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A Holistic View of ICTD and Up-scaling of Community Development Projects

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ABSTRACT

The ICTD field over the past decade has been questioned on its value and contribution to development. Many projects today still suffer from '*pilotitis*', a concept associated with initiatives that are characterized by the full use of resources to test a concept in a community, which is often short-lived and never scaled to other community contexts. Furthermore, if scaled, there is no consideration for re-contextualization nor efforts to learn lessons from previous implementation. These initiatives need to be assessed for their readiness to scale, either within an existing community, or to other contexts. Scalability assessment aims to guide how and why a project should be replicated based on the success of the project. This assessment needs to be based on a comprehensive evaluation of the ICTD project, which can provide an indication of the level of effectiveness of that project throughout its life, and post-implementation. The research study aims to address the question of how the scalability of an ICTD project can be assessed, based on a comprehensive approach to evaluation that takes into consideration the impact and potential sustainability of a project, and imperative factors for up-scaling.

Keywords: Scalability, Comprehensive Evaluation, Assessment

INTRODUCTION

The process of development can be supported by the availability of information and knowledge which can be accessed through the use of Information and Communication Technology (ICT) (Harris, 2004; Dodson, Sterling and Bennett, 2012). When used in aiding the development process, Information and Communication Technologies for Development (ICTD) projects are established with the overall aim of positively developing the communities they are implemented

in. However, the projects need to be suited to the needs of the community and an ICTD strategy should be developed in accordance with these needs so that it will assist in achieving them (Baduza and Khene, 2013). In reality, this does not happen, as many case studies have shown that ICTD projects lack sustainability, resilience and scalability, and are mostly anecdotal in nature. ICTD projects typically lack critical monitoring, and impact assessments (Heeks 2008; Chib and Harris, 2012; Bon, Akkerman and Gordijn, 2017). As a result, investors and stakeholders have increasingly required the proof-of-concept provided by a promising or successful pilot project, in order to convince them to invest in larger projects that will have greater impact on more communities (Hosman, 2008). This paper aims to understand the techno-social paradigm that contributes to understanding development in the 21st century. The current debates around ICTD and its holistic view are discussed in depth, which provides a link to why we have pilot projects in the ICTD field and how these projects can be up scaled. The paper then concludes that depending on the context, the imperative factors that are needed to determine whether a project should be up scaled or not should be given much consideration before upscaling.

2. THE 'TECHNO-SOCIAL' PARADIGM

2.1 ICTD's Current Focus, Holistic View and Continuous Misconceptions of ICTD

ICTs were previously used to describe computer-related technologies, increasingly with a focus on providing access to infrastructure and strengthening the technical dimension of the ICT (Gomez, 2013). Around 2005 ICTs shifted slightly to include novel applications and more in-depth discussions about ICTD impact. This included different sub-themes that where tackled, including access, readiness, availability, financing, governance, ICT applications, uptake, and impact (Heeks, 2010; Gomez, 2013).

The role, use and views of ICTs and ICTD have evolved over the years. The views have moved from ICTs or ICTD being just a tool, to a holistic approach of using it in conjunction with the communities and programmes to aid development. Many authors have documented how solutions that had placed a central emphasis on requirements of the poor by enabling them to participate in the design process as active innovators, have had much greater success in changing

circumstances of target groups than top–down and centrally planned ICT initiatives for promoting general economic development and poverty alleviation (Moseson *et al*., 2015; Yildirim and Ansal, 2011; Eggleston *et al*., 2002; Avgerou, 2008; Avgerou 2019). People who are marginalized by digitization are reached more effectively and engaged more when they co-develop solutions. As Borzaga and Bodini (2014) point out, successful ICT intervention requires a deep understanding of context such as perceptions of ICT mediated information and the possible mechanisms it activates, socio-cultural barriers and issues surrounding literacy and language. Due to a lack of contextual understanding of the working environment in developing countries, decoding user contexts of ICT use are far more complicated when compared to developed economies. Standard approaches for capturing user requirements, systems analysis and design, and building software specifications that often yield working guidelines for software developers often fail to yield valuable outputs in a developing country context, because they are not designed for the environment (Bhatt, Ahmad and Roomi, 2016). Approaches to developing more suitable and contextually relevant methods have been made; for example, mobile development, translation and more, have made the process of developing for the communities much easier (Bon and Akkermans, 2014; Franz-Vasdeki, Pratt, Newsome and Germann, 2015; Avgerou 2019; Walsham 2017). Therefore, traditional software development approaches cannot simply be adapted to suit the context, but more contextually aware solutions built in communities are needed.

3. The Incidence of 'Pilot Projects' Rural in Communities

A pilot project is often a positive developmental implementation that is useful to its client or community (Batchelor and Norrish, 2005). Pilot or experimental projects often introduce a range of innovations, not all of which are central to the initiative's success. An additional component of presenting credible evidence, therefore, is to document aspects of the interventions that were most central in producing the desired results, which can then also make it possible to simplify the innovation (Simmons, Fajans and Ghiron, 2007). A pilot project is usually designed and implemented with a set of specific goals that it needs to achieve. This becomes an important factor in ensuring that the clients and communities are able to provide quality feedback that can be used to effect changes on the product or innovations developed.

ICTD pilot projects implemented in communities have often provided an indication of how the initiative implemented will work in the identified community. These pilot projects in communities have often been a point where the project starts and ends in most communities. This results in projects 'being stuck' on a phenomenon known as 'Pilotitis'. Pilotitis is associated with social programs that do well in their pilot stages, however, they fail when implanted at a large scale (Toyama, 2015). This is mainly attributed to the effort that is put into pilot projects, where skilled labour and devoted individuals are placed in programs to ensure the project succeeds (Toyama, 2015). Pilotitis has also been a syndrome that many governments and donors have complained about, as the inability of a project to succeed when up-scaled due to a variety of technical, practical, economic, often institutional and political barriers (Franz-Vasdeki *et al*., 2015). A lack of cross-sector expertise, contextual knowledge and 'critical human components of social change', are imperative in social change programs, as these factors are evidence that a alone-size-fits-all approach and predetermined solutions to societal programs, are not suitable for development projects (Toyama, 2015; Franz-Vasdeki *et al*., 2015; Avgerou 2019).

