

THE VALUE OF EXTENDED NETWORKS: INFORMATION AND COMMUNICATION TECHNOLOGY INTERVENTION IN RURAL PERU

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Abstract: This interpretive case study discusses the implications of the information and communication technology (ICT) intervention in a remote village located in the northern Peruvian Andes. An integrated perspective, bringing together the ICT and social capital theories, provides a sensitising framework for this exploratory research. Using grounded theory method for the analysis of the stories of two villagers, the paper illustrates how the ICT intervention enabled a few people to gain or reinforce ascendancy in their village. The paper then discusses implications from the actual and potential consequences of ICT intervention in rural areas in developing countries.

Keywords: Information and communication technology intervention, social capital, rural areas, developing countries.

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1. INTRODUCTION

The potential benefits of using ICT networks have attracted the attention of both academicians and practitioners as a useful way to overcome everlasting problems affecting less favoured regions in the world. Walsham (2001) stresses the relevance of ICT since it “can be regarded as a political actant in the production and reproduction of knowledge, truth and power” (op. cit., p. 59) and concludes that “no society can afford to ignore these technologies at this time in history” (op. cit., p. 203). However, evidence linking access to ICT and social development is increasing, but largely anecdotal (Bhatnagar, 2003).

This research is designed to discover, through the lens of social capital theory, the consequences of using ICT in a remote Peruvian village. We try to answer the question: How does ICT influence social relations among villagers in a developing country?

2. ICT AND SOCIAL CAPITAL

In this section we present a summary of the established literature relevant to this study. Figure 1 represents our preliminary theoretical framework, which takes previous knowledge into account and provides the guide for the fieldwork (Eisenhardt, 1989; Walsham, 1995b). By no means, does it constitute a definite model. It is a “sensitising device” (Klein & Myers, 1999) that represents the assumptions that guide this research and assisted us during the data collection process. The preliminary theoretical framework should not suppress new issues arising from fieldwork evidence (Miles & Huberman, 1994; Urquhart, 2001; Walsham, 1995b).

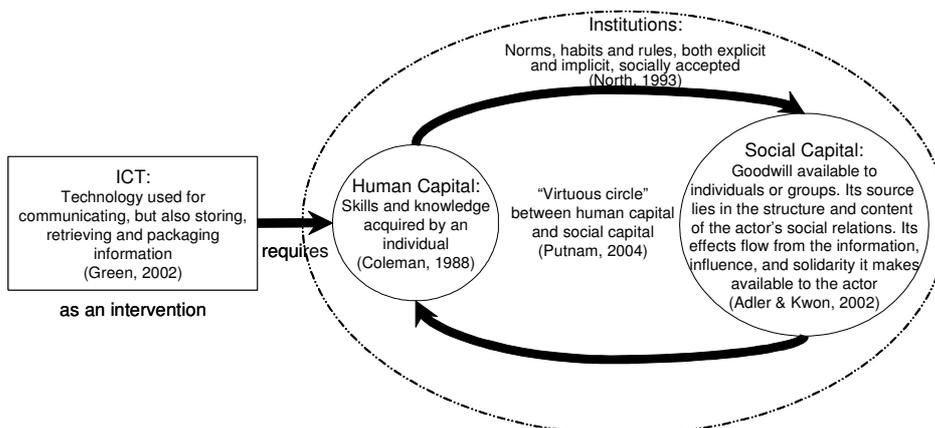


Figure 1: Preliminary theoretical framework

2.1. ICT and ICT intervention

In general, ICT is “the technology used for communicating, but also storing, retrieving and packaging information” (Green, 2002, p. xv); in particular, the technology that we are talking about is computers. An information system consists of not just the technology (hardware, software, data, networks) and/or the social setting (people, business processes, politics, economics, psychology, culture) but also the rich phenomena that emerge from the interactions between the two (A. Lee, 1999).

Technological intervention takes place when new ICT is inserted into a collective social space. Thus, the ICT intervention should be analysed through an examination of the interaction between technological innovation and social conditions (Avgerou, Ciborra, & Land, 2004).

