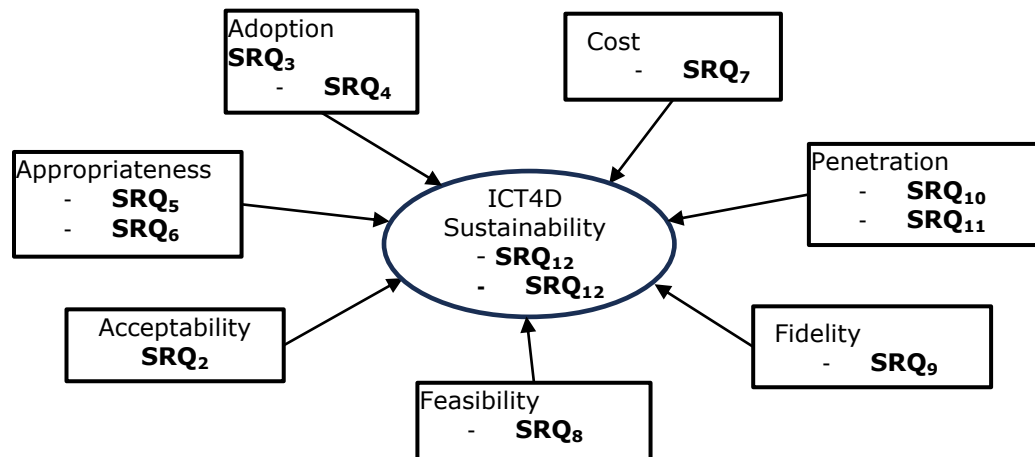


Figure 1: Conceptualization of ICT4D Project Sustainability
Source: Researchers' Construct, 2024

METHODOLOGY

The study adopted the qualitative-interpretive case study design using three well-known ICT4D initiatives in South Africa: (i) the Siyabuswa Educational Improvement and Development Trust (SEIDET), (ii) the Siyakhula Living Lab (SLL), and (iii) the Council for Scientific and Industrial Research (CSIR) Cyber Security Awareness Project. The approach aimed to generate meanings from the data collected. Atlas.ti8 was used in the thematic analysis to understand individuals, the social and cultural contexts in which they live, different knowledge, enquiry strategies, and the collection and analysis of data (Neuman, 2014).

A total of 27 participants were interviewed for the study and were drawn from the following stakeholders for ICT4D initiatives: national, local and municipal government departments; academic institutions; the private sector; and the ICT4D initiatives themselves. The demographic characteristics of the sampled respondents are indicated in Table 1. The sample of respondents majority were male (59%), education level of majority was Masters level (37%), aged between 51-60 (37%), educators (22%) who are by majority Board Members (Executives) (29.2%) (Table 1).

The study used thematic analysis as an analytical technique. Thematic analysis is a structured iterative process for coding and deducing patterns organised into themes used to create narratives for interpretation (Clarke and Braun, 2021). The in-depth interview data were thematically analysed to identify themes which were then related to the predefined coding provided by the three guiding theoretical frameworks, namely, the CA framework, the OD framework, and the IOs framework. Thematic analysis involved reading through the interview data set to look for patterns in the meaning of the data and thereby establish themes. The qualitative data were thus categorised in terms of 12 sub-research questions pertaining to the eight IOs items, that is, Acceptability (SRQ₁ and SRQ₂), Adoption (SRQ₃ and SRQ₄), Appropriateness (SRQ₅ and SRQ₆), Costs (SRQ₇), Feasibility (SRQ₈), Fidelity (SRQ₉), Penetration (SRQ₁₀ and SRQ₁₁) and Sustainability (SRQ₁₂).