External and internal stakeholders also often fail to understand that pilot projects generally provide a high degree of uncertainty and there needs to be recognition on the part of both the project team and the governing stakeholders that the purpose of the pilot stage is primarily to prove viability, not deliver a perfect product (Mathur, 2013; Knoco 2014). Key deliverables of ICTD pilot projects are often not jointly agreed on by all stakeholders. This creates unrealistic expectations from the various parties involved. It is the responsibility of all parties involved to ensure that the correct pilot dimensions are deployed to the community, training of users who are identified to use the product in a pilot phase is conducted, and timely reminders to the community to use the product is applied (Simmons, Fajans and Ghiron, 2007; Mathur, 2013; APM; 2014). The monitoring at times is often left to one party when various selected people in a project should ensure that the product is used in the manner it is supposed to be used, by regular visits and follow ups (Mathur, 2013). One of the ways that commercial IT pilot projects have been successful is through ensuring ownership of the project by the customer. The owner of the pilot project must plan, monitor and control activities that will lead to success (Mathur, 2013; Knoco, 2014). A dedicated pilot project owner must firstly work out a project plan to track critical paths in order to ensure smooth progress and timely closure of the pilot project (Mathur, 2013). Credible evidence is one of the key elements that should be provided and therefore should

be documented detailing which aspects of the interventions were most central in producing the desired results. This can then make it possible to simplify the innovation for the community (Simmons, Fajans and Ghiron, 2007).

4. THE ROLE OF UP-SCALING DEVELOPMENT PROJECTS

4.1 The Concept of Scalability

According to Walsham and Sahay (2006) and (Walsham 2017), scalability of ICTD projects is one of the imperative topics that have been neglected. However, due to a number of factors, including the lack of a proven business model for success, the high failure rate of such projects, and the small number of projects that have in fact scaled, little has been written about scalability and the sustainability of such projects (Roman and Colle 2005; Walsham and Sahay 2006; Walsham 2017). Scalability has multiple definitions but generally it can be defined as a process that entails the expanding of the size and scope of a project, the adaptation of a projects to the context/community, sustaining of desired policy, program and practice changes and the implemented projects in different places, in order to reach a greater number of people and communities, whilst working towards replication (Batchelor and Norrissh, 2005; Walsham and Sahay, 2006; Gerhan and Mutula, 2007; Walsham *et al*., 2007; Hartmann and Linn 2008; Saebo and Thapa, 2012; World Bank, 2012; Fox, 2016). Implied in definitions of scaling up is the assumption that we scale up in order to achieve valued outcomes, such as poverty reduction, or the goals of a country and World Bank strategies (World Bank 2012). Untapped opportunities exist to multiply and scale up successful pilot projects and approaches. Up-scaling may also imply increasing benefits. A participative ICT approach, involving people from the needs assessment to monitoring, makes a difference when scaling (Gerster and Zimmermann, 2005; Pade-Khene 2016). However, Uvin, Jain and Brown (2000), argue very strongly that up-scaling development projects should be based on expanding the impact of the project rather than trying to achieve a larger project that spans large regions without any impact. This should be done to avoid the success of small development projects operating in small 'islands of excellence' in a space of wider development inequalities that mostly affect the marginalised areas (Uvin, Jain and Brown, 2000). Linn 2012, elaborates by indicating that the process of scalability generally is not linear, but an iterative and interactive cycle as the experience from scaling up feeds back into new ideas and learning. Hosman (2008) also indicates that the topic of scalability should also

encompass ICTD capacity building activities which includes issues of affordability, accessibility and awareness of the intended audience. Scalability assessments could also be done in order to increase the complexity of services offered over time to people in order to respond to their growing and changing needs (Walsham, Robey and Sahay, 2007: 323).

In the case of development, Up-scaling generally refers to increasing of the size, outreach and deepening of the impact, which can either be vertical or horizontal; or a mix of both (Meegammana *et al*., 2009). Vertical up-scaling is defined as the increasing of the impact of the project (Gillespie, 2004; Gerster and Zimmermann, 2005; Meegammana *et al*., 2009). Some examples of up-scaling the project vertically would include, an increased volume of content; new added subjects, enhanced software and interfaces, improved content quality and usability to deepen the learning impact and catering for more user groups (Laitinen, Fayad and Ward, 2000; Meegammana *et al*., 2009). Vertical up-scaling also refers to other activities related to the same chain of activities as the original one, which are added to an existing program (i.e., upward or downward linkages are made) (Gillespie, 2004). Horizontal up-scaling mainly deals with increasing of the outreach, to increase the number of people or social groups benefited; which also overlaps with increasing of geographic coverage through replication; but differs when looked at from a single locality where horizontal up-scaling increases the number of people using an existing system (Gillespie, 2004; Meegammana *et al*., 2009). Horizontal up-scaling also represents new unrelated activities that are added to existing programs, or new programs that are undertaken by the same organization.

Both forms of up-scaling are generally functional in nature, as they focus on achieving scale within the desired project. Therefore, both vertical and horizontal up-scaling are parallel processes and are equally important to increase usage and the number of people who are able to benefit, which then assists in improving impact and sustainability of the project (Meegammana *et al*., 2009). However, up-scaling is not only about quality of impact, scale and sustainability. In practice it involves a multidimensional process of change and adaptation.

The literature considers a variety of possible dimensions and applies a multitude of different terms. Uvin (1995), indicates that there are four different dimensions of up-scaling. These

dimensions include quantitative, functional, political, and organizational up-scaling. Quantitative upscaling, is the geographical spread to more people and communities within the same area (Uvin, 1995). Functional scaling up is expansion by increasing the scope of activity, for example, an initiative initially specialized in agricultural development may add nutrition, health or literacy activities (Uvin, 1995). Functional scaling up is also similar to the concept of vertical upscaling as the focus is on increasing the current offerings of the current project. Political scaling up refers to expansion through efforts to influence the political process and work with other external stakeholder groups (Gravesen, 2016; Uvin, 1995). Through political scaling up, individual organizations can achieve greater influence, protect their efforts from countervailing political interests and affect political and institutional change that sustains scaled up interventions in order to institutionalize innovations through policy or legal action (Uvin 1995; Gravesen, 2016; Simmons and Shiffman, 2007). Organizational or institutional scaling up means the expansion of the organization implementing the intervention, or the involvement of other existing institutions, or the creation of a new institution (Gravesen, 2016; Uvin, 1995). This can involve both horizontal and vertical organizational expansion, the former involving similar institutions while the latter means going up the ladder from community to local to regional to national (and in some cases even supra-national) institutions. The various dimensions of scaling up are interrelated, which indicates that scaling up does not only typically occur in one dimension. For example, programs can scale up quantitatively and functionally or they typically can scale up politically and organizationally (Uvin, 1995; Hartmann and Linn, 2008; Gravesen, 2016). However, there is no criteria to determine whether the project should either select horizontal or vertical or a combination of up-scaling based on its progress. Programs, therefore, should clearly understand their existing structures, strategies, organisation capacity and ability to research sustainability, in order to select the most appropriate form of scaling.

