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## EVALUATION OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTs) TOOLS CONTRIBUTING TO RURAL DEVELOPMENT

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### ABSTRACT

The move towards embracing the fourth industrial revolution by the South African government to explore more employment opportunities brings questions on how rural communities will be supported to join this digital revolution. However, measurement tools for ICTs in rural areas could be more varied. Furthermore, existing measurement tools are designed for organisations, thus excluding the individuals who are at the receiving end of development, thus extending the digital divide. This paper explores how rural development can be measured, focusing on individuals and communities. A qualitative semi-integrative review was conducted, and data was analysed using content analysis. Results revealed that specific measurement tools for measuring the impact of ICTs in rural development are limited, and only a few frameworks could be identified, suggesting a need for more inclusive approaches. Available frameworks are project-focused and do not allow self-evaluations by community users experiencing other ICTs. Additionally, it was revealed that while a focused measurement tool is required, CA and including relevant livelihood assets can be valuable for evaluating ICT impact. A framework was proposed that could be feasible for South African rural communities. The implication for practice is that infrastructural challenges are at the heart of the digital divide; therefore, policymakers and development practitioners should push for policies promoting digital inclusion and readiness in rural areas.

### KEY WORDS

Measurement tools, rural development, information and communication technologies, frameworks, the fourth industrial revolution, rural communities.

Access and availability of information and communication technologies (ICTs) in rural communities can offer advantages and disadvantages for development. ICTs can foster development in rural communities with limited infrastructure (Alao et al., 2021; Nimodiya & Ajankar, 2022). Some benefits include communication, social connections, internet use to search for economic opportunities, education, and health (Rumata & Sakinah, 2020; Apriani, 2022). They are also effective in governance and business operations (Apriani et al., 2022; Osah & Pade-Khene, 2020; Rabbi et al., 2020). However, ICTs require significant investment in infrastructure and hardware (Silva et al., 2016), which can also broaden digital exclusion. Even with the advent of telecentres, the digital divide was wide due to the cost and logistics of reaching the nearest one (Alao et al., 2017; Kapondera & Hart, 2016). However, the mobile phone has challenged access issues as most people in rural communities can now access it compared to other inaccessible digital devices (ITU, 2021). Communities that struggle to access ICTs are therefore given an opportunity for access by this device.

South Africa has committed to embracing the fourth industrial revolution (4IR) to tackle some of its socio-economic problems (RSA, 2020). Its adoption in developing countries is related to issues of poor or no infrastructure (Islam et al., 2018), thus extending to challenges experienced during the era of telecentres. Researchers argue that a lack of infrastructure and technology readiness, including a struggling economy, is a hurdle to everyone



experiencing 4IR benefits (Alexander, 2022; Olaitin et al., 2023). A South African study has already confirmed gaps in knowledge regarding 4IR where those with low socio-economic opportunities did not understand the opportunities of 4IR and how to harness it to improve their current conditions where needed (Mtoty et al., 2021). These challenges further threaten broader access and usage of mobile phones, which has resolved some of the device access challenges.

According to the International Labour Organisation (ILO, 2023), rural areas still need their economic potential to be unleashed. However, the noted infrastructural challenges limit the expansion of the rural economy (Matsenjwa et al., 2019). Much as the adoption of ICTs and their related services is still a challenge in rural areas, some studies show that rural communities who see the value of these services will adopt the technology. According to Rumata and Sakinah (2020), farmers who could get information that supported their farming activities adopted ICT services beneficial for their business. Equally, young people experiencing benefits may encourage each other to join social platforms, thus expanding their social networks.

Therefore, to gain a comprehensive understanding on the effectiveness of ICTs in their users' lives it is imperative to measure their impact. Measurement of ICTs in rural communities is important as it can help monitor the progress in the development of such areas. It can also be used in building and analysing models that monitor sustainable development goals (Yingqin et al., 2018). The availability of measurement tools not only equips users and service providers with insights into areas requiring improvement but also highlights problems in need of attention. However, these tools, as correctly pointed out by Grigorovici et al. (2002), should address vital issues that need to be addressed in digital divide policy reports. These authors further argue that electronic metrics (e-metrics) can be good for evaluating daily uses of technology.