Table 1: Demographic characteristics and percentage point differences by interview

Demographic categories	Participant count	Percentage
Gender		
Female	11	39%
Male	16	59%
Educational attainment		
Learner	1	3.5%
Matric	1	3.5%
Certificate	2	7.5%
National Diploma	1	3.5%
B-tech/Bachelor's Degree	4	15%
Honours	5	19%
Masters	10	37%
PHD	2	7.5%
Italian louder	1	3.5%
Age		
10-20	1	3.5%
21-30	4	15%
31-40	6	22%
41-50	5	19%
51-60	10	37%
61-70	1	3.5%
Employment (source of income)		
Learner	1	3.5%
Academic	3	11%
Administrator	1	3.5%
Contractor	1	3.5%
Researcher/Senior	5	19.25
Researcher	3	%
Researcher and software developer	6	11%
	1	22%
Educator		3.5%
Engineer	5	
Manager (Financial, Risk, Chief Risk, dept of Schools, Data recovery, Impact area, Project managers)	1	19.25
		%
Self-employed		3.5%
Category of Participants		
Board Members (Executives)	8	29.6%
Private Sponsors	3	11.1%
institutional sponsors	3	11.1%
supporting staff	7	25.9%
User	6	22.2%

Source: Field Data, 2024

Findings and Discussion

From the 27 face-to-face interviews, which included members of the executive board of the ICT4D initiatives (n=8), the focus was unsurprisingly on transformational outcomes through providing computer training. Computers were perceived to carry transformative power and have a unique ability to impart important knowledge to communities. Interviewees reported poverty as a serious challenge in rural communities. Therefore, imparting the community with knowledge on ICT constituted a means of bringing innovation. This finding corresponds to **SRQ₅** and **SRQ₆** by indicating poverty as a key community problem and elaborating how ICT assists in addressing the need to alleviate poverty. These findings indicate that the

intended recipient accepts and perceives ICT4D as a technique with the potential to make a positive change in alleviating poverty (Proctor et al., 2023). Consequently, as executive management of ICT4D initiatives work together to alleviate poverty in their communities, it is deemed important to *engage all community members* in ICT education. This serves as a means of reaching out and making a difference in individuals' lives, corresponding to **SRQ₆** as well as **SRQ₉**, serving the initial purpose of ICT4D.

The findings further revealed that the executive management of ICT4D initiatives is focused on streamlining operational processes targeting communities to align ongoing costs related to constant configuring and maintenance. This corresponds to **SRQ₇** on cost implications of ICT4D. Specific points from the executive management revealed that despite members of the community demanding to be trained, it emerged that with the provision of training, users can use smart devices/computers extensively without any supervision. This finding corresponds to the level of skills of users (**SRQ₈**), the extent of users keeping coming back to the ICT4D projects (**SRQ₁₁**), and the reason/s for doing so (**SRQ₁₂**). This is in line with the arguments for sustainable ICT4D by Khadjesari et al. (2020) and Proctor et al. (2023). As the key focus was on having a longer-lasting implementation for the ICT4D initiatives, it is noted that the day-to-day operations of these initiatives require ground rules for acceptable behaviour that are clearly transparent to all role players. This reflection aligns with **SRQ₁** and **SRQ₂** which emphasise a clear mission and common understanding.

The executive management needs to continually "*specify appropriate requirements*" to provide solution outcomes where needed. For example, the proposed solutions ought to be tested and accepted to determine if they meet all the requirements before recommendations are finalised. In terms of credibility and peer review, it is crucial to take effective measures to build up information resources that encourage learning. In doing so, the ICT4D initiative is capable of providing the community with convenient access to information and services. Another finding indicates the importance of ICT4D executives to continually *strive to make an initiative accessible* to all users to achieve the development outcomes. Consequently, for sustainability of ICT4D, it is essential that ICT4D operations are driven by formal procedures. This finding corresponds to **SRQ₁** and **SRQ₂** on having a clear mission and vision, coupled with a clear common understanding. It also corresponds to **SRQ₃** and **SRQ₄** on having the community members "trying out" ICT services as well as reflecting the benefits that the community can derive from the ICT initiatives. These findings resonate with Dearden and Kleine's (2021) argument for the need for collective co-facilitated standards by stakeholders for sustainable ICT4D initiatives.