4.2 Challenges and Considerations in the Scaling-up Process

There are many challenges that are experienced in up-scaling projects at any level. These challenges should be carefully considered before a decision to up-scale is taken. The understanding of the implications of upscaling an ICTD project, should be supported by the stakeholders' understanding and responses to the challenges that might be experienced in the

upscaling process. Some of the challenges that are experienced are discussed below with considerations for the process:

4.2.1 Economies of scale and Financial support

Challenge: Expanding the reach of a project will either require more or less funds depending on the economies of scale that are obtained (Uvin, Jain and Brown, 2000). Economies of scale might not be achieved by pilot projects but it is important to consider piggybacking on current under-utilized capacity of the new context (Hartmann and Linn, 2008). However, this might mean getting more donor funding and effecting the scaling shift but each context is different and cannot be seen as the same area. It is usually not possible for a development project to achieve economies of scale and the up-scaling of a development project usually requires more financial assistance than what was allocated by the funders to the project initially.

Consideration: Economies of scale are a major driver in deciding to up-scale the project or not. The availability of funds and internal success factors should understand the demand of services through clear financial benefits for the target groups and convincing officials and donors to support the program. Self-selection of services by target population groups at scale might be able to address demand issues and help contain costs (World Bank, 2012). Development activities might not be internally sustaining in financial terms, but the organization needs to achieve an efficient level that makes the input and output ratios of its programs better so that the costs of operating the program are kept at minimal (Uvin, Jain and Brown, 2000). Financial sustainability can come in different forms in ICTD projects (Pade *et al*. 2008). For example, self-sustainability can be advocated for by citizens, as government are required to provide or support a service as a right to citizens, or community cohesion (‘ubuntu’) can see the value in investing in a development programme for the greater good of the community. Many contextual and cultural factors play a role in promoting financial sustainability – these need to be identified and enabled.

4.2.2 Defining the level of up-scaling

Challenge: When the projects have been successful in communities, taking into account the impact of the project, the project's stakeholders including government and funders often decided to up-scale the project to other communities where the favourable impact might be achieved as well. Many organisations may be deliberate in their attempts to scale and seek guidance through

a guided process (Gravesen, 2016). However, very few projects of this nature have a clear view on the specifics of what kind of upscaling they have in mind for the project (Cooley and Linn, 2014). Organisations need to make valuable strategic decisions on what kind of scaling they need in the organisation whether horizontal, vertical, political and so forth, but it needs to be supported by strong evidence of the need to scale.

Consideration: Defining the level of scaling that should happen within a project is crucial whilst taking into account, the needs of the target population and the nature of the intervention (Cooley and Linn, 2014). It is also important to consider realistically the time horizon over which the scaling process needs to extend in order to achieve the desired level of scaling-up. Hartmann and Linn (2008), found that successful scaling up of programs to national scale can take ten to fifteen years, or longer. The different conditions that will enable the up scaling of the project need to be reviewed depending on whether the project is being scaled locally, nationally or internationally (Hartmann and Linn, 2008). For example, the different policy and regulatory constraints, capacity, infrastructure, and so forth that need to be considered in this process.

4.2.3 Complexities of the New Environment and the Stakeholders Involved in Up-scaling

Challenge: Community based programs face special challenges in scaling up. These programs tend to be highly contextual and are thus difficult to expand and replicate in a new environment (Gillespie 2004, Mansuri and Rao 2004; Harris, Croot, Thompson, Springett, 2015). Maintaining participation by the communities and preserving a lean, committed and accountable management are difficult challenges as one moves from small, single-community initiatives to large-scale programs that try to involve many different communities (Uvin 1996; Hartmann and Linn 2008). The internal stakeholders in the new environment are often anxious about the development that has been brought to their new environment, in particular how the interactions, outputs and success of the project will happen (Ssozi-Mugarura, Blake and Rivett, 2017). Therefore, it is vital to ensure that the internal stakeholders are clear in how they will be involved in the project, how the project has functioned in other contexts and how they stand to benefit as a community from the project.

Consideration: The community condition also needs to be reviewed. It should consider the different processes of consultation and communication with the intended community. The level of beneficiary and stakeholder involvement during the pilot; the different identified needs of the

beneficiaries and the stakeholders; evidence of demand that is relevant to disadvantaged people; an understanding of the key factors that made certain projects successful; evidence of buy-in and capacity of local organisations to move things forward; and lastly, what impact might a scaled version of the pilot have in a new environment (Batchelor and Norris, 2005; Dodson, Sterling and Bennett, 2012; Hartmann and Linn 2008; Harris *et al*, 2015); are all factors that should be reviewed to assist in ensuring the transition into the new community has less complexities and does not unsettle the internal stakeholders.

4.2.4 Top-down projects and Ownership of Scaled Project in New Contexts

Challenge: According to Hartmann and Linn (2008), the nature in which the community project is driven and the participatory approach that is used in the new community will determine the success or the failure of the scaling efforts. Community projects are typically transaction intensive and require essential context-specific information which therefore, means they generally not suitable for top-down, hierarchical approaches (Dodson, Sterling and Bennett, 2012; Hartmann and Linn, 2008). According to Singh, Andrade and Techatassanasoontorn (2017), top-down approach projects experience struggles and challenges which often leave community members trying to understand how they 'fit-in' the project instead of actively engaging in the project to ensure ownership. Institutional support accompanied by a well-planned process of scaling, cannot be achieved when stakeholders operate in an individualistic and relational approaches, as the consequence of such results in other internal stakeholders being excluded from the process (Hartmann and Linn, 2008; Mansell 2011; Gaventa 2006). The individual initiative, innovation and leadership of community members should not be underestimated as vital information can be obtained in suiting the up-scaled project to the given context.

Consideration: Context is key to understanding what a community values and treasures, in order to understand what the community could have a vested interest in to see it succeed. Taylor (2016) indicates that stakeholders who understand their role and contribution to the success of the project are much more eager to ensure the project scaling is successful. External stakeholders have the responsibility to ensure that community members understand the value and role of ICT's in their process of community development. This will ensure that all stakeholders have the

same understanding of how this project will operate and not "experts" bringing top-down solutions to "beneficiaries", but to ensure that all parties are co-contributors (Walsham, 2017). Through the understanding of stakeholders as co-contributors and a participatory process in decision making, ownership by the community can be obtained in a more effective manner.

4.2.5 Business Models used to Scale ICTD project

Challenge: Business models in development projects have not yet been clearly modeled and mastered in order for them to be used in various development projects. According to Chesbrough, Ahern, Finn and Guerraz (2006), the primary challenge in the business models that have been designed to target lower-income households and communities is that they are inherently designed for the customer who has a higher buying power or a wealthier pocket to fund their transactions. Community development projects fail because the implementation of unsuitable business models that are not customized to the local conditions (Chesbrough *et al*, 2006; Avgerou 2019). As ICTD projects face a similar dilemma of who will pay once the funders leave, developing business models that focus on 'structuring value propositions and partnerships to exploit the opportunities of technologies' for communities should be key (Schaffers, Cordoba, Hongisto, Kallai, Merz and van Rensburg, 2007). How can the impact scale be reviewed in order to make sure the solution is viable once it is taken to scale? What ways can be used to 'test' the impact scale (Batchelor and Norris, 2005).

