The role of Social Capital in sustainable ICT4D

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Abstract: This paper tells the story of an Information and Communication Technology for Development (ICT4D) project and a research approach. The research used a novel definition of sustainable development that emerged from South American development philosophies. The concept of Social Capital (SC) is central to this definition and SC was used to study the sustainability strategies of participants in a project to deploy internet access to schools in a rural region in South Africa.
A novel support model was developed by selecting local post-school youth for entrepreneurial attitudes and then training these so-called "Village Operators" (VOs) as on-site technical support. Their job was to maintain wireless-mesh networks serving clusters of schools and the in-school internet access. The VOs received intensive small business training and mentoring from experts contracted by the project. The research question was: What were the sources of support and the business strategies used to grow their businesses? The business performance of VO businesses could be evaluated, but it was difficult to determine why some succeeded and some did not. The relationships of the VOs were researched as the means to access resources for business development. The results are discussed in detail to showcase the different relationship structures and the sustainability strategies of the Village Operators. Recommendations for sustainable ICT4D project design based on this research are made.

Keywords: Social Capital, Business model, Sustainable, Entrepreneurs, Rural schools

Introduction

Sustainability via the building of local skills and the use of local capacity after the project team withdraws is a perennial problem in development projects and in large scale ICT4D projects (Marais, 2015). The sources of sustainability of such a project were researched. A large government initiative, Broadband-for-All (BB4ALL), adopted an entrepreneurial model that used individuals from the communities to provide local technical support to clusters of schools connected via a wireless mesh network (WMN) (Roux and Marais, 2011). These individuals were conceptualised as "Village Operators", a concept related to the support services of a local Internet Service Provider. The project was aligned to the South African government goal of enabling broadband access in remote areas concert with small business development.

The research used social capital as a conceptual framework and therefore relationships were studied via interviews with VOs. Social capital is the intuition that "the goodwill that others have toward us is a valuable resource" (Adler and Kwon, 2002: 18). The focus on social capital and the nature of the relationships networks of individual VOs worked well to uncover the diversity of VOs roles in their community and in their business and social roles. First, the theory base of social capital and development is discussed, including application in the ICT4D domain. Secondly, the research methodology and data collection are presented as a case study of the VOs. Results and analysis are discussed in-depth and used to develop recommendations regarding the design of the intermediary role to enable development of local capacity and enhance sustainability in different ICT4D development strategies. Finally, conclusions are presented.

The theory base: Social capital and Development theory

The interrelationships between social capital and development theory were developed from the perspective of sustainable development. Social capital is founded on trusted relationships and sustainable development is dependent on trust. The dilemma is that the trust required to achieve collaboration takes time. ICT4D projects mostly do not invest enough time in understanding and collaborating with the participants to foster development of existing and new trust relationships. Therefore, this paper focuses on social capital as an integral component of selected sustainable development strategies.

Social Capital

The concept of social capital is introduced, followed by use of a systems approach to explore social capital as both a macro-level and micro-level concept. The relationship between development theory and the role of social capital in the context of enterprise-led development in resource poor areas is discussed.

Definition of social capital

Social capital has many meanings and has been applied indiscriminately (Woolcock, 1998; Farr, 2004). The intuition that "the goodwill that others have toward us is a valuable resource" (Adler and Kwon, 2002: 18) is a good starting point. This goodwill, as a resource, is embedded in and generated via the structure and content of an actor's social relations and can be used to support action (ibid.). An extensive overview of social capital is provided in Marais (2016).

Cultural and social capital must be added to economic capital to explain the dynamics and structure of societies (Bourdieu and Wacquant, 1992). Social capital "exists in three forms, embodied, objectified, or institutionalized" (ibid.: 119) and these forms can be converted to each other (ibid.). Portes (1998) illustrated the conversion of social capital as follows:

Hence, through social capital, actors can gain direct access to economic resources (subsidized loans, investment tips, protected markets); they can increase their cultural capital through contacts with experts or individuals of refinement (i.e., embodied cultural capital); or, alternatively, they can affiliate with institutions that confer valued credentials (i.e., institutionalized cultural capital) (Portes, 1998: 3).

Social capital therefore has two main elements, namely the relationships (membership) that allow access to resources of the group, and the sum of these actual and potential resources. The definition of membership of these groups can be related to family, friendship, shared ethnicity or class, or informal connections such as supporting a sport.

The social relationships that form the collective system (i.e., an organisation or a form of group) are called internal social relationships, while external relationships are those with other people. Internal relations are generally referred to as "bonding" (Adler and Kwon, 2002), while external relations are "bridging" (Woolcock, 1998), leading to the reference to bonding and bridging types of social capital.

Access to external resources was defined by Woolcock (1998) as linking social capital, which in the context of his definition of just two levels – micro (the community level) and macro (the society and state level) – are linkages to those outside the community who can provide access to these resources.

Halpern (2005: 25) views linking capital as "a special form of bridging social capital that specifically concerns power – it is a vertical bridge across asymmetrical power and resources." Halpern's definition is used in this article in accord with the view of Clark (2010) that linking social capital is used to "describe the ability of groups to engage vertically with external agencies to influence policy or access resources" (ibid.: 207).

Social capital is therefore about relationship networks that enable or inhibit certain outcomes; bonding social capital refers to what binds individuals and groups and what occurs inside these collectives, while bridging social capital links disparate groups to form an

extended network (Woolcock and Narayan, 2000; Grunfeld, 2011). The definition of social capital used is that by Farr (2004:9) who, following Putnam (1995; 2000), combined the concepts of networks, norms and trust to define social capital as:

> *…the network of associations, activities, or relations that bind people together as a community via certain norms and psychological capacities, notably trust, which are essential for civil society and productive of future collective action or goods, in the manner of other forms of capital.*

In a development context access to external resources are vital and hence we stress linking capital as a special form of bridging capital. The external resources are part of a larger system and therefore the scope of the system of interest should be described.