The second set of participants were private sponsors (n=3), who indicated their willingness to donate to and participate in ICT4D initiatives. This reflects a response related to sub-theme **SRQ₇** on cost implications, both financial and non-financial, towards ICT4D. The focus of private sponsors is, in particular, on social responsibility by enabling access opportunities that enhance the lives of the community members. These individuals are in most cases volunteering their time to the projects and communities as a part of improving their image as well as their skills in life. This narrative supports Khadjesari et al.'s (2020) attestation of the need for cost bearers, both financial and non-financial, for ICT4D initiatives to continue. The lack of such support results in the fizzle, stagnation or death of such initiatives. The high cost of digital technologies and their maintenance limits access to and use of ICT4D initiatives as a resource for addressing community problems (Frings-Hessami & Sarker, 2022).

Two (02) institutional sponsors out of the three that were interviewed (n=3) in ICT4D demonstrate that individuals in the community ought to have the appropriate skills, and that will only be possible through better network connectivity (**SRQ₁₀** and **SRQ₁₁**). By having these skills and better connectivity, they will be able to participate in the digital era and contribute to the alleviation of the high rate of poverty (**SRQ₄**). However, there is a notable competition between community centres and Internet café's offering Internet

services, which needs to be looked at in the long run. In the discussions with the institutional sponsors concerns about funding were raised. It was pointed out that although the community might still be in need of continuance of the ICT4D, the sponsors are not committed to funding the initiatives continuously (**SRQ₁₂**), since they are not making/gaining money. This finding is supported by Proctor et al.'s (2023) definition of sustainability as the way in which a process can exist continually. Thus, in determining the necessity of donations for financial support, it became evident that institutional sponsors are driven by a passion for serving and giving back to support the initiative (**SRQ₇**). Addressing different levels of knowledge in development may involve sponsoring users to educate those unfamiliar with computer use. One institutional sponsor (n=1) noted that ICT4D initiatives are deemed important to institutional sponsors as it provides a platform to perform corporate social responsibility (CSR) to improve their corporate image in the communities they serve. Institutional sponsors are prepared to volunteer their services in the form of money and/or skills to empower the community (**SRQ₇**). The theme of ICT4D needing to be "accessible to interact with the outside world" emerged in the interviews as well. Stakeholders emphasised that users' access is the basic requirement for effective collaboration and continued use of ICT4D initiatives (**SRQ₁₁**).

In discussions with supporting staff (n=7), the concept of ICT bringing the world closer to individuals was perceived to imply that the community has been given the means to participate in the information society. This finding not only reflects the common understanding of the role of ICT in development (**SRQ₂**) but also reflects the ability to serve the initial purpose of the ICT4D initiative (**SRQ₉**) and its need to establish routines (**SRQ₁₂**). It was noted that the supporting staff is allowing members of the community to participate in the information society, and the effective use of ICT tools leads to a reduction of the administrative burden that overwhelms society (**SRQ₆** and **SRQ₉**). This means "*convenient access to information and services*" for the realisation of development outcomes (**SRQ₉**). Among the factors for the ongoing implementation of the ICT4D initiative is its continued relevance in serving its initial purpose of fostering development (Nyoni & Bvuma, 2022).

The focus of users (n=6) was on the significant opportunities that ICT4D offers in bringing individuals together (**SRQ₄** and **SRQ₉**). Bringing individuals together is possible when creation of solutions that are easier to use for everyone (**SRQ₆**) is made core to the ICT4D projects and the knowledge for training on how operate computer functionalities. Consequently, this finding underscores the critical importance of ensuring that ICT4D continues to serve its original purpose while effectively addressing community problems or needs (Nyoni & Bvuma, 2022; Frings-Hessami & Sarker, 2022).

However, users of ICT4D initiatives are not interested in the costs involved in the daily operation of the project, but rather in an easy and accessible ICT4D projects. This finding corresponds to sub-theme **SRQ₇**, that highlights the cost implications of ICT4D initiatives. In some ICT4D initiatives the computer service was offered to the community members for free, while others allowed a minimal fee to cover the cost of keeping the community centre laboratories clean (**SRQ₇**). Nyoni & Bvuma (2022) established that costs are a critical factor in the adoption and continual implementation of ICT4D initiatives. Given this, the sustainability of the reviewed projects is thus questionable.