2.2. Human capital and social capital: micro-level and macro-level

An ICT intervention requires fertile conditions to be effective. They are represented by the notion of absorptive capacity – the individuals’ ability to identify, incorporate and utilise new information, based on previous knowledge (Cohen & Levinthal, 1990). Absorptive capacity is embedded and underlies the concept of human capital – “the skills and knowledge acquired by an individual” (Coleman, 1988, p. 100). Human capital represents the micro-level perspective.

Achieving a successful technological intervention is not just a matter of access to computers, but people with the essential skills for interpreting contents are required (J.-W. Lee, 2001; Wade, 2004). However, individuals’ abilities are not enough if they are not participating in a community. We need social structures, which represent the macro-level perspective, in order to exploit the technological potential (Avgerou, 1998; Main, 2001). Cornford (2003) states that social capital becomes the crucial determinant of the capacity of societies to utilise ICT.

Since Bourdieu’s (1983) definition of social capital as “made up of social obligations”, the concept has been evolving. It refers to norms of trust and reciprocity existing in networks (Putnam, Leonardi, & Nonetti, 1993). Adler and Kwon (2002) define social capital as “the goodwill available to individuals or groups. Its source lies in the structure and content of the actor’s social relations. Its effects flow from the information, influence, and solidarity it makes available to the actor” (op. cit., p. 23).

We adopt this definition because it entails both internal (bonding) ties – the structure of relations among actors within a group – and external (bridging) ties – the relations an actor maintains with other actors. Coleman (1988) proposes that social capital fosters individuals’ human capital, and Putnam (2004) declares the existence of a virtuous circle between both human and social capital. Yet social capital has its “dark side” (Field, 2003), where strong networks can be used for negative purposes such as drug cartels and corrupt practices. The World Bank’s enthusiastic promotion of social capital has also been criticised (Schuurman, 2003) as a vehicle for promoting neo-liberal values and ignoring those communities that do not have the ‘right kind’ of social capital.

Huysman (2004) builds on Nahapiet’s and Ghoshal’s (1998) dimensions of social capital – structural, cognitive, and relational embeddedness – and Adler’s and Kwon’s (2002) sources of social capital – opportunity, ability and motivation to propose three domains of social capital. 1) Structural opportunity, ‘who’ transacts and ‘how’ social capital is transacted; 2) Cognitive ability, ‘what’ resources of social capital are transacted; and 3) Relation-based motivation, ‘why’ and ‘when’ the transaction takes place. These domains and components are shown in Table 1.

Social capital domains	Components of the transaction
Structural opportunity to share	‘Who’ and ‘how’
Cognitive ability to share	‘What’
Relation-based motivation to share	‘Why’ and ‘when’

Table 1: Social capital domains (Huysman, 2004)

2.3. Institutions

The aforementioned transactions do not take place in a vacuum. They are performed within established frameworks socially accepted and instantiated by norms, habits, and rules both explicit and implicit (North, 1990). A social constructivist approach supports the thesis that technology's consequence is ultimately a matter of interpretation by human actors according to their social circumstances (Madon, 2003).

“Our opportunities and prospects depend crucially on what institutions exist and how they function”, declares Sen (1999, p. 142). Analysing the consequences of any ICT intervention ought to include a portrayal of the particular context because “without an institutional lens, information technology research might focus more narrowly on technological designs, economic imperatives, or psychological impacts, thus missing important social, cultural, and political aspects” (Orlikowski & Barley, 2001, p. 154).

3. BACKGROUND OF THE ICT INTERVENTION

Given the nature of this research, there is a need for a rich description of the context where the ICT intervention took place (Avgerou & Walsham, 2000; Klein & Myers, 1999), and this section provides that description.

It began with the conception of the *Infodes Project* by Intermediate Technology Development Group (ITDG) a British NGO. In 2001 the *Infodes Project* provided library services through local information centres, ‘infocentros’, in six villages (Guillén Marroquín, 2004). Because they lacked Internet and even telephone services, ITDG deployed two additional projects: a broadcasting station for the region (Villafuerte Quiroga, 2003) and a rural telephony pilot project (Guillén Marroquín, 2004).