However, more research needs to be conducted on how ICTs' impact on development in rural areas can be measured. Most studies focus on ICT for development (ICT4D), which tends to disseminate results on projects conducted by organisations (Osah et al., 2014; Pade-Khene & Sewry, 2012; Yim et al., 2021). Therefore, user-centric studies are scanty, especially in the South African context. This paper stems from the findings of a doctoral dissertation on a matrix for assessing and evaluating the impact of mobile phones in the development of rural areas (Modiba, 2015). It builds on the study by conceptualising a framework to assess further how user-centric ICT assessments can influence responses to ICT-related challenges. Thus, this study aims to identify, review, and recommend a framework for measuring the impact of ICTs in facilitating rural development in South Africa. Therefore, the research question guiding this paper is: what are the measurement tools for ICTs that contribute to rural development?

This paper's contribution is threefold; firstly, since there is an inclination towards 4IR, the government and policymakers need to understand how to support this revolution and plan the assessment of related projects. Secondly, implementing ICTs should not be done in a vacuum, but the government should be aware of existing challenges and opportunities in such investments. Lastly, this paper builds on the body of knowledge regarding development frameworks, which can spark debates and formulation of new frameworks suitable for rural contexts and for policymakers to prioritise developing and implementing programmes to fast-track rural digital inclusion.

This paper has six sections; section one introduces the study and its purpose. Section two presents the methodology, and section three provides the theoretical framework adopted for the study and reviews the literature. Section four presents and discusses the findings. The conceptual Rural ICT evaluation framework (RICTUF) is presented in section five, and the study is concluded.

## **MATERIALS AND METHODS OF RESEARCH**

The systematic review identified papers that focused on ICT measurement aspects relating to rural development in South Africa. The study used two forms of systematic



literature review: a mapping and a semi-integrative systematic review. Mapping studies are used when there is little evidence from empirical studies on a topic researched (Kitchenham et al., 2009). They are deemed useful when a study intends to identify gaps that future studies need to address. However, more than mapping studies may be required to influence new theories or models.

On the contrary, semi-integrative reviews can be used for such purposes. According to Snyder (2019), these types of studies can be considered when a research question is not interested in addressing all the topics that have been published but rather needs to explore perspectives to create new theoretical models. Combining the two was useful as it allowed snowballing to identify relevant papers. Scopus, Science Direct and Google Scholar databases were used to search for articles using the search strings: *“measurement tools,”* or *“assessment tools,”* *“ICTs,”* and *“rural development”* and *South Africa*. A corpus of 7, 8 and 9 papers from Scopus, Google Scholar and Science Direct, respectively, was screened. A few relevant papers were identified, and snowballing was used for backward and forward searches (Boell, 2014) to search for more papers not provided by the databases. Digital tools such as Elicit, Research Rabbit and Litmaps were also consulted to determine if other papers were cited by the reviewed ones that might be relevant to this study. Excluded studies focused on contexts other than South Africa, studies conducted in urban areas, and studies not addressing the measurement aspect of ICTs. Five primary papers were then used for the review. Data was analysed using content analysis (Snyder, 2019).

## THEORETICAL FRAMEWORK

A capability approach was adopted to inform the design of the proposed conceptual framework. The capability approach (CA) is an evaluative framework focusing on people's capabilities and freedoms to pursue a fulfilling life through their choices (Kimhur, 2020; Sen, 2005). The framework is adaptable to various disciplines as it has been used in social and technical studies to examine the adoption and usage of ICTs (Ashraf, 2017; Kimhur, 2020). However, the CA has been criticised for not addressing the social and contextual issues that often anchor ICT usage (Ashraf et al., 2017). Nevertheless, the human development approach of the CA in measuring ICTs helps in neutralising the traditional measurement approaches that are only interested in physical indicators (Grigorovici et al., 2002).