In terms of the normative perspective, community members seem to lose interest easily on the ICT4D projects. This is mainly because their understanding of ICT4D initiatives is that they are for acquiring a certificate, similar to college, rather than acquiring basic development skills (**SRQ₂**). Some of the individuals who initially used a centre to access employment opportunities became discouraged after failing to secure employment (**SRQ₆**, **SRQ₁₀**, and **SRQ₁₁**). It is thus crucial to *include more interactive programmes* for the community to regularly participate in (e.g., hosting idea-sharing sessions and finding solutions) (**SRQ₁₂**). This is supported by Dearden & Kleine (2021) who stress the

importance of establishing commonly understood standards and routines that facilitate utilisation, where each individual sees value and benefits in using ICT4D initiatives. Once users have identified the available opportunities to improve the daily operational process of community centres, the information should be shared on the central portal for community reference. However, the overall rate of skill transfer is observed to be very low since the running of operations at the centres is not documented which is reflected in sub-theme **SRQ₁₂**. For example, the necessity of involving users in an ICT4D initiative's process design, is reflected in the theme "*more involved users in the process of innovation*" which speaks to committed and innovative processes that lead to smooth operations. This suggestion corresponds to the need for a clear mission and vision (**SRQ₁**) as well as an established routine that encourages continual use of ICT4D initiatives (**SRQ₁**). Best practices need to be made an integral part of the ICT4D initiative. This would mean that the ICT4D initiative is grounded in operation standards, through integrating work instructions into policies and procedures.

Proposed Improved Guidelines for IOs for Sustainable ICT4D

The analysis of the discussions from the face-to-face interviews to examine contribution beyond the data obtained provided an overarching reflection on the research, theories, findings, and implications of the study. The study's main aim was to investigate the ability of the IOs framework to contribute to the theory and practice of ICT4D community initiatives. Data pertaining to the suggestions for improvement of IOs was collected from 27 participants through face-to-face interviews. A significant challenge to ICT4D initiatives is that they tend to fizzle out after a few years (Phahlamohlaka et al., 2010), and most research has, therefore, focused on overcoming this challenge by addressing issues relating to the sustainability of ICT4D (Pade-Khene and Lannon, 2017). These suggestions have focused on encouraging flexible, iterative, incremental processes that incorporate participatory approaches extending beyond mere consultations (Toyama & Heresy, 2015; Ika & Hodgson, 2014), fostering "learning to be sustainable" through reflections on organisational learning, knowledge and project management (Pade-Khene & Lannon, 2017). This study reflects on the application and revises the IOs framework for the sustainability of ICT4D.

Proposed IOs Framework for ICT4D

Figure 2 illustrates the theoretical framework that can serve as the foundation for a new implementation framework for sustainable ICT4D projects. The framework can be used in designing policies and fostering societal change to improve community implementation outcomes. The framework proposes that training and awareness building to be made core to the three phases of ICT4D project implementation, that is exploration, preparation and implementation of ICT4D initiatives. Training and awareness building provides opportunities for all stakeholders including sponsors, users, ICT4D officers and the overall community to comprehend the ensuing benefits of the ICT4D projects, consequently implementation achieves IOs for sustainable ICT4D.

The framework proposed training and awareness to be implemented at all the three phases of project execution, however in each phase different IOs should be emphasized. In the project exploration phase, the framework suggests that implementors needs to focus on determining the feasibility and appropriateness of the ICT4D innovation to the target group. At this stage project implementors needs to determine the relevance (Appropriateness) of the project and analyse its achievability (Feasibility) within the context of the targeted recipient community (Osei-Bryson & Bailey, 2019). During the preparation phase, the framework suggests that implementors needs to focus on ensuring the acceptability of the ICT4D initiatives and develop strategies for its adoption within the targeted communities. This may involve setting criteria for acceptable service delivery, processes and strategies that encourages minimum service usage standards (Gow et al., 2018). Equally, the

framework proposes emphasis on fidelity, penetration and implementation costing dimensions during the third phase, the implementation phase. The framework suggests implementors to reflect realistic project budgets after thorough analysis of the project costing against community resource base. Project costing should include not only the implementation costs but also reflect the service costing that shall ensure coverage of ICT4D maintenance and service delivery costs. Likewise, the framework suggests clarity on project roll-out plans and accessibility, training and capacity building at all levels to ensure penetration and utility of ICT4D projects. On fidelity the framework suggests setting clear project expectations and consideration of defining specific and clear role and responsibilities of different players in ICT4D projects. Clarity should be made on the rules of engagement, commitments, restrictions and accountability among the different players in ICT4D initiatives.