The particular ICT intervention discussed in this paper was initiated by the Rural-Urban Information System Project (Sistema de Información Rural-Urbano – SIRU) in the village of Chanta Alta in the Cajamarca region, in 2003. It was funded by a number of European NGOs, including ITDG, and seeks to “provide timely and useful information to local farmers, businessmen and government agencies to build up capabilities for local development” (our translation, Pereyra Romo, 2002, p. 5). An information system was implemented connecting the infocentros and the Coordination Information Centre in Cajamarca City, the chief city of the region, by satellite communications. Infocentros services include Internet access, phone calls and messaging, computer training courses and local broadcasting programmes.

3.1. ICT in Peru and rural Cajamarca

Since the mid 90's, the swift pace of ICT adoption in the Peruvian cities is chiefly explained by the burgeoning number of *cabinas públicas*¹ run on a profit-seeking basis by small entrepreneurs (Holmes, 2001). Rural towns, however, neither provide the market potential nor enjoy the infrastructure that the cities do. Almost 7.5 million, out of the over 27 million Peruvians, live in rural areas² (INEI, 2006). Nearly 80% of Peruvian rural inhabitants are below the line of poverty, while more than 50% of them live in extreme poverty (INEI, 2006).

Among all the Peruvian regions, Cajamarca encompasses the largest rural proportion: 75.3% of the cajamarquinos live in the countryside (INEI, 2005). Cajamarca region is one of the largest producers of dairy products and also contains Minera Yanacocha, one of the world's top five gold mines (Newmont, 2006). Paradoxically, Cajamarca lacks adequate

¹ As the Internet cafés are known in Peru.

² Rural areas are those with 100 or less contiguous dwellings or having more than 100, these ones are dispersed (INEI, 1999).

roads infrastructure, only 36.3% of its population enjoys electricity (Reyes, 2005), ranks 21st among the 24 Peruvian regions on human development index, and its population is regarded among the five poorest in the nation (PNUD, 2002).

3.2. Chanta Alta

Chanta Alta (3,800 metres above sea level) is a 2.5-hour drive from (68 kilometres north of) Cajamarca City. It has 539 inhabitants (MAQS, 2005), largely devoted to subsistence farming and stockbreeding. Its Saturday open-air market, where individuals trade and barter their products, attracts not only people from the nearby hamlets, but also traders from Cajamarca City. Chanta Alta lacks electricity, and the only telephone available is a satellite one at the infocentro; drinking water is provided with major restrictions and public sewage was made available in February 2005.

An identifiable informal association in Chanta Alta is the Peasant Organisation. Beyond its mission to combat cattle rustling, it provides strong social glue that unites the villagers around common goals, while creating strong links of reciprocity. Within the organisation, villagers organise the voluntary and unpaid communal work, which is a long established tradition. A handful of non-governmental organisations are present in the village. Two large private companies have major influence: a Nestlé Corporation subsidiary, which collects milk from local producers, and Minera Yanacocha, the gold mine corporation. The latter engenders mixed feelings in the village population; one folk muttered bitterly, "We cannot make them go out; so, they have to contribute to us because they extract our resources".

4. METHODOLOGY

This study is located on the "analytical borderlands" (Sassen, 2004), where cultural values and specific practices define the way of using computers. Our ontological assumption is that social reality is locally and specifically constructed (Guba & Lincoln, 1994) "by humans through their action and interaction" (Orlikowski & Baroudi, 1991, p. 14). Our epistemological assumption is that "findings are literally created as the investigation proceeds" (Guba & Lincoln, 1994, p. 111). Thus, an interpretive perspective was brought into play, where the researcher becomes the vehicle by which the reality is revealed (Cavana, Delahaye, & Sekaran, 2001; Guba & Lincoln, 1994; Neuman, 1997; Walsham, 1995a, 1995b). On pursuing this, we applied the case study research methodology (Yin, 2003) from an interpretive perspective (Walsham, 1995a, 1995b) to get a deep understanding of the anticipated consequences of the ICT intervention.