Consideration: According to Chesbrough *et al* (2006) commercially viable products that are developed from communities are developed with a strong focus on the development of a comprehensive business model. This is developed with a focus first on the design and implementation of a business model that commercialized the technology, and only second upon product design (Chesbrough *et al*, 2006). It is also important to note that developing a business model for development areas take a significant amount of time, as various approaches are experimented with to understand which approach is most ideal for the environment. According to Schaffers *et al* (2007), business models in the development context should undergo three phases (which are initialization, operation and commercialization) to try and obtain the best fit for the community.

4.2.6 Assessment of pilot Projects

Challenge: The main question of scaling up that needs to be investigated is whether, is it viable to up-scale the pilot or innovative solution. If it is, then what is the intended impact of the up scaled project or is there another approach that can be used to achieve a larger audience (Batchelor and Norris, 2005). Monitoring and evaluation of projects usually focuses on the impact of the evaluation and rarely on the factors and spaces that ensure effective scalability. In the scalability assessment process Pade-Khene and Sewry (2011) highlight the importance of using theory to validate and judge the procedure for scalability. This is reiterated by Toyama (2015) on how projects that are scaled fail due to the problem of the theory that is used or due to how the theory was implemented. The scalability assessment therefore needs to critically evaluate the theory that is used and its suitability to the problem critically reviewed before scale.

Consideration: The monitoring and evaluation of ICTD projects used to be questioned on its credibility to be linked to the development agenda's that related to investments in ICTD projects. The evaluation of ICTD projects has many times been based on tangible and quantifiable indicators, a change has started to occur through the slow move of accounting for the intangible and unintended indicators of ICTD project evaluation. However, the focus of evaluation in the ICTD stream has predominantly been done on big projects and not many documented on ICTD pilot projects. Although many ICTD projects start off as pilot projects, not a lot has been written about the evaluation of such pilot projects.

4.3 Scalability Methods

4.3.1 Understanding the Various Methods Utilised to Achieve Scalability

In order to achieve the process of scalability as discussed earlier, the model that is to upscaled needs to be refined thoroughly. This includes the process of 'testing, clarifying, refining, and simplifying the model to emphasize those elements essential to its success' and various aspects that would be utilised in the new environment (Cooley and Ved, 2012). According to Hulme (1990), due to the scarcity of successful development pilot projects that have scaled, the moment a pilot project scales, that model is used as the blueprint without the process of refining it for the appropriate context and utilising the most appropriate methods to scale and with caution. Scaling

methods as commonly noted in development literature, can be achieved either through Expansion, Replication or Collaboration. All three methods will be discussed further.

4.3.1.1 Expansion

Expansion as a method of scaling refers to the implementing organisation increasing the scope of its operations, this can be done in four ways, these include growth, reconstruction, franchising and spin-offs (Cooley and Ved, 2012; Cooley and Linn, 2014). The goal of expansion is to reach out to new locations and target groups which the organisation has not been exposed too. Using the expansion as a scaling method is suited to projects that are process intensive, comprehensive in model developed and where the capacity of the original project is strong (Cooley and Ved, 2012). However, the biggest challenge of using expansion as a scalability method is the inability to implement internal changes for the refined model and therefore might put pressure on securing the needed financial support to operate at scale (Cooley and Linn, 2014).

4.3.1.2 Replication

Replication as a scaling method is defined as the repeated use of a particular process, technology, or model through encouraging the use, take up or implementation the revised model (Cooley and Ved, 2012; Cooley and Kohl, 2005; Uvin, 1995). The word has been documented as being synonymous with the word 'scaling', however these concepts seem not to have the same meaning as replication includes policy adoption, grafting, diffusion and commercialization of the envision model that is to be upscaled (Cooley and Ved, 2012; Fox 2016). Replication can also occur between organizations of the same type, e.g., NGO to NGO or government to government, or between organizations of different types, as they share the refined model amongst themselves (Cooley and Kohl, 2005; Hartmann and Linn, 2008). Replication is the most suitable method where there has to be a transfer of the model to other organisations, where the quality of NGO's is strong and where governance of the implementation of the project will be strong (Cooley and Ved, 2012; Fox 2016). The challenge to replication as a method is that it is suited to projects that are to be implemented technically as opposed to projects that involved a process where the sensitivity and community participation are key factors to its success (Cooley and Lin, 2014).

4.3.1.3 Collaboration

Collaboration as a scaling method, is commonly referred to as the link between expansion and replication. It includes the formation of formal partnerships and strategic alliances; and networks and coalitions in order to advance the process of expansion and replication (Cooley and Ved, 2012). It is suitable where various organizations have 'different and complementary skills or resources, shared or overlapping objectives, and a high level of mutual trust' (Cooley and Lin, 2014). The challenge though to this method is that because these organisations are collaborating, they have come together because they might lack external resources, therefore, the rate of adoption and coverage of the program may be slower and might not reach other areas unlike other methods and strategies (Colley and Linn, 2014).

4.3.2 The Most Appropriate Scaling Method for ICTD Pilot Projects

Community based programs face special challenges in scaling up. These programs tend to be highly contextual and are thus difficult to expand or replicate in a new environments (Gillespie 2004, Mansuri and Rao 2004; Toyama 2015). These challenges therefore, make it important for projects to be designed according to their context in order to localise them and to ensure the success and impact of the project (Meegammana *et al*., 2009). The method that is chosen is also key to how it is integratable to the community and whether it will achieve the envisioned effect and impact. According to Colley and Ved (2012), the process of method selection should be based on what the organisation wants to achieve by being clear about 'its current effectiveness (developing a solution that works), efficiency (finding a way to deliver the solution at an affordable cost), and expansion (developing a way to provide the solution on a larger scale)'. After understand the three themes, they an organisation can choose what they see appropriate depending on whether they still need to collaborate to expand or to replicate the project or go straight for the expansion or replication of the project. However, there a number of issues to consider before a method is chosen. Replication is the most appropriate method when the organisation would like to transfer to other communities. However, replication, may not be enough to address the underlying 'systemic, multi-level causes of accountability failures' of the project if they do exist (Fox, 2016). Expansion on the other hand is suited to very complex models and environments that have a strong capacity, however self-regulation is a key problem in expansion as a scalability method. When selecting the most appropriate method of scaling in

developing areas, it is important to consider the method against factors such as the presence of NGO networks, social homogeneity, quality of governance, source of financing, the type of model and its comprehensiveness (Cooley and Ved, 2012).