Overall, the framework proposes a citizen-centric approach, where participatory ideation, preparation and execution of ICT4D projects (Li et al., 2017; Thomas & Li, 2015). It suggests that critical to ICT4D success and sustainability all stakeholders, with users or beneficiaries at the center, must be involved in all the stages. A citizen-centric approach ensures that ICT4D interventions make substantial and sustainable impact on communities (Heeks, 2017). The citizen-centric approach is useful in bridging the gap between the ICT4D initiatives' design and the context of its use (Heeks, 2017; Li et al., 2020). Consequently, by training, making aware and involving stakeholders in the ICT4D initiatives idea exploration, preparation and execution, IOs that bring about project sustainability can be achieved.

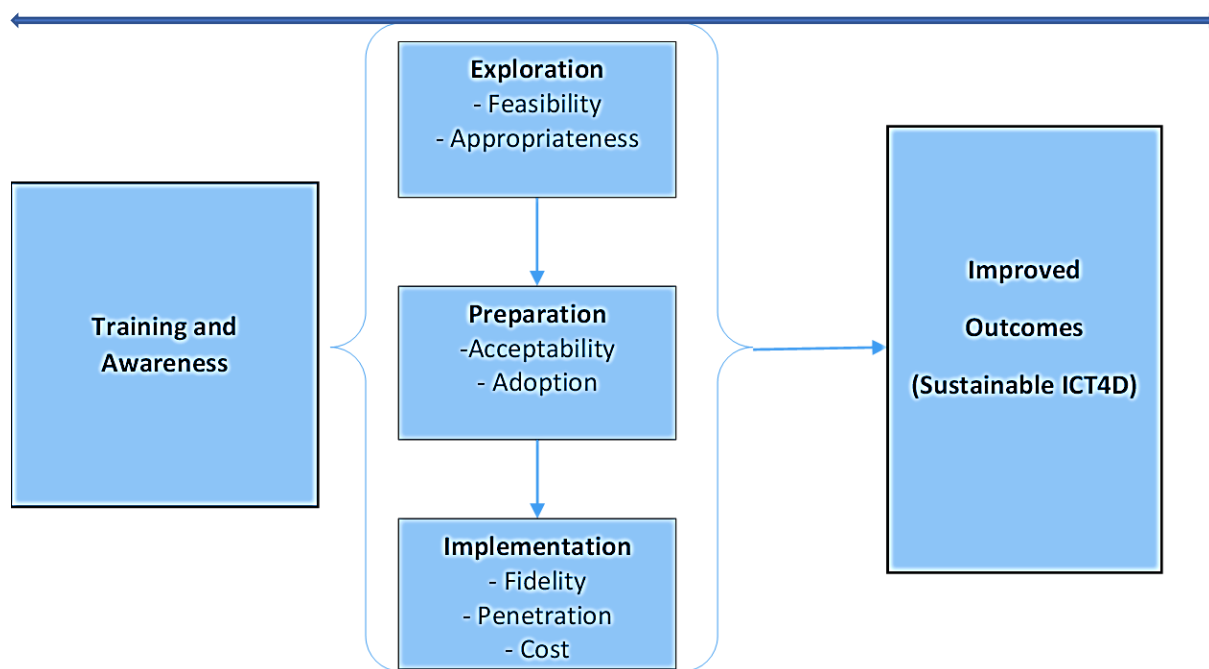


Figure 2: Proposed Implementation framework for ICT4D projects

Source: Researchers' Construction (2024)

The IOs dimensions proposed on the framework in Figure 2 that can be adapted through engagement between stakeholders in ICT4D initiatives are as described below:

- (1) *Acceptability and community development* - Typical failure cases of ICT4D initiatives are from challenges that arise when users cannot find employment after attending computer training courses. These users felt discouraged and, in turn, tended to discourage others from attending these courses because they viewed acquiring

computer skills as a waste of time. However, the findings stress the crucial need to align the vision of the initiative to accommodate new needs. It was noted that community members did not understand the vision of ICT4D initiatives, and efforts will have to be targeted towards ensuring all stakeholders have a common understanding as far as the aims of ICT4D initiatives are concerned.