4.1. Data collection

The data collection process aimed to obtain information that shed light on the phenomenon's hidden dimensions. One of the authors was directly involved in the data collection process between 4th and 13th September 2005, as part of a four-and-half month stint in the field. This allowed the first author to live with the participants and to some extent enter their world, which confers an ethnographic approach to this study. A self-imposed condition for the fieldwork was to be flexible (Eisenhardt, 1989; Trauth, 1997; Yin, 2003) and adaptive (Yin, 2003). Sometimes, the current conditions took control of the data collection process. Sampling, which proved to be a major challenge in rural and remote Peru, was designed towards theory construction (Charmaz, 2006). Both enthusiastic users of and strong opponents to the infocentro were sought; none of the latter could be identified.

We used multiple sources of evidence, which were recorded, organised and analysed to corroborate our findings (Creswell, 1998; Yin, 2003). Focused in-depth interviews, field

notes and photographs were our primary sources. The interviews, conducted in Spanish and audio-taped, were key elements to uncover participants' understandings, experiences, feelings and motivations (Collis & Hussey, 2003; Tacchi, Slater, & Hearn, 2003; Walsham, 1995b; Yin, 2003) when using computers. Nearly 40 hand-written pages of field notes contain not only factual accounts but also researcher's interpretations of the observed phenomenon. We reviewed secondary sources too: ICT media content and documentary material.

4.2. Data analysis

Since the output of this research is to explain how social relations are affected in the presence of ICT based on data directly obtained from the fieldwork, we followed grounded theory technique as the method of analysis. That is "the discovery of theory from data" (Glaser & Strauss, 1967, p. 1) by coding textual data. Once again, the preliminary theoretical framework, depicted in Figure 1, helped avoid getting overloaded with data, but it may be revised and modified according to the actual facts observed during the fieldwork and should not be regarded as a rigid set of premises (Miles & Huberman, 1994; Walsham, 1995b).

We assigned labels to the units of meaning according to the codification procedure, which was assisted by NVivo[®] software, starting with initial codes (Charmaz, 2006). When naming them, we privileged *in vivo* words – "the terms used by actors" (Strauss, 1987; p. 33) – over sociological constructs, in order to hold firmly to what the data were saying (Glaser, 1992). We always kept in mind not to develop too many substantive codes that might dilute the core categories analysis (Glaser, 1992).

Then, we moved towards focused codes, those with higher inference power, to differentiate and combine the gathered data (Charmaz, 2006). Since we allowed "the data [to] speak to us... rather than imposing preconceived categories" (Urquhart, 2001, p. 129), we adopted the Glaserian version of grounded theory as opposed to the Straussian one³.

Through an iterative process, we discovered our emergent categories, the conceptual elements that explain the process under study (Charmaz, 2006; Glaser, 1992). They emerged from the application of the concept-indicator model (Glaser, 1978), contrasting pieces of data against other pieces of data through a "constant comparison" (Charmaz, 2006; Glaser, 1978, 1992; Glaser & Strauss, 1967; Strauss, 1987). We often had to compare, again, raw data to the new categories since some category boundaries are fuzzy. We also wrote analytic memos to build theoretical ideas around the identified codes (Charmaz, 2006; Dey, 1999; Glaser, 1978, 1992; Strauss, 1987; Strauss & Corbin, 1990; Urquhart, 2001).

Finally, from the categories, a major theme explaining the phenomenon emerged. Figure 2 represents the inductive thinking path.

³ Kendall (1999) presents a detailed discussion on the divergence between the authors of grounded theory.