Sen (2005) highlights the issue of capability as another barrier to individuals' freedom to use ICTs effectively. Therefore, having access to ICTs guarantees their utilisation only if individuals have the necessary capabilities. ICTs can build or enhance capabilities such as communication through devices like mobile phones and Internet surfing for educational purposes (Yim & Gomez, 2018). This usage underscores the importance of ICTs in development in rural communities, as the lack of local content limits the Internet's potential. Therefore, some research emphasises the need for ICT users, especially those in rural areas, to become content producers to fully benefit from ICTs (Karunakaran & Selvabaskar, 2022).

Various capabilities are required in using ICTs, including literacy and financial resources, which are not distributed equally (Karunakaran & Selvabaskar, 2022). Consequently age, education, gender, income, and geographic location can significantly determine people's ability to choose and use ICT devices and services (Karunakaran & Selvabaskar, 2022; Horn & Gifford, 2022). Thus, assessing the status of ICTs in communities requires considering access, functionalities, and impact. It is insufficient to determine whether people can access and use ICTs; understanding the purpose, reasons, and outcomes individuals seek to achieve through ICT usage is crucial. Therefore, access to ICTs goes beyond device availability and requires knowledge and skills to enable certain capabilities.

According to this approach, people's freedom to use ICTs is based on their capabilities and access to appropriate resources like skills (human capital), finances (financial capital), infrastructure and devices (physical capital), and social networks (social capital) (Modiba, 2015). Capabilities also involve knowledge and experience regarding which ICTs to use and



how to use them. This usage is translated to functionality since users will have a purpose and reasons behind using ICTs (Yim & Gomez, 2018). Therefore, when individuals achieve the necessary capabilities, they can effectively utilise ICTs, indicating good functionality. High functionality can only be achieved if it aligns with individual values (Wilson-Strydom, 2011).

## LITERATURE REVIEW

The prolific use of ICT and the move towards 4IR means that technology has become part of everyone's lives whether they use it or not. Though full of opportunities, the digitisation movement can entrench the digital divide if people do not have access to devices and good telecommunications infrastructure (Nothias, 2020). The cost aspect is evident in zero-rated platforms such as Facebook to keep global South users connected to their services (Nothias, 2020). Such movements have also been criticised for data extraction and technological testing grounds by stakeholders (Madianou, 2021; Nothias, 2020). Nothias (2020) further points out that the data extracted through the free basic applications could be used to inform the design and development of new products that benefit technological companies. Thus, these products are not free, and it is worth wondering if the users know they are trading their data for 'free' applications.