Consequently, to ensure the sustainability of ICT4D projects, a better understanding of the behaviour of intended users is critical (Afful-Dadzie, Larney & Clotney, 2022). The element to consider for development is cultural links, thus making the theoretical link visible, such as fostering social fairness among nations. Contributing towards this crucial aspect of ICT4D is the increasing flexibility of IT to connect individuals around the world and create a single global society. The framework identifies the exploration and establishment of cultural linkages as an important facet of sustainable ICT4D projects.

- (2) *Adoption of broader engagement among stakeholders* - All stakeholders share a common belief that providing users access to e-services and computer literacy training has a positive impact. Access to e-services enables the adoption of social networking and online training materials on ICT4D initiatives. ICT4D stakeholders are diverse, including agencies, individuals, or groups with direct or indirect interests in ICT4D projects or their evaluation (Renken & Heeks, 2013; Heeks 2017). The primary focus of the broader stakeholder engagement should be on transferring the appropriate skills to the staff taking over the project. In doing so, when new opportunities arise, it is within these new ICT4D initiatives that the skilled staff can derive improved outcomes. This approach provides a fresh way of documenting the skill-transfer and utilisation process. Through training and awareness programmes, ICT4D implementers must ensure visions are aligned with broad community needs and that common understanding prevails across all stakeholders (Thomas, et al. 2022).
- (3) *Emulate perceptions for appropriateness* - Some stakeholders were more concerned with network connectivity since they had experienced better connections in other areas. The issue of connectivity impacts members in rural communities and is one which needs to be addressed. Users were also no longer recognising the benefit of using the community centre due to the slowness of the computers. The main idea of ICT4D initiatives should be to facilitate community members to use and share their ideas through the appropriate suggestion channels that are acceptable to the community. Conclusively, ICT4D initiatives must ensure accessible and reliable infrastructures that facilitates exchange of idea. Continuous innovation is motivated by studying and improving the IT infrastructure supporting ICT4D initiatives. The foundation of ICT4D initiatives should be operationalised in the form of a specific function that stakeholders carry out to support the infrastructure strategy. Conditions will improve through the execution of the necessary activities.
- (4) *Cost and adaptation of offerings* - Longer lasting implementation of ICT4D necessitates financial support to maintain the initiative, takes care of individuals, gives back to the community, and ensures the sponsors realise that the initiatives are meaningful. While the study contends that enabling participants is the primary objective to achieve financial sustainability, paying participants is, however, against ICT4D project principles (Sanner & Sæbø, 2014). Governments must be persuaded to "buy in" by assisting with the maintenance of equipment, providing incentives to volunteers, and installing a backup (like solar energy) to help when the electricity supply is unexpectedly interrupted (Nyoni & Bvuma, 2022). Consequently, various ways must be explored to involve government partnerships to support sustainable ICT4D initiatives.