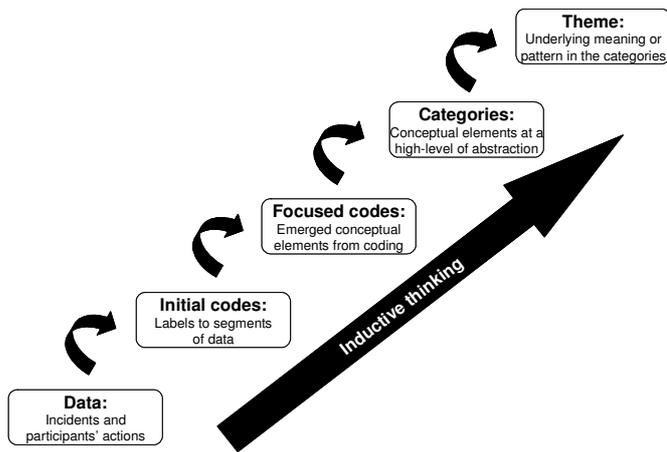


Figure 2: Inductive thinking path (adapted from Glaser (1992) and Charmaz (2006))

Strauss (1987) stresses that one of the requirements of grounded theory analysis is to engage the emergent theory with current theories. In this paper, one of the emergent themes of the grounded theory – ICT as a vehicle for ascendancy – is then viewed through the lens of social capital theory – one aspect of the sensitising framework.

5. THE FINDINGS

This paper examines two personal accounts about using computers. Arturo⁴ (28), the infocentro manager, and Alejandro (33), a farmer, who raises cattle, runs a small dairy shop and looks after other people’s livestock as part of his duties as a local livestock technician. In the following sub-sections we present a synopsis of the chain of evidence along the bottom-up inductive thinking process that led to the discovery of the two emergent categories as shown in Table 2 and Table 3.

Category	Focused codes	Initial codes
Individual capacities	Value of education	<i>Family expectations, seeing long-term benefit, comparing quality of education, demonstrating commitment, not seeing long-term benefit</i>
	Reading habits	<i>School demands, general interest, specialised interest, indifference towards reading, functional illiteracy</i>
	Learning computers	<i>Manifesting eagerness, formal setting, informal setting, implying the existence of other priorities, excitement on the novelty</i>

Table 2: Construction of Individual capacities category

⁴ Participants’ names are disguised.

Category	Focused codes	Initial codes
Individuals' attitudes	Recognisable characters	<i>Being famous, increasing recognition for computer abilities, being respected</i>
	Community leadership	<i>Organising activities, guiding role, representing fellow countrymen, setting goals</i>
	Urban exposure	<i>Personal purposes, acting as a delegate, professional purposes, business purposes</i>
	Degree of initiative	<i>Bringing initiatives, looking for better opportunities, can-do-attitude</i>
	Accepting modernity	<i>Not perceiving the benefits, daring to try with new ideas, acting as change agents</i>

Table 3: Construction of Individuals' attitudes category

5.1. From data to focused codes through initial codes

We start by presenting the data, i.e. participants' quotations, and the discovered initial codes, which are distinctively marked in italics. Retrospectively, we present the focused codes, constructed from the initial codes, as the headings of the next sub-sections.

5.1.1. Value of education

We need to comprehend people's expectations and interests in the process of knowledge acquisition to understand more about the social consequences of the technological intervention. For example, it is not an unusual situation in Chanta Alta and its surrounding hamlets that school students walk long distances, normally more than one hour, to attend classes (*demonstrating commitment*).

However, villagers recognise their disadvantage when they talk about education opportunities. Indeed, Arturo and Alejandro completed high school in Cajamarca City (*comparing quality of education, family expectations*). Alejandro moans, "Education became worse because teachers do whatever they want... they come to classes whenever they want and nobody cares" (*comparing quality of education*).

Alejandro declares, "Education is essential for development" (*seeing long-term benefit*). However, we observed a high rate of drop-out at the school; not a few villagers prefer their children working at their land instead of spending their time at school (*not-seeing long-term benefit*). And girls seem to drop-out more readily than boys (*not-seeing long-term benefit*).

5.1.2. Reading habits

Another emerging aspect was people's inclination, or not, for reading. In a village where there is no public library, newspapers are not available at all and the few books at the infocentro are untouched and dust-covered (*indifference towards reading*), Alejandro's eagerness in reading information about stockbreeding is remarkable. He periodically receives information about animal research from a website he has subscribed to (*specialised interest*). In addition, he seizes the opportunity to read newspapers on his weekly travels to Cajamarca City (*general interest*). Students only read for completing assignments (*school demands*).