4.3.3 Up-Scaling Community Pilot Projects in the ICTD Space

Due to the high failure rate of ICTD pilot projects, it is imperative that pilot projects produce credible evidence and outputs in order to determine whether a project can be up-scaled or not. Pilot projects in communities need to be given a real chance to succeed as their key objective is to produce a first working version of 'something' (APM, 2014). This process is important for future planning as it provides the needed experience to understand how these projects work and for showing "what not to do in future". Project evaluation team members must be prepared to "stop" a prototype design project whenever it does not show concrete progress (APM, 2014). Many authors agree that discontinuing non-productive pilot projects early is far better for overall positivity of the project, than letting them drag on non-productively (APM, 2014; Mathur, 2013; Knoco, 2014). At the same time, a prototype team must never work in a way that leads to long term operational commitments, no matter how successful. That must remain part of the "roll out" or operational implementation of a working version of the product (Knoco, 2014). Successful ICTD pilot projects that have been evaluated often produce actionable findings or a well-tested prototype. However, they are not conducive to measure shifts in development metrics or witnessing social change because of the short-term intervention, therefore, they do not have the time to be scaled-up or replicated, since they need to be evaluated comprehensively before the move to being scaled-up (Dodson *et al.*, 2012; Chib and Harris, 2012).

When pilot or experimental projects are tested in social and managerial environments that differ greatly from the setting that they are eventually transferred into, a second research phase may be called for in which the innovations are validated in more typical programmatic contexts before large-scale expansion proceeds (Simmons, Fajans and Ghiron, 2007). Successful scaling up implies that key features of new practices tested and proven to be effective remain intact during expansion, otherwise pilot results cannot be replicated. Literature on scaling up calls attention to the risk of losing the essential characteristics of interventions as they are expanded to new areas (Simmons, Fajans and Ghiron, 2007). Transfer of projects from one setting to another is

facilitated when innovations are easy to install, there is obvious demand for them, they are not costly and/or the resources for their introduction are available, and their implementation does not require much time (Simmons, Fajans and Ghiron, 2007). These possibilities must be carefully evaluated, assessing how the influence of social and cultural factors can be harnessed to magnify the impact of innovations tested in pilot or experimental projects (Simmons, Fajans and Ghiron, 2007).

Monitoring how the innovation is implemented and tracking the results is part of a practitioner mindset that is oriented to the possibility of scaling up (Batchelor and Norris, 2005). The importance of monitoring and evaluation in determining and reviewing the scalability of ICTD projects is crucial. As scaling up proceeds, the sophistication of evaluation and learning should increase and feed into decisions about scaling the innovation and about the implementation process, creating reciprocating learning and decision-making (Batchelor and Norris, 2005). Effective impact assessments of ICTs on individuals and communities are required to determine whether ICT for development (ICT4D) projects are successful, scalable and replicable (Hosman, 2008).

5. SUSTAINABILITY AND RESILIENCE IN SCALABILITY OF DEVELOPMENT PROJECTS

The topic of scalability however, cannot be considered in isolation but rather with the topic of sustainability, which refers to if the project is scaled can it be sustainable over long periods of time with the appropriate resources, which include money and people (United Nations, 2012; Walsham and Sahay, 2006, Batchelor and Norris, 2005). The design of current ICTD programmes/projects which are sustainable and scalable with greater reach and able to survive after the external initial funding are the most appropriate for rural communities (United Nations, 2012). Resilience has become an imperative factor in ensuring projects survive and able to be adaptable in the communities they are implemented in.

5.1 Sustainability of Development projects

An old age tail in the ICTD space has been how to achieve sustainability in the community development projects so that they are viable in the various forms of sustainability which include, technological, social and financial sustainability. The shift in trying to understand this tail

includes understanding clearly that ICT's cannot be the only tool that is used in a community to enable development (Marais, 2015). Sustainability can be loosely defined as the ability to be more efficient in the use of resources, through reducing, reusing and recycling the available resources (Walker and Salt, 2006; Marais, 2015). With the high failure rate of ICTD projects it is no secret, that sustainability in this field is what is aspired when projects start but not achieved in the execution (Marais 2011; Meyer and Marais, 2015). The inability to effect change at various levels of governance, more particularly of policy is of concern, as the changes suggested by NGO's, organisations and institutions results in the unsustainability of the projects they developed. Sustainability is categorised in 5 forms, these include, and financial / economic sustainability, cultural/social sustainability, technological sustainability, political/institutional sustainability, and environmental sustainability are themes that have been used to develop strategies to ensure the continued survival of ICTD projects (Liu, 2016).

There have been various models and frameworks have been developed on these themes in order to achieve the notion of sustainability in various development projects. Marias and Meyers (2015) indicate that although the themes are established and have been discussed at length, there are two elements that need to be understood as they perpetuate the continued sustainability of projects, these are systematic drivers and project-level drivers. Systematic drivers includes questions such understanding who defines the change in the community; the level of change that is possible; is current change understood and utilised; is the proposed change aligned to readiness of the system to change (Meyer and Marais, 2015). Project-level drivers are the factors that allow projects to be delivered in different and complex environments that would ensure sustained benefits in the community (Meyer and Marais, 2015).

The concepts of resources and sustainability are concepts that have received much attention in the field of ICTD, with constant concerns of resources availability when the funding has been depleted and the sustainability of the project in the absence of the donor funds (Jackson, Pompe and Krieshok, 2012; Kleine, 2010; Chib and Zhao, 2009). According to Chib and Zhao (2009), examining the concept of sustainability in various ICTD projects requires thoroughly investigating what aspect of the project needs to be sustained, for how long, for whose benefit and at what cost, what are the needed resources and measured by which criteria. However, there

have been many debates around the concept of sustainability, with some authors declaring that it is a fallacy and is something that cannot be achieved (Toyama, 2015; Ali and Bailur, 2007; Kleine and Uwin, 2009). The arguments used by various authors are based on the discussions around the extreme difficulty of operationalizing sustainability and the challenges of keeping a project going, in a similar manner to when it was initiated (Ali and Bailur, 2007; Marias and Meyer, 2015). This has resulted in a call to rethink the approach that is taken on achieving sustainability and the manner in which accompanying resources are used. Ali and Bailur (2007) propose the concept of 'bricolage' which is aimed at using the resources at hand in leveraging the resources for the current problem in the context. This can be interpreted as using the resources of the project, to function for the intended goals but also for the unintended goals based on the situation in the context in efforts to keep the project going. Sustaining the project's scalability is a huge challenge of ICT4D and thus it is also a challenge in relation to whether the target user will continue using the platform. A need therefore arises to develop and build on local talent and needs of the community based on the scalability assessment. The importance of participation of rural communities in identifying their needs was reiterated, as a way to promote ownership and ensure sustainability and scalability of programs.