Table 1 – Reviewed studies

Measurement tool	Device	Theoretical framework	Methodology	Field of Study	Findings	Author(s)
A conceptual framework for analysing the success of digital inclusion projects	Mobile phone	None	Systematic literature review	Education	Digital inclusion projects are essential in improving digital inclusion in rural areas. The project in Siyabuswa was community driven. Evaluation of projects should be done regularly. Scalability is another way of measuring impact, as positive effects will lead to scaling projects to other areas.	Smith (2015)
Rural ICT Comprehensive Framework (RICT-CEF)	Project-determined	Rolling approach	Mixed methods	Information System	The evaluations must be comprehensive, covering the impact and effectiveness of such tools. A baseline study was conducted to understand the socio-economic status of the community. Evaluations should be iterative and indicate the methodologies used. They recommend an assessment of social and economic viability, sustainability, and replicability.	Pade-Khene & Sewry (2012)
Rural ICT4D Project Process Assessment Framework (RICTP-PAF)	Project-determined	None	Literature study	Information Systems	Process assessments are integral in understanding how the rural communities' developmental goals are being met. Critical themes for rural ICT4D projects proposed by the framework include service utilisation, organisational function, and external project factors. Process assessments can improve project implementations, especially if used as part of a comprehensive evaluation in ICT4D. Process assessments do not undermine the project life cycle but support it as they capture successes and failures as the project progresses.	Osah et al. (2014)
Outcome and impact assessment framework for rural ICT4D	Project-determined	Theorising process	Literature study	Information Systems	Projects must emphasise learning over time and effecting a "comprehensive" evaluation. Assessment should be conducted at every project lifecycle stage to attain a comprehensive evaluation. Outcomes and impacts should reflect the achieved desired developmental needs. The sustainability of outcomes and impacts should also be reflected when evaluating projects.	Mthoko & Padekhene (2017)
Impact measurement matrix	Mobile phone	Capability approach	Mixed methods	Development Studies	Ten frameworks and approaches were reviewed, and there were no suitable assessment tools for rural areas. A matrix was proposed, informed by the capability approach, where users' skills and agency can be used to assess how they use mobile phone applications. The matrix emphasises a user-centric approach to evaluation where users can continuously record their usage and skills gained. The effectiveness of the matrix was tested with a small sample.	Modiba (2015)



However, there are several challenges for rural communities to be included in the digital economy. Part of the problems is related to age, education, gender, and geographical location (Lembani et al., 2019). These factors and resource distribution can significantly influence ICT use outcomes (Umukoro et al., 2021). These limitations mean inadequate resources will result in low adoption and usage of ICTs. Therefore, a plethora of challenges with ICTs for some social groups mean taking steps to reduce the digital divide, particularly for rural communities, has become even more important. Proper planning and delivery of ICTs can efficiently improve digital inclusion to avoid limiting factors such as gender, education, geographical location, and age (Alamelu 2013). They can also be used to develop the digital economy and contribute to the rural economy.

*Rural development.* The need to develop rural areas is a contentious issue as it gives the impression that these areas are not good enough. Some rural areas face geographical and socio-economic challenges because their infrastructural needs are not prioritised like in urban areas. There is a gap in the provision of facilities, services and economic opportunities between rural and urban areas (Chand & Raj, 2020). This resource inequality is especially true for emerging economies like South Africa, where colonisation and apartheid policies influenced the geographical positioning of these areas where development was not prioritised for decades (Kepe, 2016). The results have been rural communities that lack basic infrastructure such as roads, schools, and health care facilities. Such limitations have also meant that the rural economy was not prioritised to support the rural population. Pathak and Deshkar (2023) argue that rural areas are characterised by poverty, geographic isolation, incompetent administration, poor planning, and livelihoods dependent on natural resources. The dependence on natural resources thus limits other services that are also instrumental in keeping local economies attractive.

*ICTs and rural development.* Most rural areas, particularly those in the global South, are developing at a slow pace. Their infrastructural development is at a different level than their urban counterparts. For instance, the International Telecommunication Union's (ITU) report (2021) indicates that in Africa, half of the urban population has access to the Internet in contrast to rural areas, with only 15% of the population having access. However, in recent years, the delayed development impedes these areas from growing their local economies. ICTs have been cited to be instrumental in rural development by promoting social and economic development (Bala, 2021). In areas like India, ICTs have helped farmers expand their market sizes, enabled governments to manage social welfare payments, upskill youths, and exposed rural schools to smart schools and digital content (Bala, 2021; Ghosh et al., 2020).

Similarly, benefits related to the agricultural sector were reported by a study conducted in Punjab – Pakistan and Nigeria (Anodzie et al. 2022; Butt et al. 2017). However, the listed benefits that some communities are reported to have experienced are yet to be evaluated. Bala (2021) further contends that assessing people's needs is crucial before giving them products and services.