Many women hardly read and write. For instance, the lady managing the local restaurant barely writes her name and is not able to prepare a receipt (*functional illiteracy*). When a movie was screened – using solar panel energy – most of the female spectators could hardly make sense of the quick-running sub-titles scripts (*functional illiteracy*). In general, women are devoted to chores (see Figure 3).



Figure 3: Chanta Alta woman weaving on a traditional loom

5.1.3. Learning computers

The previous findings lead us to explore the process of learning computers. Alejandro asked a forestry researcher to teach him how to use computers (*informal setting*); he learned in Cajamarca City even before the infocentro was launched (*manifesting eagerness*). Later on, he encouraged his livestock technician colleagues to ask ITDG for a training workshop (*manifesting eagerness*). He asserts, “We all three were trained in computers and Internet” (*formal setting*).

Arturo recalls, “I thought it was too late for me, that I would never be able to use a computer [...] I could use neither the mouse nor the keyboard”. When he was appointed as infocentro manager, he received training and overcame this deficiency (*manifesting eagerness, formal setting*). Afterwards, he offered basic computer training to the villagers (*formal setting*), “They liked computers very much. They never had access to one... they looked very happy... they learnt, they went a step further” (*excitement on the novelty*).

Nevertheless, Arturo admits, “The most important thing for them was to use the computer at a basic level” (*implying the existence of other priorities*). Probably, learning computers was an attractive experience, but it was beyond their real interests. Alejandro concurs that only a few people are able to use computers and adds, “I think I am the most interested among my colleagues in learning computers and the one who uses it the most” (*implying the existence of other priorities*).

5.1.4. Recognisable characters

It was easy to find the most renowned persons in the village; people spontaneously coincide in mentioning a few names. Arturo makes explicit his satisfaction in his recognition, “I am very famous; not only in Chanta Alta but also in the surrounding hamlets” (*being famous*). He proudly affirms, “People have always had high respect for me” (*being respected*).

Alejandro acknowledges that his involvement in planning for running a small farming business in 2001 prompted his subsequent nomination as a livestock technician promoter.

He recalls, "When ITDG had to decide for someone to be trained, that person should be acknowledged by the community with a relative degree of recognition and acceptance" (*being respected*).

But that is not the complete story. Alejandro says that he brings to the villagers the information he obtains from computers (*increasing reputation for computer abilities*). Arturo's role as infocentro manager makes apparent this benefit, "I enjoy being recognised as the infocentro manager... I want to learn more how to interact with people because it helped me to increase my contacts; it made me even more famous..." (*increasing reputation for computer abilities*). He reflects on new attractive opportunities, "Thanks to the infocentro I could meet other people and high-profile persons" (*increasing reputation for computer abilities*).

5.1.5. Community leadership

The fact that the non-governmental organisations working in the zone avoid appointing anyone as a representative without villagers' approval constitutes an unambiguous indication of the community's ability to recognise its leaders. Alejandro was elected president of the school's parents' association (*representing fellow countrymen and women*). Once in charge, he "exerted pressure on Minera Yanacocha to build four classrooms" (*setting goals*). He recalls, "We had a meeting, where I raised the scheme for each parent to work for four days" (*organising activities*). He concludes, "Everybody agreed" (*guiding role*).

During the interview, Alejandro illustrates other instances of his leadership in Chanta Alta; i.e. "I encourage my colleagues to visit a specific website" (*guiding role*). Although not so remarkable as Alejandro's, Arturo shows some leadership traits. He is proud of his contribution in reorganising the Peasant Organisation, "We have reorganised it. Today we are working very well; the infocentro was the venue for the initial coordination" (*organising activities*).

5.1.6. Urban exposure

Everyone in Chanta Alta has visited the surrounding hamlets and Cajamarca City at least once during their lives. However, not many people have been exposed as many different environments as the interviewees. Arturo, besides his regular meetings for SIRU Project at Cajamarca City (*professional purposes*), has visited other Peruvian cities for various reasons. He declares, "I participated in regional and national tournaments in Lima, Huancayo and Trujillo" (*acting as a delegate*). And his qualities both as a painter (*professional purposes*) and musician (*business purposes*) brought him to different places in the Cajamarca region.