- (5) *Feasibility and interrelation* - All users in the ICT4D initiatives that were interviewed indicated to some degree, that they recognised the progress in their ability to use computers and smart devices as a result of training at a community. Equally they demonstrated their belief that information concerning community members can be stored in a central repository and be accessible to the community. As users, they appreciated the benefits of being skilled in ICT because that could help to shape their future. They, for example, pointed out that they can now develop documentation for easy application and usage.
- (6) *Engagement with fidelity* - Executive management opined that ICT4D initiatives assisted in reducing the rate of poverty (by providing basic computer skills). For example, they pointed to many individuals being capable of working in local businesses and towns using computers. Furthermore, institutional sponsors recognised that the initiatives were being rolled out to members in the most accessible and controlled ways. While ICT4D initiatives actively sought progression, the improvements effected in the community were predictable. Community members needing change is natural. When the needs of community members change, the operational procedures of the initiatives can be revised and workshops (such as stock market trading classes) can be introduced for the youth.
- (7) *Penetration and continuous improvement* - A key focus for users in the communities was on daily use of the computer laboratories but at different times and during periods when the laboratories were operational. Information and technology have also been referred to as modern magic that allows flexibility. For example, they may be linked to the implementation of a central hub as an information or focal point.
- (8) *Level of improvement on sustainability* - Using computers or smart devices makes the lives of community members more manageable. For example, community members can set up reminders and to-do lists. While it can be a good idea to enable individuals at all project levels to improve the processes they are involved in, doing so tends to be more effective when using the properly approved channel/s. As the community's needs change, project leaders need to recognise the necessity of re-strategising the visions of the initiatives to adapt to these needs.

It is apparent that most researchers use ICT4D initiatives as a testing ground for their research studies with the view of acquiring data and thereafter abandoning the initiative. IS researchers have a responsibility to critically discuss and contribute to a better worldview of ICT4D initiatives as social researchers.

LIMITATIONS

The IOs framework, while it has been widely applied in health sector research, is ill-prepared to explain how to achieve implementation success in IS and ICT4D fields (Rudd, Davis, & Beidas, 2020; Proctor, 2023). ICT4D project communities are relatively young comparable to other projects such as public health which is matured and often exhibits well-funded projects. ICT4D initiatives are typically community-funded and, therefore, receive minimal funding (Worldometer, 2023) consequently sustainability is a critical challenge. Nonetheless, the goals of ICT4D and well-funded projects such as public health are relatively similar and are directed towards community development. Consequently, this study offers a new way to consider ICT4D initiatives and their relative importance to national and global development.

CONCLUSION

This study explored the tendency of ICT4D community initiatives to fizzle out and proposes a IOs framework. It contributes to the body of knowledge on ICT4D sustainability. In examining why ICT4D fizzles out, the study identified several issues that align well with IOs

components. The study thus recommends applying components of IOs through training and awareness building in the subsequent stages of exploration, preparation and implementation of ICT4D projects. In addition, the proposed framework, which emanates from this study, responds to issues that have been raised in the literature. For instance, Heeks (2017) makes a cogent argument recognising the diverse nature of ICT4D stakeholders. Similarly, the framework highlights the importance of a shared understanding among stakeholders regarding the needs and vision for ensuring the sustainability of ICT4D projects (Thomas, et al. 2022). Importantly, the framework proposed by this study can serve as a guide for designing policies and facilitating societal change to improve community implementation outcomes for ICT4D projects.

The study established that a computer's unique ability to impart skills and knowledge to the community, is the core of the transformative power of ICT4D projects. Moreover, the study established the importance of a human-centric approach in implementing sustainable ICT4D. Clarity and common understanding of a project mission by all stakeholders and collective co-facilitated transparent standards are critical enablers of sustainability. Consequently, for sustainability, the study recommends a human-centered design approach for ICT4D projects that includes a comprehensive stakeholder profile in the implementation teams. Furthermore, implementers must not only ensure the initiatives are accessible to all users and continue to serve their original purpose but also incorporate more interactive programmes that attract regular community participation.

Acknowledgments: The authors extend their gratitude to the University of Johannesburg for their material and financial support in conducting this research. Equally, we thank the contributions of various experts including the language editor for the language editorial work done.

Declaration of interest statement: I confirm that all authors of the manuscript have no conflict of interests to declare. Equally, I declare that this article is not under consideration for publication elsewhere. On behalf of all Co-Authors, I shall bear full responsibility for the submission.

Disclosure statement: The authors report there are no competing interests (both financial and non-financial) to declare.

Contribution of the co-authors

- **Faith Chauke:** Developed the article idea, collected the data and contributed in writing the article
- **Hossana Twinomurinzi:** Provided supervisor role; read and commented the paper
- **Maria Lauda Joel Goyayi:** Conducted the analysis and contributed in writing the article to finalization

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