Ample opportunities and benefits linked to ICTs are challenging in areas with high unemployment rates, poor infrastructure, and low literacy levels (Chand & Raj, 2020; Gupta & Gautam, 2017). Access to ICTs is associated with costs on the device and services side. As Lange et al. (2022) noted, ICT services depend on devices and can be energy-intensive, thus creating more problems. Additionally, users need to have money to purchase data or Wi-Fi to access the Internet, and where incomes are low due to unemployment, this becomes a challenge. Similarly, good network connectivity and electricity are required for stable Internet access (Gupta & Gautam, 2017); thus, more infrastructure is needed to digitally include those in rural areas with the financial means to access the Internet and its related services. These infrastructure challenges are especially true for areas like South Africa, where access to electricity is challenging due to the national grid's inability to provide everyone with power. For rural areas, the energy crisis has been an issue for decades, and now the electricity supply is unstable (Eberhard, 1986; Motjoadi et al., 2020).

In investigating the development progress in rural areas by identifying barriers limiting progress, Ashraf et al.'s (2017) study highlights social constraints that must be addressed for



development to occur. They identified social challenges related to cultural and gender norms as potential contributors to delayed development; thus, rural communities can be set on a developmental path when addressed. The community's e-readiness is also instrumental, and the government can facilitate this by ensuring that necessary infrastructure is provided (Kotzinos et al., 2021).

## **RESULTS AND DISCUSSION**

In investigating measurement tools for assessing ICT impact in rural development, this systematic study identified five studies that conceptualised frameworks intended to measure ICT's developmental impact in South Africa's rural areas (refer to Table 1). The identified studies acknowledged deficiencies in the measurement aspects related to undefined baseline studies and digital exclusion aspects that affect the quality of projects responding to community needs (Pade-Khene & Sewry, 2012). However, four of the studies focused on ICT4D projects, thus leaving a gap for continuing to capture ICT needs for rural communities that users can collect given that the mobile phone is the widely used device, which means the impact of ICT services accessed through this device cannot be captured. The disciplinary focus of the studies influenced the ICT4D as they were from information systems.

Smith (2015) asserts the importance of sustainability, value, and scalability in digital inclusion projects (DIP). The Siyabuswa Educational Improvement and Development Trust's (SEIDET) value is linked to educational development because it provides maths and science support to secondary school learners and those enrolled at institutions of higher learning. The evaluation of the DIP projects did show the scalability and sustainability of the projects; the project was replicated in three other rural communities near Siyabuswa. The sustainability could have been maintained by the community's involvement in the project, as they were key stakeholders and were involved from the beginning. The value assessment is evident through participating graduates who were later employed within the ICT fields or started businesses through the skills learned.

The framework by Ohsa and Pade-Khene (2014) provides the basis for the implementation of projects, particularly at a process assessment level. Their framework is informed by what is viewed as 'rural-sensitive' themes, which were drawn from multiple studies not all developed for a developing country's context. It also extends Pade-Khene & Sewry's (2012) rural ICT comprehensive evaluation framework, which emphasising the need for projects to conduct comprehensive evaluations. The process assessment framework further emphasises the importance of assessing implementation using their core themes (service utilisation, organisational functions, and external project factors) to ensure outcomes are met. The shortcoming of this framework is that although measurement might be universal, some indicators need to focus on a local context for relevant and effective measurement of projects (Pade-Khene & Sewry, 2012). Moreover, the users impacted by these project outcomes are not actively involved, which threatens the sustainability of such a project. While the service utilisation is designed to address users' needs, addressing this at a project level without involving the beneficiary can be ineffective since their needs are assumed rather than communicated.

Mthoko and Pade-Khene's (2017) framework is aligned with both Pade-Khene and Sewry (2012) as well as Ohsa and Pade-Khene (2014). The outcome and impact assessment framework for rural ICT4D uses thematic areas of empowerment, livelihoods, strategic value, most significant change, and sustainability to assess how projects have affected the socio-economic conditions (Mthoko & Pade-Khene, 2017). While the framework purports a need to assess the influence of ICTs in human development (Mthoko & Pade-Khene, 2017), its application to the living lab under which it was developed has yet to be reported, thus making it difficult to measure its effectiveness. Moreover, it seems limited to organisations carrying out projects.