Social capital as relationship structures

To describe the role of social capital via a systems approach, Halpern (2005) summarised the debate between social capital as a macro-level concept referring to large scale networks (national, regional, community level) and as a micro-level concept at the networks formed at the family level. He focused on covering "both poles of the macro-micro division" as well as the reality of interactions in society such as substitutions of social capital at the one level for that at the other level (ibid.: 18).

Halpern (2005) therefore created a multi-level conceptual map in which the fundamental arguments are seen as describing a different dimension of social capital, all of which are largely independent of or perpendicular to each other. Three major dimensions were identified (ibid., 26):

1. components – networks, norms, sanctions
2. levels or domain of analysis – individual, group, community, nation, etc
3. character or function - bonding, bridging, linking.

The three levels and examples of the dimensions are depicted in Figure 1.

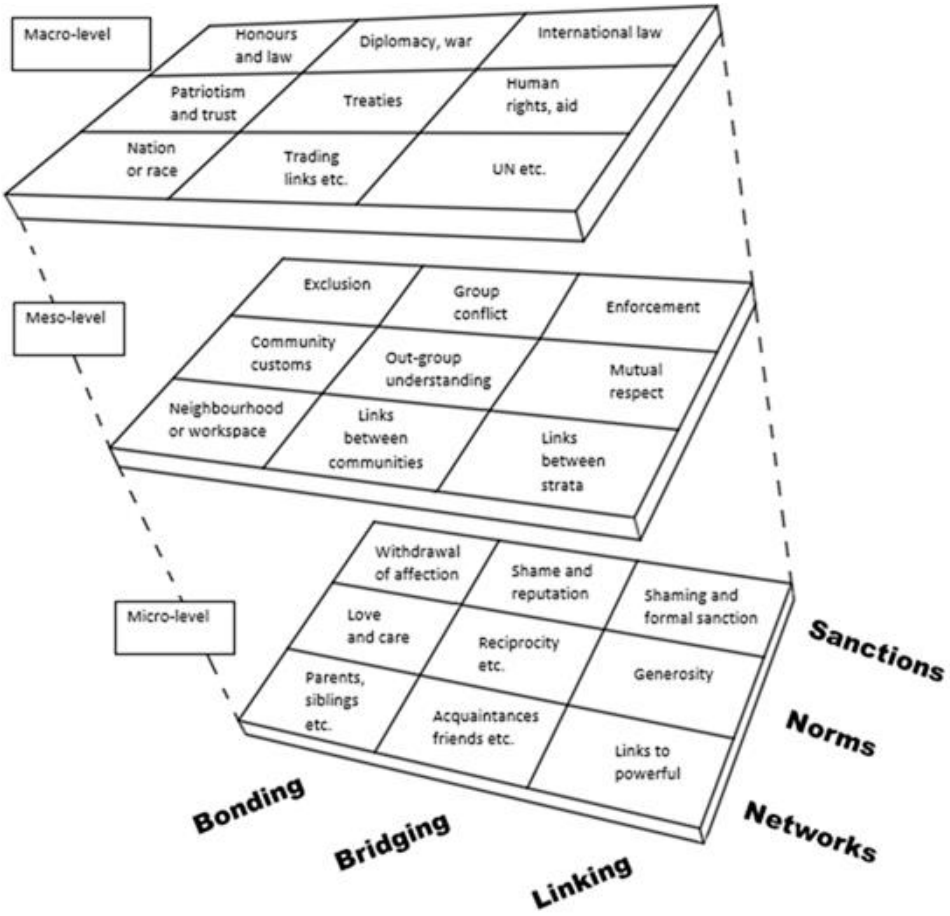

Figure 1. Social capital concepts, (Adapted from Halpern, 2005).

To illustrate how social capital varies across levels, consider that norms for bonding capital would be "love and care" at the micro level, "community and customs" at the meso level, and "patriotism and trust" at the macro level (ibid.: 27).

Social capital in sustainable development theory

Introduction

Three theoretical departure points were used in this research, namely the Choice Framework (Kleine, 2010), the sustainable livelihoods approach that uses the Sustainable Livelihoods Framework (SLF) (DFID, 1999), and human scale development (HSD) (Chigona, Pollock and Roode , 2009; Max-Neef, Elizalde and Hopenhayn, 1991).

The Choice Framework was developed to support the aim of translating Sen's capability approach at conceptual and practical levels into a systemic framework (Kleine, 2010). In Sen's Capability Approach to development (Sen, 1999) a person needs resources to achieve freedom of choice. The sustainable livelihoods approach includes livelihood assets, described as capital assets (e.g., social capital and financial capital) which are used to develop livelihoods strategies (DFID, 1999). The concept of resources or assets and to achieve development are present in both approaches.

The sustainable development strategy described by Chigona et al. (2009) is based on human scale development (HSD) principles, which relies on the bottom-up driven development of networks of relationships (social capital) around aligned interests between the different levels in society to achieve complementary top-down development support.

Social capital has been used as a conceptual framework to link a developmental initiative to the growth of collective action, via the building of networks and the associated embedded

resources in these networks (Thapa, Sein and Sæbø, 2012; Ostrom, 2000, Putnam, 2000; Díaz Andrade and Urquhart, 2009).

Woolcock (1998:162) used two complementary forms of social capital, called 'embeddedness' (relationships inside a group) and 'autonomy' (relationships with those outside a group). According to the concept of embeddedness, the spectrum from social practices to societal economic activity is seen as "inherently enmeshed in social relations" and therefore development changes the kind of embeddedness (:162).

Social capital in sustainable micro-enterprise development

The role of social capital in development is dependent on the theory of development that is used, the perspective on the practice of development and the actual context.

The context of the research is micro-enterprise development in resource-constrained rural areas in ICT4D, and therefore, the general problem statement is how to improve the sustainability of enterprise-led development using social capital. The assumption is that use of local resources (e.g., social capital) reduces dependency on external sources, which should foster long-term bottom-up driven sustainable development. To achieve sustainability, pathways need to be developed that will be dependent on many actors at different levels of society. From a bottom-up perspective, the question becomes how to establish fruitful interactions, between development actors at all levels to achieve the best-possible alignment of strategies and resource use. In other words, how to align top-down development to support bottom-up driven sustainable development starting from the local community.