Alejandro travels to Cajamarca City almost every week to bring goods for his dairy shop (*business purposes*). He takes advantage of his time in there to visit cabinas públicas to get some information related to stockbreeding and be in touch with some contacts in both Peru and overseas. He has visited Lima only once when he got his passport for a failed trip – due to budgetary constraints at ITDG – to Italy, where he was supposed to attend an international conference about organic food (*professional purposes, acting as a delegate*).

5.1.7. Degree of initiative

The participants instinctively expressed their commitment in pursuing certain objectives. Since they are distinguished persons in Chanta Alta, their efforts in achieving their goals drag other people along. For instance, Alejandro pushed himself and other people, "We were incorporating a small business... we were around 15 people" (*bringing initiatives*). He declares he wants to use his knowledge and will to get better opportunities for the village (*looking for better opportunities*).

Arturo reveals his determination when he had to deliver a computer workshop for 28 people having only one computer. He declares, "It was not difficult for me, I did manage to deliver it". He was very creative, "I asked them to bring typewriters... So, the one who did the best typewriting exercise was ready [to sit in front of the computer]" (*can-do-attitude*).

5.1.8. Accepting modernity

The above-explained participants' dynamism, however, is not the common denominator in the village; it seems that almost everybody takes for granted the hard life they experience. Villagers need to see concrete results before adopting new ideas; Alejandro reflects, "It is difficult to make people change" (*not perceiving the benefits*). But he acknowledges any change takes time and is part of a process, "There are people who are changing... They want to improve their work and to increase their production. You have to accept risks" (*daring to try with new ideas*).

It is in that process where Alejandro and Arturo – the former more than the latter – instinctively turn into models for the rest of the villagers (*acting as change agents*). Alejandro, through everyday face-to-face contacts, shares with the villagers his knowledge on stockbreeding. Arturo, through the information he gathers, from SIRU Project, to be disseminated both at the infocentro and his weekly radio programme, is also a change agent.

5.2. From focused codes to emergent categories

Now it is time to put together the heretofore-unconnected ideas. We put together the most relevant and conceptually-linked focused codes "in terms of how well-founded they are in prior experience [and at the same time recognising] the value of holistic understandings" (Dey, 1999, p. 147). Two categories emerged from this process.

The evidence leads us to conjecture that only a few individuals made an effort in building special abilities, mainly regarding computers. Therefore, when we group together the discovered focused codes value of education, reading habits and learning computers, the **individual capacities** category emerges. It represents the way people strive for nurturing themselves or nurturing by others.

Similarly, the following focused codes make up the **individuals' attitudes** category: recognisable characters, community leadership, urban exposure, degree of initiative and accepting modernity. This category stands for the way of thinking and approach of our interviewees when dealing with other people and when facing both challenging and new circumstances.

5.3. Shaping the theme

So far, we have discovered two categories. An holistic analysis in the presence of the ICT intervention shapes the core theme. The evidence indicates that those individuals who enjoy a prestigious position, both by their knowledge and by their attitudes towards the villagers when accessing information through computers, consciously or unconsciously, strengthen their guidance role in the community.

Indeed, we discover that ICT is a useful vehicle the participants use for gaining ascendancy. It became a catalyser that reinforced or generated appreciation for individuals before their peers. We do not affirm that using ICT by itself enlarges individual status, but those who enjoy a prominent position in the village can increase this feature by using it. We reconstruct the whole story and put in context the role of the technological intervention.

Alejandro elucidates the benefit he obtained from a virtual friend, who provided an effective solution to the villagers' problem:

“My level of knowledge has increased. For instance, in the past I had a problem with the cows in this area; they had sores in their udders. So, I brought this problem [online] to a Mexican doctor; he asked me some questions and suggested possible solutions. He told me, ‘Do this. We always do in this way; try with your cows’. What can I say! He looked very interested. The next time [we met online] he asked me, ‘How did it go?’ I told him, ‘Yes, it is working’. It makes it easier to have different alternatives”.