Another important factor in project-related evaluations is replicability (Pade-Khene & Sewry, 2012), which Smith (2015) had evaluated in his assessments. However, replicability can only be crucial for projects involving the government. It might be optional for



organisations doing projects for social investment footprints or those testing their products' viability, as Nothias (2020) posited, that some companies use marginalised communities as testing grounds. Measurement tools should be broad enough to evaluate all ICTs, whether linked to projects or self-initiated. Therefore, a holistic approach will help with extensive assessments crucial for communities and those planning interventional projects for rural areas, including ICT4D projects.

Studies advocating for individual users and how they use their own devices to harness developmental benefits linked to such devices is that of Modiba (2015). Modiba (2015) argues that ICT4D projects tend to fail because they do not improve the socio-economic conditions of rural areas. Hence, there is a need to have evaluations from the user's side. As seen in the matrix proposed in that study, different parties can use the matrix components. However, other scholars mentioned the need for electronic measurements which could be useful (Grigorovici et al., 2002). Nevertheless, such approaches should compensate for quantitative data shortfalls since understating the reasons for usage are equally relevant (Ohsa & Pade-Khene, 2014).

Some noted commonalities amongst the frameworks related to sustainability, community involvement and scalability. Smith (2015) believes that digital inclusion projects should focus on sustainability, which means a project must be able to sustain itself after the funding has stopped. The financial capital is important because if the project cannot sustain itself, even if it has value, it is at risk of failing. The SEIDET's success has been attributed to community involvement since the community initiated the project. Thus, similar projects are needed, ones championed by communities rather than organisations needing to expose certain ICTs to communities. When community-driven ICT projects exist, an organisation can bring their proposed solutions as plug-ins that can be co-designed with the community members. Communities must be involved in the planning, design, and implementation phases to ensure continued support of projects and sustainability (Modiba, 2015; Smith, 2025). Such involvement is important in supporting the sustainability of projects since community members will have a sense of responsibility for the outcomes related to the project. This value of community involvement can be attested by the success of SEIDET (Smith, 2015).

Education and training were also important when introducing ICTs and related artefacts (Smith, 2015; Modiba, 2015; Ohsa & Pade-Khene, 2014). Knowledge gained on ICT usage can benefit users who can communicate the benefits of ICTs accessible in their communities, thus increasing awareness and continuing use of beneficial ICT services, thus impacting social and human capital development within communities.

As noted in Modiba (2015), there is a need to assess how users of ICT devices' skills have improved over time, thus influencing some aspects of their development. Additionally, assessing how the devices or ICT-related services increase their abilities to make choices that improve their lives is when the efficacies of ICTs can be observed. It is also undisputed that the capability approach offers an opportunity to investigate the relevance of devices like mobile phones in people's lives as they are better accessible than other devices. However, with the mobile phone, people's freedom to use it to change their life situations is limited by infrastructural challenges affecting rural communities in South Africa (Matsenjwa et al., 2019). They lead to poor network connections and an inability to access digital platforms like the Internet and social media, which can expose them to work opportunities. Therefore, infrastructural issues are impeding rural communities' development for individuals who have opportunities to use digital technologies to explore options for improving their livelihoods.

*Rural ICT's user-centric measurement framework (RICTUF)*. A conceptual framework for measuring the impact of ICTs and their related services is proposed to assess the impact of ICTs on rural development. Since the evaluated frameworks had limitations related to incomprehensiveness, orientation towards organisations, and usability, the rural ICT user-centric measurement framework (RICTUF) (see Figure 1) aims to improve the gaps and provide guidelines on how it can be scaled to other contexts. The rural ICT measurement framework allows users, the ICT device, related services, and interested bodies like the government and private sector civil society organisations to access data on the ICT impact



documented by the user or through the user. The system, through the deployment of an application, can collect data from the user's device based on activities performed to build a rapport of activities that are linked to developmental aspects such as human, financial, physical, and social capital (Ashraf, 2017; Modiba, 2015). The system also collects data by interacting with the user to source feedback to confirm or dispute observations made by the system.