Self-reliant human scale development, as conceptualised by Max-Neef et al. (1991), is aligned with the focus on social capital and therefore the definition of sustainable development adopted is (Chigona, Pollock and Roode, 2009: 5):

> *This sustainable development strategy can be applied in a bottom-up fashion to influence top-down development. The bottom-up driven development of networks of relationships around aligned interests between the different levels is required to achieve the necessary interdependence and complementarity.*

This sustainable development strategy can be applied in a bottom-up fashion to influence top-down development (ibid.). The bottom-up driven development of networks of relationships around aligned interests between the different levels is required to achieve the necessary interdependence and complementarity (ibid.).

The development of entrepreneurs for sustained growth

Max-Neef et al. (1991, p. 65) devoted special attention to the "invisible sectors or the micro-organizations" since they are often ignored, while they represent the reality of everyday life where productive practices link to collective survival strategies, and connections exist between social organisations, cultures, and business. In addition, this formed part of the strategy of HSD to complement other bottom-up development strategies by making the invisible sectors relevant rather than marginalised.

Duncombe (2006) pointed out the important role of infomediaries as livelihoods structures that arise from a livelihoods-based analysis.

Díaz Andrade & Urquhart (2010) in their research of a project providing internet access via information centres in rural Peru, found that villagers shared information with others and were termed 'social connectors' with reference to the usage by Gladwell (2002) of the terms connectors, mavens and mavericks to describe the behaviour of people in the diffusion of trends. Some individuals were seeking information on behalf of others in their group (e.g., farmers) to share with them, i.e., social capital in action. Information was communicated via networks of contacts and understood due to shared sets of meaning. This social connectivity behaviour was deemed to be supported by the cultural norm of reciprocity.

The Akshaya Telecentre Project used a franchising model in which a network of telecentres, after the start-up phase, had to sustain themselves financially (Madon, 2007, 2005, 2004). The design of the project model required that the telecentre entrepreneurs

perceive and function as the human link between the introduction and the use of ICTs by the community, similar to the role of VOs. This a pro-active function that has been called an 'intelligent intermediary' (Gopakumar, 2007:22), 'infomediary' (Mukerji, 2008:2), 'innovation intermediary' (Kilelu, Klerkx, Leeuwis et al., 2011), 'social connector' (Díaz Andrade & Urquhart, 2010), or 'champions' (Renken and Heeks, 2019). In these roles good relationships with customers are vital and therefore the building of various types of social capital is required.

Masiero (2011:13) described telecentre entrepreneurs as being more than change agents as referred to in the diffusion of innovation work of Rogers (2003), since they guide a customer from the first innovation decision (e.g., going to a telecentre) to an ongoing process of adapting and adopting ICTs to derive value.

Intermediaries can also bridge the gap between different classes of society in a market as a study in India determined (Bhatt, Qureshi, and Christopher, 2022).

The scope of the system in focus can grow from individuals and projects to systems and business models. This will be shown in the in-depth discussion of VO in the case study.

Views on the relationship between ICT and Social capital

The facilitating role of ICT in the building of social capital via enhancing information flows and connecting individuals was highlighted in previous research (Adam & Urquhart, 2009). Examples of research regarding the influence of ICT4D in rural areas are the work of Díaz Andrade and Urquhart (2009, 2010) and Yang, Lee and Kurnia (2009). Renken and Heeks (2018:1) recommended Social Network Analysis (SNA) as "a potentially useful theoretical and methodological approach for researching ICT4D topics".

The conceptual model of Grunfeld, Pin and Hak (2011:152) regarding "a virtuous spiral dynamic between the use of ICT and the building and strengthening of capabilities, empowerment, and sustainability" has also been used to reflect on the interaction between social capital and community engagement as "a virtuous spiral dynamic". Social capital triggers and sustains ICT projects in communities, while ICT projects trigger community engagement that strengthen the communities (Grunfeld, 2011).

In ICT4D research a major role of ICT use is in enabling communications that strengthen relationships of different kinds thus building social networks, therefore, in Woolcock's framework, ICT4D influences embeddedness at community level, called integration (intra-community linkages), and at societal level, synergy (state-society relationships). ICT4D influences autonomy at community level, called linkage (extra-community linkages), and at societal level the influence on the ICT4D initiative is via organisational integrity (i.e., institutional capacity, norms). The mutual influences between an ICT4D intervention and social structures at various levels are central to success and sustainability.

Simpson (Simpson, 2005; Simpson, Wood, Daws et al., 2001) found a social capital perspective useful in the development of a framework for understanding the complexities of implementing and sustaining community informatics initiatives and recommended that project design for significant and long-term impact should include support via the building of social capital as one of the key factors.

Different types of 'intermediary' and collaboration roles that emerge in and across the micro-, meso- and macro levels have emerged as mentioned in the previous section and the applications of these roles in ICT4D at these different levels were discussed by (Marais and Vannini, 2021). An example from the case study in this paper is the very important role played by a VO to set up an email account for an administration clerk at a school and teach the clerk how to use email and to read their email if their internet was down (Marais, 2016). This is an 'intelligent intermediary' that adapts to the communication needs of the clerk as well as the local reality of internet failure.

The following VO case study illustrates the application of the theory base.

Case: Village Operators in SA

The context of the Broadband for All project

In 2011 there was an estimated 26 500 public schools of which 17 000 were in remote areas that had poor access to digital communication facilities (CSIR, 2014; Roux and Marais, 2011. In the last twelve years there has been improvement, but it is still true that remote rural areas, with dispersed settlements, and limited disposable income, pose business challenges due to the high costs of infrastructure establishment, support and maintenance (Roux and Marais, 2011; CSIR, 2014).