5.2 Resilience of Development Projects

There is no conclusive agreement on what resilience means for the development sector and in ICTD. Papers have been written about the topic of sustainability within the ICT4D field and these papers have recently started incorporating the idea resilience in the conversation. Most have these papers have been reiterated a similar concern, 'how to keep the project operating when the investor pulls out from the project or when the funding ends' (Marais, 2015; Chen, 2015; Toyama, 2010). The many failed ICT4D projects have shifted their focus to the importance of evaluation, scalability and the need for the initiatives to be more sustainable (Marais, 2015). According to Chen (2015) and Marais (2015), resilience has been documented as the capability of the system to maintain its state despite any changes or shocks to the system and the environment in which the system operates in. This entails servicing current system demands without jeopardising the needs that the project might have in the future (Walker and Salt, 2006). ICT4D projects are implemented in contexts that are rapidly changing and are defined by their political, socio-economic and physical environment which in turn influence the cost and usability

of systems developed in these areas (Hartmann and Linn, 2008 and Chen, 2015). The need for ICT4D projects to be resilient in their environments is a call for the materialization of local learning and community ownership, which influences the need for ICT4D projects to first focus on human capability development than on technological development. Resilience in ICT4D projects can ideally be achieved through designing projects for modularity [manner in which subsystems are connected], diversity [number of people, institutions and variations in the system] and simplicity, and incorporating continuous feedback loops (Walker and Salt, 2006; Marais, 2015; Chen, 2015). Resilience is a concept that is not too far from the concept of sustainability and bricolage. The resilience is understood to be the ability of a system to adapt and recover from the shock that it experiences from internal and external factors (Walker and Salt, 2012; Bass, 2009; Heeks and Ospina, 2019). It is linked to key factors which illustrate resilience as the ability to experience stability, agility, flexibility, adaption and transformability of the system based on what the changes that affect the system (Walker and Salt, 2012; Bass, 2009; Marius, 2015; Heeks and Ospina, 2019; Calgro, Llyod and Dominey-Howes, 2014; Chen, 2015). It is governed by the ability of the system to self-organise, be adaptive through learning and feedback loops and its robustness to the shocks it experiences (Chen, 2015; Walker and Salt, 2012; Heeks and Ospina, 2019).

In the efforts to scale, resilience is fundamental to achieving sustained expansion or replication. It is vital that the best method of scaling to communities is selected and understood in how it will enable the individual, community and digital engagement resilience. The external and internal stakeholders need to clearly understand which existing resilience components in the community can the envisioned up-scaled project utilise and capitalise on.

6. LINKING EVALUATION AND ASSESSMENTS WITH SCALABILITY

6.1 The role of evaluation and assessments in the process of scalability

The process of scalability or replication basically means that the model or framework used in the project is either going to be stretched or used in a different setting besides its own original setting. This means that the model or framework is firstly validated in its own setting through a

process of assessment or outcomes mapping. According to Patton (2011) evaluation or monitoring leading to scale, focuses on how the project was implemented and in comparison to how the project should have been implemented, in order to develop the knowledge gaps of how the project could be improved.

Social programmes, according to Toyama (2015), usually have no impact and are scaled when they should not have scaled, and this is usually because of three reasons. These include bad program design which firstly includes 'a problem with the theory of the intervention', secondly with 'how the theory was implemented' and the third reason relates to faulty implementation which would result to the project failing at scale (Toyama, 2015). All these reasons provide the greatest motivation of why a project should be evaluated before the project proceeds to scale. In the Batchelor and Norrish (2007) framework for the assessment of ICT pilot project as indicated earlier, the outcomes and data from the project purpose assessment provide a base on which questions can be asked on how scale will happen with similar conditions in the next environment. The same sentiments are reiterated by Patton (2011) about how the understanding based on evaluation of the project is key because it provides key drivers and barriers of the functioning of the project and contributes to the understanding of under what conditions did the project succeed.

It is crucial that the plan to scale a project be based a positive summative evaluation, the framework or model used also needs to be validated through a rigorous process to clearly identify what needs to be scaled (Patton, 2011). The process of validating the model that will be used in the upscaling process is crucial to the evaluation stage because the provided template is refined, tested, best practices selected and so forth, from it (Patton, 2011; Batchelor and Norrish, 2007; Sampson, 2007). Batchelor and Norrish (2007) also emphasise the need for the various drivers, barriers and key factors that emanated from the assessment process to be validated or tested to use them in the process of scaling. An example to illustrate this validation could be, if resistance was experienced from a headmaster in a school project, a process of validation could include interviewing the various district officials to understand if it could be a recurring problem amongst all officials before the project is scaled to other schools (Batchelor and Norrish, 2007). Another caution that is given, is how the evaluators and project implementers should refrain

from having a 'franchising' mental model of development projects, this is based on assumptions that from the evaluation data, the project worked in 'community A', it will definitely work in 'community B' forgetting the deep contextual differences even though they are similar (Patton, 2011). Therefore, it is vital that a clear scalability assessment of the ICTD pilot project is based on the credible, comprehensive evaluations and assessment of these projects.

6.2 Scalability Assessment of ICTD pilot projects

The scalability assessment of ICTD pilot projects has been a process that not many ICTD development authors have written about. From literature surveyed for this research, Batchelor and Norrish (2007) and Pade-Khene and Sewry (2011) seem to be the only authors that have developed a conversation around how the assessment is supposed to be conducted before the pilot project is scaled up. According to Pade-Khene and Sewry (2011) a scalability assessment is conducted in order to determine and get detailed answers as to how and why the development intervention could result in desirable outcomes and cause developmental changes in the environment. The assessment should not only be done after the evaluation of the outcomes of the project, but should be something that is conducted throughout the lifecycle of the project to make sure no important details are missed in the process (Pade-Khene and Sewry, 2011).

When a scalability assessment of ICT pilot projects is conducted on a project there are various factors that have to be reviewed to determine whether the project should be scaled or not. Due to the assessment being conducted once it is essential that it is conducted from the onset of a pilot project, with the following conditions being closely monitored:

- Adequate stakeholder consultations need to be happen between the external and internal stakeholders, this includes a process of developing a common understanding when, how and why the scalability assessment should be happening and the benefits of the process clearly explained to them (Pade-Khene and Sewry, 2011; Batchelor and Norrish, 2007).
- The outputs and findings of the project should be validated in order to make appropriate interpretations and judgements based on it to understand if it is scalable or not, in relation to earlier mentions of the importance of positive summative evaluation (Pade-Khene and Sewry, 2011; Batchelor and Norrish, 2007).

- Another aspect relation to outcomes, is to clearly identify which aspects of the project could be used to scale to another context, taking into account that some of the current projects aspect might have been too contextual to the current project (Batchelor and Norrish, 2007).
- The level of 'buy-in' from the current project beneficiaries of the project being expanded in the current environment should be interrogated as it might indicated the level of 'need' the community still has for the project (Batchelor and Norrish, 2007).
- The ability to adequately judge the scalability of the project should be based on the collective interpretation of the various evaluation domains and through conversation of the external and internal stakeholders (Pade-Khene and Sewry, 2011).
- Other issues to consider as noted by Batchelor and Norrish (2007) include the following:
    - What are the current and planned policy and regulatory practices that are applied to ICTs?
    - Has there been a clear link between the developmental goals of the community to the project objectives?
    - Is there a common understanding to the various conditions and factors that lead to the project functioning?
    - What is there competitive advantage that the beneficiary community has received from the implementation of the project in relation, or had the project not occurred in the community would the same result be achieved?
    - What impact might the project have on the envisioned community?
- Dissemination of the projects evaluation or assessments results should be shared with the intended audience (Pade-Khene and Sewry, 2011; Batchelor and Norrish, 2007).