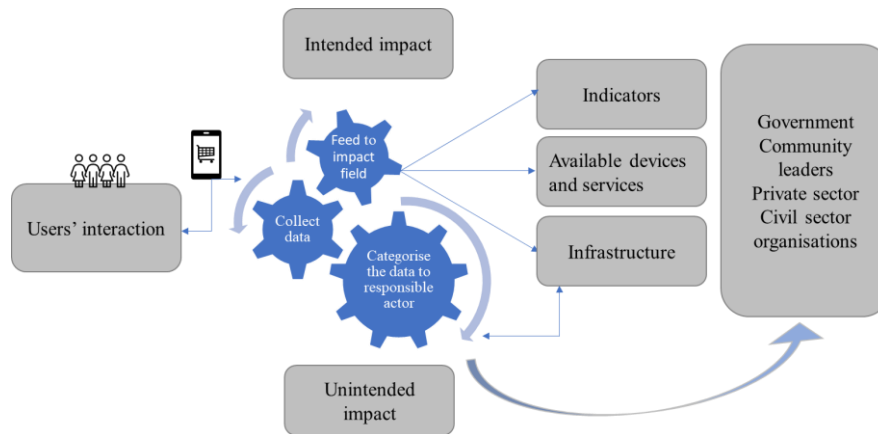


Figure 1 – Rural ICT User-centric Framework (RICTUF)

This framework deviates from project-orientated frameworks by providing information that addresses users' needs and challenges that can be provided by the user or captured by an application. As the users interact with their mobile devices, the system can collect information that will be used to create indicators that address the developmental needs of the community. The system will collect information fed through the device, including technical aspects such as poor connectivity and outages. While the user may indicate what they expect to gain from the system, the app will also document the unintended benefits that users are experiencing. Evaluations sometimes reveal changes that were not expected to emerge, as noted by Mthoko and Pade-Khene (2017).

## CONCLUSION

This study underscores the pressing need for further research in measuring ICTs' impact on rural development. The reviewed studies proposed frameworks that were more project-oriented, overlooking broader development of rural people exposed to ICT4D projects. The assessment of ICTs in the context of rural development requires a comprehensive and tailored approach that recognises the specific needs of rural communities. Therefore, RICTUF is proposed for measuring ICT's impact in rural communities; it emphasises the need for co-creation with community members, offers indicators tailored to the specific context and incorporates self-evaluation for users to identify areas of improvement. This holistic approach ensures a more nuanced understanding of ICTs' role in driving rural development, contributing to effective policymaking and program implementation. This study contributes to rural development by highlighting the gaps in measuring ICT-related development. It identifies crucial areas that future government-led projects should prioritise when implementing ICT initiatives in rural areas. However, it is crucial to acknowledge certain limitations such as the study's exclusive focus on rural ICTs and its primary consideration of mobile phones as the dominant technology. Moreover, the framework is conceptualised for smart devices, potentially excluding users with feature phones.

To enhance future research in this domain, broadening the scope and comparing evaluations between rural and urban settings is recommended. This comparison could provide valuable insights into the different impacts of ICTs on development in various contexts. Additionally, researchers should strive to develop digitised frameworks that can be





tested and adapted across diverse settings, facilitating a more comprehensive and scalable approach to measuring ICT's impact on rural development. Therefore, interdisciplinary collaborations from Computing Science and Development Studies could lead to digitised socio-technical evaluation tools. By addressing these recommendations, future studies can strengthen our understanding of the role of ICTs in rural development and pave the way for more effective and inclusive policies and projects.

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