The Department of Science and Technology (DST) initiated the Broadband Community Wireless Mesh Network project (referred to as the Broadband for All, or BB4All project) with the aim of bridging the market gap in rural areas by using new advances in wireless mesh network (WMN) technology, with schools as the area of focus. The research hypothesis was stated as follows (CSIR, 2014: 1):

> *The BB4All project aims to provide a cost-effective way of enabling reliable broadband connectivity in rural areas that will provide social benefits and grow rural economies.*

The rural areas in which the project was deployed, were the District Municipalities (DMs) of Sekhukhune in Limpopo Province, Nkangala in Mpumalanga and the John Taolo Gaetsewe in the Northern Cape as shown below (Figure 2).

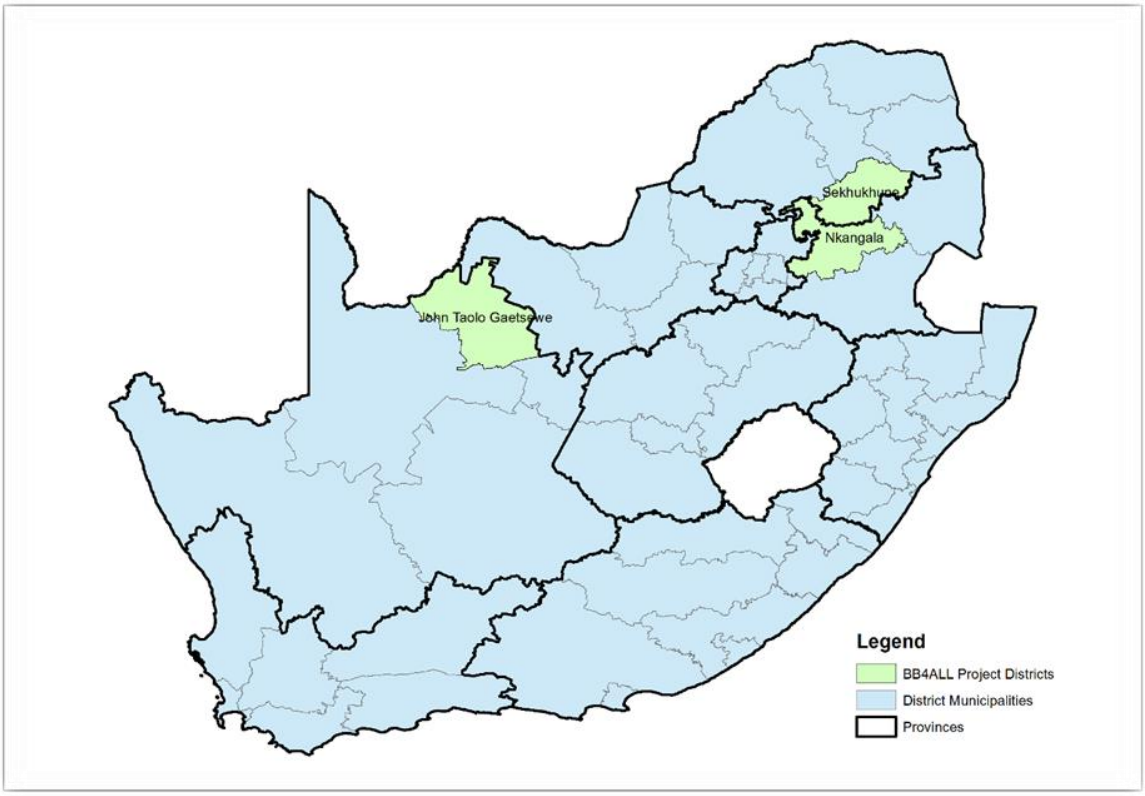

Figure 2. BB4All deployment areas (Marais, 2016)

The large distances between schools in the Northern Cape required a different business model. In the other deployments schools were clustered within a 10 to 15km radius (CSIR, 2014).

The BB4All project introduced the concept of VOs to provide a range of affordable ICT services to communities via entrepreneurs that provide local support and enhance use of connectivity provided in under-served areas, with points of access (mainly schools) via a WMN as a broadband solution. Economic sustainability of broadband access and service reliability were and are the key issues.

Clusters of facilities (mainly schools) were selected in Nkangala and Sekhukhune for implementation of the WMN and each cluster was connected to the internet via a gateway facility to the wireless backbone network. Figure 3 shows the location of the schools in these 14 clusters.