All of these factors tend to be very broad and still should be broken down to detail and provide set up assessment questions, methods and approaches that could be used in the scalability assessment process. According to Pade-Khene and Sewry (2011), the results of a scalability assessment should be shared amongst external stakeholders, which usually include the key personnel that would make the decision to scale the project or not and also for them to review the

decisions that they took during the project and how it affected the projects results. Outputs from the scalability assessment should also be shared with local stakeholders so that they understand how the project worked in their own community and how it could impact other communities, and them knowing that they championed the start of an impactful project if it's up-scaled to other communities (Pade-Khene and Sewry, 2011). However, it is vital to also understand that based on the assessment some projects will only be sufficient as very well done pilot projects that have proved the needed prototype and the funders needed just that kind of information (Patton, 2011; Cole *et al*, 2016).

6. CONCLUSION

Current ICTD studies have increased the call to understand that development cannot be brought about by only the tool of ICTD. Communities defining their own understanding of development is key to ensuring that they understand what the tool can assist them with. The focus of ICTD projects should therefore continue to be centered around the understanding of holistic development and how it is the most beneficial tool to equip ICTD. Pilot projects illustrate a concept or idea that indicates how it will operate - the use of pilot projects in ICTD has resulted in phenomenon such as pilotitis. Chronic pilotitis should be avoided as this does not advance the concept of developed and therefore projects should aim to scale when they have been successful. The understanding of scalability and its challenges, approaches and methods ensures that the most appropriate method is selected to scale a project. As many case studies have shown that ICTD projects lacked sustainability and scalability, and were mostly anecdotal in nature, lacking critical monitoring, impact and evaluation assessments. It is therefore essential that the understanding is clear to all stakeholders as to enable and demonstrate a similar view of the projects' eco system which would enable scalability, expansion, replication, collaboration, resilience and sustainability.

REFERENCES

Association of Project Management (APM), 2017. 'What is the difference between a trial and a pilot?' [Online] Available: https://www.apm.org.uk/resources/find-a-resource/what-is-the-difference-between-a-trial-and-a-pilot/ [Accessed: 04/03/2017]

Avgerou, C., 2008. Information systems in developing countries: a critical research review. Journal of information Technology, 23(3), pp.133-146.

Avgerou, Chrisanthi. 2019. "Contextual Explanation: Alternative Approaches and Persistent Challenges," *Management Information Systems Quarterly* (43:3), pp. 977–1006.

Avgerou, C. 2019. "Contextual Explanation: Alternative Approaches and Persistent Challenges," *MISQ*

Batchelor, S., and Norrish, P., 2005. Framework for the assessment of ICT pilot projects. InfoDev. [Online] Available: http://wwww.infodev.org/en/Publication.4.html [Accessed: 03/08/2011]

Bhatt, P., Ahmad, A.J. and Roomi, M.A., 2016. Social innovation with open source software: User engagement and development challenges in India. Technovation, 52, pp.28-39.

Bon, A. and Akkermans, J.M., 2014. Rethinking technology, ICTs and development: Why it is time to consider ICT4D 3.0. The Network Institute VU University Amsterdam.

Borzaga, C. and Bodini, R., 2014. What to make of social innovation? Towards a framework for policy development. Social Policy and Society, 13(03), pp.411-421.

Chib, A. and Harris, R., 2012. Linking research to practice: strengthening ICT for development research capacity in Asia. First edn. Singapore: Markono Print Media.

Chen, J., 2015. Computing within limits and ICTD. First Monday, 20(8) 1-8.

Chesbrough, H., Ahern, S., Finn, M. and Guerraz, S., 2006. Business models for technology in the developing world: The role of non-governmental organizations. California management review, 48(3), pp.48-61.

Cooley, L. and Linn, J.F., 2014. Taking innovations to scale: methods, applications and lessons. Washington DC: Results for Development Institute. [Online] Available: https://www.usaid.gov/sites/default/files/documents/1865/v5web_R4D_MSI-BrookingsSynthPaper0914-3.pdf [Accessed: 02/06/2017]

Cooley, L. and Kohl, R., 2004. Scaling up–a conceptual and operational framework. Washington, DC: Management Systems International. [Online] Available: http://vibrantcanada.ca/files/kohl_scaleup.pdf [Accessed: 05/01/2017]

Cooley, L. and Ved, R., 2012. Scaling Up—From Vision to Large-Scale Change: A Management Framework for Practitioners. Washington, DC: Management Systems International.

Dodson, L., Sterling, S.V. and Bennett, J.K., 2012. Considering Failure: Eight Years of ITID Research. ICTD Special Issue, 9(2), pp. 19-34.

Eggleston, K., Jensen, R. and Zeckhauser, R., 2002. Information and communication technologies, markets, and economic development. The Global Information Technology Report 2001-2002: Readiness for the Networked World.

Fox, J. (2016). Scaling accountability through vertically integrated civil society policy monitoring and advocacy. Brighton: IDS. [Online] Available: https://opendocs.ids.ac.uk/opendocs/ds2/stream/?#/documents/613382/page/1 [Accessed: 24/04/2017]

Franz-Vasdeki, J., Pratt, B.A., Newsome, M. and Germann, S., 2015. Taking mHealth solutions to scale: enabling environments and successful implementation. Journal of Mobile Technology in Medicine, 4(1), pp.35-38.

Gaventa, J. 2006. "Finding the Spaces for Change: A Power Analysis," *IDS Bulletin* (37:6), pp. 23–33.

Gerhan, D.R. and Mutula, S.M., 2007. Testing a recent model of ICT in development: Botswana and its university. Information technology for development, 13(2), pp.177-197.

Gerster, R. and Zimmerman, N. S., 2005. Up-Scaling Pro-Poor ICT-Policies and Practices. Switzerland, Swiss Agency for Development and Cooperation (SDC). [Online] Available: http://www.itu.int/net/wsis/docs2/pc2/parallel/up-scaling-ict-policies.pdf [Accessed: 10/01/2016]

Gillespie, S., 2004. Scaling up community-driven development: A synthesis of experience. Washington, DC: World Bank Social Development Paper, 69.

Gomez, R., 2013. The Changing Field of ICTD: Growth and maturation of the field, 2000-2010. The Electronic Journal of Information Systems in Developing Countries, 58.

Harris, R.W., 2004. Information and Communication Technologies for Poverty Alleviation. First edn. Kuala Lumpur: UNDP-APDIP.

Harris, J., Croot, L., Thompson, J. and Springett, J., 2015. How stakeholder participation can contribute to systematic reviews of complex interventions. J Epidemiol Community Health, pp.jech-2015.