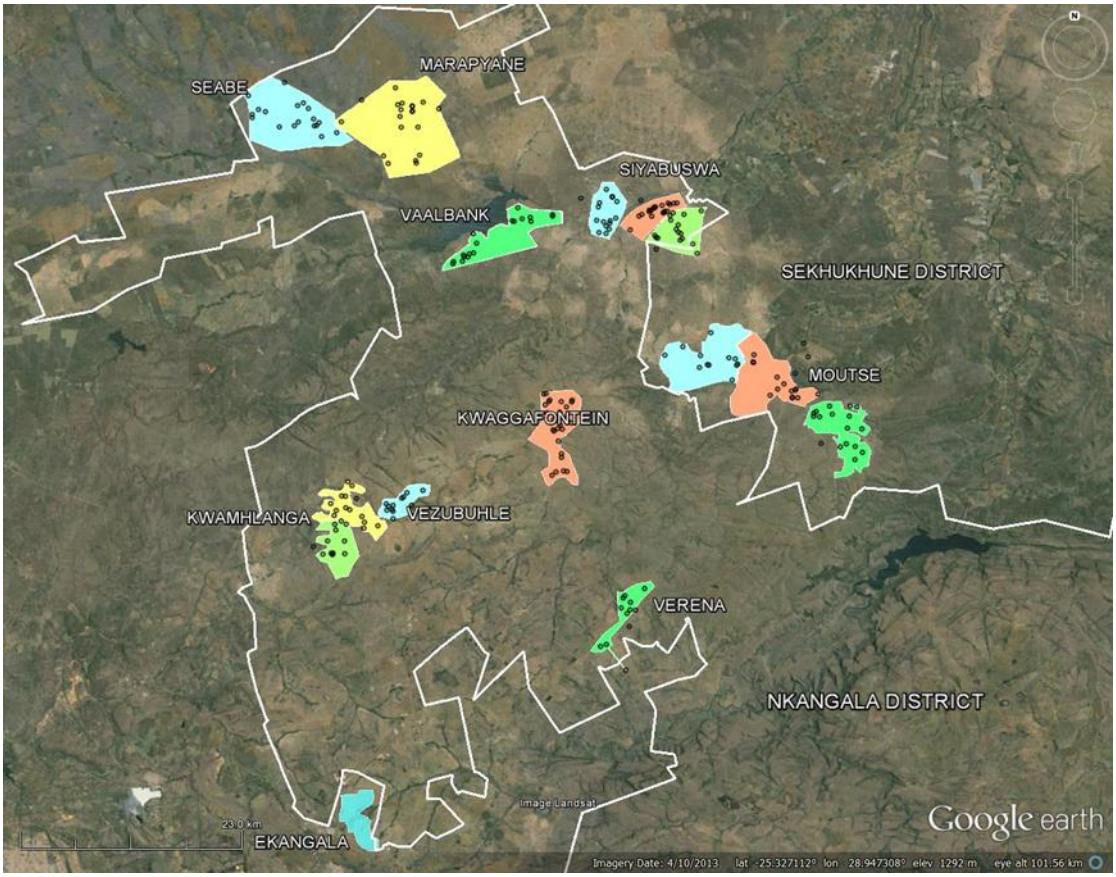

Figure 3. The 14 clusters of the Nkangala and Sekhukhune network (CSIR, 2014:32

The furthest VO office is located approximately150km north from the CSIR in the City of Tshwane, Gauteng Province

Research methodology and data collection

Methodology

The research paradigm chosen is interpretivist since the aim is to understand social capital, which is embedded in human and social interaction, and required that the researcher engage in the social setting investigated (the VO offices and school clusters) to learn about interactions from the participants' perspective (Orlikowski and Baroudi, 1991). This research is qualitative in nature and developed a single case study with embedded units of analysis (Scholz and Tietje, 2002; Yin, 2003), namely the different VOs.

Primary data were collected via interviews by using an influence mapping technique and observation, as well as project documents as secondary data.

Social capital is a relational construct and therefore the interview process had to explore the relationship networks of VOs and the meaning of these relationships to them at different levels, such as personal support, knowledge exchange and business dealings. This is a lengthy process and therefore the interview had to engage the VO and keep participation and focus levels high. Participatory influence network mapping (Schiffer and Waale, 2008; Schiffer and Hauck, 2010) fits this context and mapping was done by using the Net-Map process (ibid.). Network maps provides data that can be analysed via SNA algorithms to analyse the structural features of the network. The network map captures the nature and roles of actors and the type of interactions in the network.

Social capital and small business perspectives were used to describe the actors, and the types of relationships (links) that were considered. The typology of the relationships, i.e., the nature of the interaction and the orientation of the actors is described in Table 1. People have different orientations that influence the nature of the relationship. The relationship interactions are arranged in the usual order in which they were drawn and discussed.

Table 1 A typology of relationship interactions and orientation of the actors

Interactions in relationships	Orientation of actor	Comments
Giving advice	(IT)	An internet and IT orientation
Giving and receiving services	(E)	Entrepreneurial orientation
Paying money	(Dev)	Developmental orientation, i.e. they want to help you.
Bringing new clients (business referrals)		
Money flow		
Information flow		
Giving commands Commands: Power differences		
Commands: Demands of services		
Competing with		
The future: relationships to be strengthened or weakened		

After a few interviews, an additional link type was added: the command link was split into two – who has the power to command you or be commanded by you and who demands services, and who are you demanding services from.

The VOs assigned degrees of influence to actors at the very end of the interview process as a representation of the importance of the overall influence of this relationship. They could use as many stickers as they wanted to show the importance.

Interviews were held at the VOs' offices (Figure 4).

Figure 4 A VO with a completed influence network map

A summary of the interview was made by on the day after the interview or as soon as possible. The information from the influence network map, transcripts of the audio recordings and the interview summaries were loaded into a qualitative data analysis tool (QDA Miner, 2022), as the cases to be used in coding. Finally, a summary of each VO interview was made that collated all the information and captured the topics of interest. This was the start of analysis.

Of the 15 VOs who were members of the project at November 2012, 14 could be interviewed of whom four were female. One VO resigned before he could be interviewed.

Interviews with BB4ALL project members

Interviews were held with the two project members that had the most regular contact with the VOs, namely the field service manager (FSM) and the project manager (PM). The interview questions were mostly open-ended to encourage a free-flowing discussion. Examples of some of the questions:

- What distinguishes the VO model?
- Which VOs do you think are successful and which are less successful? (Please provide reasons).
- What types of relationships are important to success?
- How do these types of relationships influence success or failure?
- Who are the most connected/disconnected VOs?

The coding process

Coding was used to engage with the interview data, to reflect on the interview data to understand what it means (decoding) and when a code was used to label a passage, the encoding process occurred – "coding is decoding and encoding" (Saldaña, 2012:5). The coding process was driven by theories such as the collation of theories in Kleine's (2010) Choice Framework (e.g., development theory, social capital), entrepreneurship development, and selected theories and approaches used in ICT4D. Coding has a First Cycle and a Second Cycle, each with its own characteristic processes. The First Cycle is the initial coding of the data, while in the Second Cycle analytical skills such as "classifying, prioritizing, integrating, synthesizing, abstracting" (Saldaña, 2012:8) are used. Coding was used as the first step

towards further analysis and interpretation to develop themes and maybe assertions regarding VOs use of social capital and the use of social capital in ICT4D initiatives.

Results and Analysis

An initial discussion of the coding results is followed by the presentation of the case study to provide an example of the detailed information collected for coding. The analysis ends with a summary of the coding results. Due to space limitations the structural analysis of social capital is not included in this paper.