Hartmann, A. and Linn, J.F., 2008. Scaling Up a Framework And Lessons For Development Effectiveness From Literature And Practice. Wolfensohn Center For Development, Working Paper 5. [Online] Available: http://www.brookings.edu/~/media/research/files/papers/2008/10/scaling%20up%20aid%20linn/10_scaling_up_aid_linn.pdf [Accessed: 08/03/2015]

Heeks, R., 2008. ICT4D2.0: the next phase of applying ICT for international development. IEEE Computer, 41:6, 26-33.

Heeks, R. and Ospina, A.V., 2019. Conceptualising the link between information systems and resilience: A developing country field study. Information Systems Journal, 29(1), pp.70-96.

Hosman, L., 2008. A Pilot Takes Off: Examining Sustainability and Scalability in the Context of a Sri Lankan Public-Private Partnership Telecenter Project, Proceedings of the 19th Australasian Conference on Information Systems, 3-5 December 2008.

Hulme, D., 1990. Can the Grameen Bank be replicated? recent experiments in Malaysia, Malawi and Sri Lanka. Development Policy Review, 8(3), pp.287-300.

Knoco, 2014. Knowledge Management of Pilot Projects. [Online] Available: https://www.knoco.com/knowledge-management-piloting.htm [Accessed: 02/02/2017]

Laitinen, M., Fayad, M. and Ward, R.P., 2000. The problem with scalability. Commun. ACM, 43(9), pp.105-107.

Linn, Y., 2012. An ultra low cost wireless communications laboratory for education and research. Ieee transactions on education, 55(2), pp.169-179.

Liu, C., 2016. Sustainability of rural informatization programs in developing countries: A case study of China′ s Sichuan province. Telecommunications Policy, 40(7), pp.714-724.

Mansell, R. 2011. "Power and Interests in Information and Communication and Development: Exogenous and Endogenous Discourses in Contention," *Journal of International Development* (26:1), pp. 109–127.

Mansuri, G. and Rao, V., 2004. Community-based and-driven development: A critical review. The World Bank Research Observer, 19(1), pp.1-39.

Marais, M.A., 2015. ICT4D and Sustainability. The International Encyclopedia of Digital Communication and Society, 1-9.

Mathur, A., 2013. The Managed Pilot Project: A Wise Product Owner's Choice For Success. [Online] Available: http://www.brighthubpm.com/monitoring-projects/127822-the-managed-pilot-project-a-wise-product-owners-choice-for-success/ [Accessed: 03/02/2017]

Meyer, I. and Marais, M.A., 2015. Design for sustainability: countering the drivers of unsustainability in development projects. The Journal of Community Informatics, 11(3) 1-10.

Meegammana, N., Sampath, R., Khrishna, M.V., Chamara, G., Dhanajaya, S. and Pradeep, G., 2009. Up-scaling and replication? 150 Experiences. [Online] Available: http://www.shilpasayura.org/papers/7_ICT4D_Up_scaling_and_Replication-paper4.1.pdf [Accessed: 21/02/2017]

Pade, C., Mallinson, B., and Sewry, D. 2008. "An Elaboration of Critical Success Factors for Rural ICT Project Sustainability in Developing Countries - Exploring the Dwesa Case," *The Journal of Information Technology Case and Application (JITCAR)* (10:4).

Pade-Khene, C. 2016. *A Comprehensive Evaluation Approach to Iterative and Incremental Information and Communication Technology for Development*, presented at the 2016 International UNESCO Chair Tech4Dev Conference, Lausanne, Switzerland.

Roman, R. and Colle, R., 2005. "Notes on Research for Telecenter Development," in Connected for Development: Information Kiosks and Sustainability, A. Badshah, S. Kahn, and M. Garrido (eds.), United Nations ICT Task Force Series 4, pp 89-96.

Saebo, O. and Thapa, D., 2012. Towards scalability of ICT4D projects: a salience stakeholder perspective, Proceedings of SIG GlobDev Fifth annual Workshop, 16 December 2012.

Schaffers, H., Cordoba, M.G., Hongisto, P., Kallai, T., Merz, C. and Van Rensburg, J., 2007. Exploring business models for open innovation in rural living labs. In Technology Management Conference (ICE), 2007 IEEE International (pp. 1-8). IEEE.

Shackleton, S. and Luckert, M., 2015. Changing livelihoods and landscapes in the rural Eastern Cape, South Africa: Past influences and future trajectories. Land, 4(4), pp.1060-1089.

Simmons, R., Fajans, P. and Ghiron, L., 2007. Scaling up health service delivery: from pilot innovations to policies and programmes. World Health Organization.

Simmons, R. and Shiffman, J., 2007. Scaling up health service innovations: a framework for action. Scaling up health service delivery, 1, p.30. [Online] Available: http://www.who.int/immunization/hpv/deliver/scalingup_health_service_delivery_who_2007.pdf#page=23 [Accessed: 04/05/2017]

Ssozi-Mugarura, F., Blake, E. and Rivett, U., 2015. Designing for sustainability: Involving communities in developing ICT interventions to support water resource management. In IST-Africa Conference, 2015 (pp. 1-8). IEEE.

Taylor, W., 2016. Pathways to Scale: A guide for early-stage global health innovators on business models and partnership approaches to scale-up. USAID. [Online] Avaliable: https://www.usaid.gov/sites/default/files/documents/1864/Pathways-to-Scale-Guide_20161013_online-508.pdf [Accessed: 08/01/2017]

Toyama, K., 2010. Human–computer interaction and global development. Foundations and Trends® in Human–Computer Interaction, 4(1), pp.1-79.

Toyama, K., 2015. Geek heresy: Rescuing social change from the cult of technology. PublicAffairs.

United Nations, 2012. ICT, The Basis for Development [Online] Available: http://web.undp.org/geneva/ART/isi_med/handbook/3-3.html [Accessed: 10/03/2016]

Uvin, P., 1995. Scaling up the grass roots and scaling down the summit: the relations between Third World non-governmental organisations and the United Nations. Third World Quarterly, 16(3), pp.495-512.

Uvin, P., Jain, P.S. and Brown, L.D., 2000. Think large and act small: Toward a new paradigm for NGO scaling up. World Development, 28(8), pp.1409-1419.

Walsham, G., 2017. ICT4D research: reflections on history and future agenda. Information Technology for Development, 23(1), pp.18-41.

Walsham G., Robey, D and Sahay, S., 2007. Special Issue on Information Systems in Developing Countries. MIS Quarterly, 31: 2, 317-326.

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

World Bank, 2012. Lessons from Practice: Assessing Scalability. [Online] Available: http://siteresources.worldbank.org/INTARD/Resources/Scalabilityfinal.pdf [Accessed: 20/03/2013]

Yildirim, N. and Ansal, H., 2011. Foresighting FLOSS (free/libre/open source software) from a developing country perspective: The case of Turkey. Technovation, 31(12), pp.666-678.