Coding results

After the First Cycle coding was done for all the VOs, which overlapped with the Second Cycle of reflection, it was realised that the coding results should be used, but not on their own. To capture the rich context of a VOs life a write-up was required that placed a VO at the centre. The objective was to describe the striking and unique features of a VO's story about being a VO. This tended to be at the category level. At the end of each VO case a summary phrase was written to try to capture what this VO made this VO unique. This led to the identification of patterns of VO life, i.e., a form of categorisation of the different ways of being a VO. For example, VO1's business was based on *providing personalised and flexible services to a variety of customers, based on trusted relationships* (further detail below). The results from the coding process are presented after this discussion of the rich context of a VO's life and business.

In-depth analysis of an individual VO case study

The analyses constituted a rich contextual description of the VOs as entrepreneurs, the personal and business relationships and the business outcomes in terms of services and the development of new relationships. VO summaries focused on three aspects, namely the customers and services, a short description of the VO business, and a discussion of the important or unique topics that emerged.

The types of customers and the main services provided to them were summarised in a table. The comments column was used to describe interesting aspects of either the VO to customer relationship, or the nature of the service.

A particular VO, namely VO1, was selected since a rich variety of relations was represented with significant innovation in services, some of which were also found in other VO businesses.

The VO1 summary in Table 2 is followed by a discussion of the important topics that emerged.

Table 2 VO1 Business summary

Customers	Services	Comments
Large businesses: Automotive company, service suppliers to the mines and a printing business	Typing Email Creation of email addresses Designing logos Personalised services	Produced invoices for the automotive company and emailed the invoices to their customers. Logos were designed for the printing company.
Small businesses: Furniture design, furniture stores, grocery store, liquor store, construction, automotive repairs, funeral parlours, attorneys	Typing and printing Doing tenders and quotations Email Internet access Anti-virus software updates Company registrations	Used accounting skills to compile tenders.
Landlord	Internet searches	
Schools (10)	Internet access	Did business with three of the ten schools.
Secondary school principals	Internet searches, emails (for administrative use)	Showed principals in their offices how to use internet and do email.
Administration clerk at primary schools	Emails Job applications Technical support	Set up email accounts for school and for clerk. Taught them how to use email and read their email if their internet was down. Applied for jobs online. VO visited school on her way to the VO office to provide technical support.
Teachers: Mainly High School	Internet assistance	A science teacher at a high school is an enthusiastic user. She had shown him how to apply to get a site open for access.
Learners: High School	Printing Internet research	Helped them with their assignments. Provided information about bursaries. Taught them how to search on the internet.
Learners: Primary School	Printing Internet research	For assignments
Pre-school centres	Printing, typing, binding	Reports for government
NGOs	Applications for Corporate Social Investment (CSI)	Preparation of a business plan and a business profile for the application
Individuals (unemployed youth, middle-aged people and pensioners)	Training Photocopies, printing, typing Internet searches	Computer, Internet and email training
Family Brother Father	Internet access Design and printing of logos	VO1's brother assisted in the office on a part-time basis. Printing on fabrics
Friends	Internet searches Emails	Friends did pay for printing and emails.

VO1 had developed many value-added services such as assistance with preparing tax returns, registering companies, preparing Corporate Social Investment applications for NGOs which involved creating a business plan and a business profile (VO1, 2013b). VO1 provided

computer assistance to the administration clerks of three schools out of her cluster of ten schools (ibid). Evidence of investment in the business, included two extra printers and a PC for customer use (VO1, 2013a).

VO1's office was located well in a small complex of shops next to the main road to the north of Siyabuswa, the regional service town.

VO1 received very good business support from her family since they were in business too. Her father owned printing shops and one was opened by her father in the same complex to serve their mutual business interests. VO1 created designs for his customers, and he referred businesses to her ((VO1, 2013b). Her husband was referred to as an "extra VO", since he went out to schools, while she mainly ran the office (FSM, 2013b). As a building contractor he was familiar with accounting and therefore businesses came to her office for support with tenders and quotations (VO1, 2013a). VO1 marketed his electrical and buildings skills (VO1, 2013b), an exchange of value between their two businesses. Her brother had a job but did help her part-time in the office (VO1, 2013a). She did not pay him, and she remarked that the real reason he volunteered was to meet young ladies at the office to get dates with them!

Customisation of services was important and reflected her sensitivity to specific needs and the high degree of trust of customers.

Empowering businesses to use the internet: VO1 had created an email address for a business, and she communicated with them via phone to get responses that she emailed to customers on their behalf. This not only saved them time, but also allowed them to use email and internet access which they did not have and did not know how to use (VO1, 2013a).

Personalised and flexible services at all hours: She assisted a group of middle-aged individuals who would contact her early in the morning whenever they needed her to receive a fax (VO1, 2013b:4). A group of women also came her office early (7h00) for computer training since she was a woman and a trusted person, a good example of bonding capital (ibid.).

In the case of a transport business that did school tours, she extended their business by making bookings with accommodation providers via the internet (VO1, 2013a). They fetched her after hours to go and assist them at their premises. Trust was built with a meso level entity and both parties benefited from this bridging capital. Business customers would work in her office until a quotation was completed and they would take her home if it was night (ibid.).

Taxi owners would come to her with piles of accounts for doing tax returns and in addition to payment for her service she received free transport from them in exchange for her help (ibid.).

Good support provided by the project team: She could call the technical manager of the BB4All project at any time (ibid.) to log calls for VO1 with the Service Desk on her behalf which then received prompt attention. Personal relationships may improve business efficiency, an example of use of the VO's linking capital to the project.

In summary: A business built on relationships and service innovation.VO1's business was providing personalised and flexible services to a variety of customers, based on relationships that she had built through her own efforts. VO1 benefited from the supportive relationships with her husband, father and brother that added skills and business referrals (use of bonding and bridging capital).

Summary of the innovation behaviour of VOs

The prominent themes present in nearly every one of the 14 "mini case studies" (or embedded units of analysis) were VO values, business strategies and the enabling and disabling factors in the VO environment (Marais, 2016). The three high-level themes that were distilled from the VO interviews are a Discourse of community service (VO values conformed to the meso level norms of their community), Networks of innovation (innovation via relationships as a key business strategy enabled by bonding, bridging and linking capital at micro- and meso-level) and Social capital (a relational basis for describing the enabling and disabling factors in each VO's environment, described as norms and sanctions). Networks of

innovation is the theme selected for discussion. The instances of innovation were grouped in the following clusters (Figure 5).

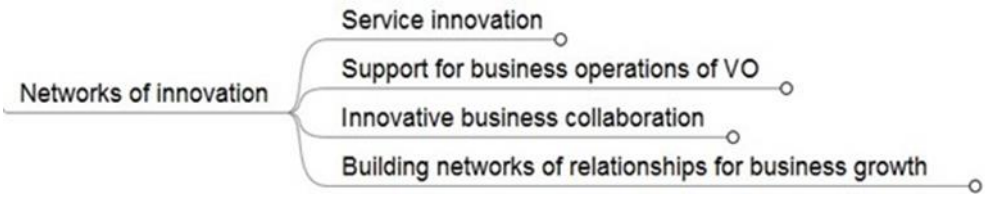

Figure 5 Mindmap of sub-themes (Marais, 2016)

The service innovation in the interaction between VOs and customers (Marais, 2016) included VOs responding to the diversity in their customers and the concomitant diversity in needs, the development of in-depth knowledge of the customers' needs and businesses, the use of networks of relationships to compete with other businesses (the general use of social capital of all types), and, in general, innovation via the use of business relationships to develop new businesses (linking capital at micro- and meso-level and the stimulation of entrepreneurship through relationships with friends (bridging capital at micro-level).

Innovative business collaboration was practised by many VOs and mutual benefit developed in very close relationships with other businesses. A common pattern was the sharing of the resources that were available in the VO office. VO customers ranged from first-time computer users (willing and unwilling) to organisations that wanted to use ICTs to improve their administration and other services. VOs enabled customers to benefit from internet use via personalised value-added services. VOs became 'service partners' who grows with you to meet your-ever evolving needs, rather than being just a provider of fixed services. This depended on the building of deep relationships based upon trust that develop over time. The degree of trust that developed was illustrated by VOs reading email on behalf of customers.

The value proposition of the VOs that emerged from this research had two major aspects (Marais, 2016).

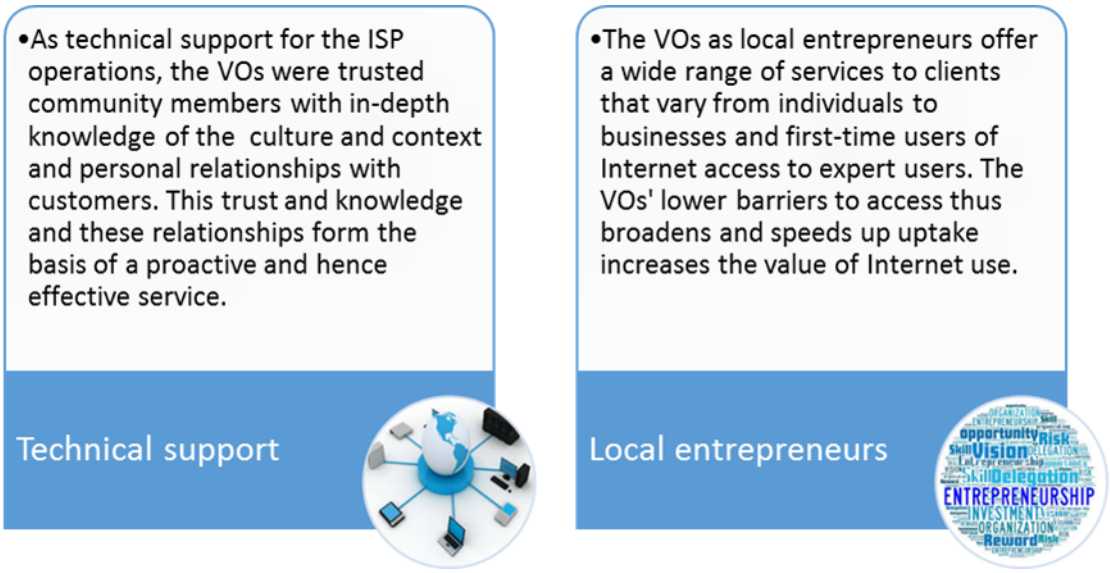

Figure 6 VO value proposition (Marais, 2016)

The VOs were more than just technical support people, they were from the local communities and understood that the needs where more than just using the Internet, but how to use the Internet and other ICT applications to fit their level of familiarity and computer skills. This understanding of the customer was the foundation for being entrepreneurs with a varied set of services that increased the uptake and value of Internet-based services.

The VO value proposition can be compared to the models mentioned in the section on "The development of entrepreneurs for sustained growth", for example, the Akshaya Telecentre Project model of telecentre entrepreneurs that perceive and function as the human link between the introduction and the use of ICTs by the community (Madon, 2007, 2005, 2004).

The VO model resulted in significant innovation in the use of ICT to benefit people's personal life and businesses. The trust required to enable this innovation rich relationships is essential and social capital as a concept enables a good description of the various relationship structures.

The types of relationships or links that were discussed in the interviews have a progression of level of trust. Sharing information (infomediaries, social connector) requires less trust than sharing knowledge, as does referring a friend to a VO business (bridging capital) or paying for services. The highest degree of trust is working together as a business with a VO to create new business services, i.e., the co-creation of business innovation and the VOs as 'service partners' who adapts to the ever-evolving opportunities (innovation intermediary, bridging capital at the meso level).

The social capital focus of this research has provided a rich description of the levels in the local social system as well as explanations for the trust required to be a "human link" or a particular type of intermediary. The strong relationships supporting VOs and their businesses is a major factor in improving sustainability of the support services and VO businesses. VOs have personal support from their families (bonding capital). VOs are also embedded in the business community and build upon trusted relationships with businesses developed over time (bridging capital). The diversity of the business services of VO1 is due to deep engagement with a diversity of local businesses, which is due to mutual trust. Sustainability is enhanced since the diversity of services and of businesses enable adaptability to respond to shifts in the local economy and the end of the project. The sustainability benefits from a diversity of social capital that is used to develop recommendations for project design that fosters sustainability.

Recommendations

The recommendations are about long-term sustainability of ICT4D initiatives. The conceptualisation, design and implementation, as well as the transfer of ICT4D initiatives for long-term sustainability, is covered.

Conceptualisation

Initiatives should start at the local level and not just top-down and drive alignment of interests from the bottom up. The development of VOs as local entrepreneurs drives alignment of interests and a sense of mutual interdependence through the natural process of translation of interests that develops between entrepreneurs and their customers in the development of services.

Development of customers at both the micro and meso level (community level) should be encouraged as this fosters alignment of interests between these levels and develops the linking social capital of entrepreneurs to the powerful. VO5's strategy was to grow the business by building relationships with people with influence, e.g., education department circuit managers (VO5, 2013a). Via these relationships as lobby group can be grown that can engage with the macro level decision-makers as partners with the project team and the project funder.

Design and implementation

Two key questions: “Who owns the problem of sustainability?” and “What is a viable strategy to achieve sustained benefit?”

“Who owns the problem of sustainability?”

Where does the intervention lie between the poles of market led ICT4D or socially led ICT4D initiatives? (Unwin, 2009). This determines the ownership model. The BB4ALL model was market led but depended on a Provincial Education Department (PED) as the largest customer who could afford the fixed costs such as the infrastructure and operational costs of internet access. Schools did not have the resources to pay for their own internet use.

An initiative is only a temporary facilitator of engagement with the real owners of the problem at the macro level, namely the PED in this case, to achieve early indication of their long-term intent regarding “taking over the initiative” and availability of resources.

What is a viable strategy to achieve sustained benefit?

- **Mobilisation of social capital:** Use the social capital developed during the initiative to mobilise the regional community (the meso level), i.e., participants and their networks, community leaders and the regional political leadership to make the benefits known to the key decision makers in the entity(ies) that own the problem. The facilitation of engagement with the real owners of the problem should be transferred rapidly to a collaborative structure consisting of a local group (e.g., the VOs, key leaders in the local society, schools, and parents) and representatives of the PED. A relationship with the local district manager was developed by the FSM (FSM, interview, 2013b). The project team management held a few meetings with the district manager who supported the project at the district level as well as at the PED. A key issue in BB4ALL is that DST provided the funding for the project but did not engage the PED sufficiently regarding the long-term sustainability (CSIR, 2014). The macro level relationship between these two government departments was not developed. A multi-pronged approach is required.
- **Market development:** Entrepreneurs should be encouraged to use personal relationship networks innovatively to grow the market for their services as this approach is more effective and credible and does not require money. The importance to entrepreneurs of being considered trustworthy should be inculcated since trust is the foundation for deepening customer relationships, thus expanding services and improving customer retention. Developing good customer relationships leads to services that fit customers, add more value, and increase paid use (see VO1 case study).
- **Training:** Initiatives should consider the addition of these training topics: social capital; social entrepreneurship; and innovation, especially co-creation of service innovation with customers.
- **Service design:** A pre-packaged definition of free (subsidised) services versus paid-for services would probably have constrained innovation. To address expectations regarding free services, the fundamentals of the business model should be communicated early as well as the shared responsibility between customers and entrepreneurs to build financial viability for sustainable long-term benefit. The shared responsibility can only develop via strong personal relationships.
- **Build networks:** Design initiative strategies to harness the power of networks. Entrepreneurs should be encouraged to develop networks to support the diffusion of innovation via bridging networks, share learning, and build capacity for collective action to the mutual benefit of entrepreneurs and customers.
- **Customer knowledge:** Focus on in-depth knowledge of customers to address the design-actuality gap (Heeks, 2002). A broader analysis may be required in which case

the model of Masiero (2016) should be used since it considers the interactions between the root-causes of design–reality gaps.

- **Brand protection:** Unfettered innovation can compromise future success by tainting the brand and the business values, and therefore broad guidelines should be developed via collaboration with entrepreneurs and customers, to become shared norms and the basis for sanctions at meso level.

Start with the end in mind: Transfer of ICT4D initiatives

A shared responsibility perspective should be adopted by the initiative and the participants to foster the acceptance by participants of the responsibility for their own future (a useful norm to develop). New opportunities develop due the very different perspectives and relationship networks (social capital) of the collection of participants versus that of a small project team.

- Design projects with an embedded parallel process that begins with the end in mind, in other words, mutual understanding of the sustainability issues is developed with participants and system owners from the start to develop and execute a participative transfer process.
- Develop knowledge of the social structure of the system or systems that own(s) the problem of sustainability to be able to predict when and who to influence and develop strategies to influence them to achieve the desired outcomes.
- The transfer process itself should be improved from a social capital perspective.
- Do a handover of key initiative relationships via personal introductions of the new 'initiative owner' to key persons in the communities to contribute to the building of the social capital by the 'initiative owner'. It reminds the key persons in the community that the initiative has ended - continued benefit to their constituencies is now their responsibility.
- Communication and consultation with stakeholders to inform them of the planned transfer process a reasonable time before the process commences. Major players must have time to react and interact to provide suggestions for improvement and consider which resources may be mobilised (making use of existing social capital).
- The transfer process can be influenced by mobilising all the social resources built up over the duration of the initiative and the resources available to participants by virtue of being local. A new 'initiative owner' should be assisted by a collaborative effort to demonstrate the overall value of the services to the community to influence the decision making of the key customer.

Conclusions

The adoption of a social capital perspective contributes to the businesses of VO entrepreneurs being more sustainable due to the trusted creative and flexible relationships with their peers and customers. Any consideration or design for a type of intermediary or enterprise support in ICT4D will benefit from the use of a social capital and relational framework approach. To gain access to local resources, projects should show the intermediaries how to determine their important local support networks and develop a strategy for expanding these networks for sustainable benefit for themselves and their customers in local and higher levels of the hierarchical system. The project must engage with entities that can take over the vital links to power. Recommendations have been provided regarding the design of the intermediary role to enable development of local capacity and enhance sustainability in ICT4D development strategies.

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