In turn, Arturo recognises the benefits from his computer abilities and how he uses them for the community:

“I received computer training in Lima... I took advantage from it and did it well [...] My motivation, overall, is that I have always liked sharing with the community. Sharing what I have learnt and giving it to them. That is what I like the most; teaching to the community”.

6. DISCUSSION

Before discussing the emergent theme, it is important to note that the findings indicate that the majority of the villagers have not embraced the technological intervention. There are a number of possible reasons. A slow speed access to the Internet (9.6 kbps), an hourly-fee for computer use (S/. 1.50) greater than the water monthly bill (S/. 1.00), the limited features of the computer (i.e., no text processor), the restricted computer availability (only one computer for two hours a day) and even quarrels with the infocentro manager’s family prevent most villagers using the computer at the infocentro. For instance, Alejandro only accesses computers from *cabinas públicas* in Cajamarca City.

Alejandro and Arturo recognise the computer’s value not only for their everyday activities but also for the village as a whole. They reinforce their ascendancy and observable position before the villagers through the information they get from computers. But they do not replace their face-to-face contacts at all; rather the contrary, they enjoy interacting personally with people. They are keen on transmitting the recently obtained information to their fellow countrymen and women. By no means, using computers has left them aside from communal life. Instead, it has opened new sources of information to them; as Alejandro points out, “It makes things much easier”.

We can only speculate about the participants’ personal motivations in using computers, but what emerged from the analysis is that the information they obtain from computers strengthens their leadership position. The key point from a social capital perspective is that they are in a dual, and privileged, position. On the one hand, they feel strongly attached to current issues within the village, i.e., participation in communal organisations and activities; instantiating the bonding form of social capital, which gives cohesiveness to the collectivity (Adler & Kwon, 2002). On the other hand, they are the village’s agents who interact with the external world, mainly by using computers; representing the bridging form of social capital that links them to actors in other networks (Adler & Kwon, 2002). Both bonding and bridging forms of social capital are interacting on each other, making evident the “strength of the weak ties” (Granovetter, 1973).

In order to address our research problem, we engage the emergent theme with Huysman’s (2004) domains of social capital summarised in Table 4. First, as regards the structural opportunity domain, we observe that our participants (the ‘who’) act as brokers of information over the technological network (the ‘how’). They are agents bringing information from external groups to the community. They become a node linked to several other networks; the information they get from external ties is immediately transferred to the village through internal ties. As a result, our participants become what we name ‘activators of information’ and set in motion collective action (cf. Krishna’s (2002) Active Social Capital).

Second, the cognitive ability domain demands the parties involved in the transaction to understand one another. Both participants exchange information (the ‘what’) with other

nodes in the extended network. Arturo receives produce market price information from SIRU Project to be shared with the villagers. Alejandro's ability to interact with veterinarian specialists and translate the received information to local people exemplifies the exchange of knowledge.

Third, the relation-based motivation domain in these transactions is based on norms of trust and reciprocity (the 'why'). For instance, when Alejandro solved the problem of the villagers' cows' udder sores, he not only trusted the Mexican doctor but local people trusted him too; consequently, reciprocity between Alejandro and villagers, and between him and his contact, is reinforced. Moreover, this initial exchange of information built a relationship beyond the casual and self-interested interaction. Because of the restrictions to infocentro opening hours, described above, the 'when' of the transactions is potentially affected, but it should be noted and individuals such as Alejandro seek alternatives to the infocentro.

Social capital domains	Illustrative components of the transactions
Structural opportunity to share: 'who' and 'how'	Alejandro and Arturo brokering the information they receive from their outside contacts to the villagers in Chanta Alta.
Cognitive ability to share: 'what'	Personal capacities allow them to process the information they receive before sharing it with the villagers.
Relation-based motivation to share: 'why' and 'when'	The relationship is based on, stimulated by and subsequently reinforced by trust and reciprocity among the parties.

Table 4: Social capital domains and their components observed in Chanta Alta (adapted from Huysman (2004))

The concept of social capital has demonstrated to have both theoretical and practical implications for ICT intervention initiatives. The findings suggest social capital provides the fertile conditions that produce a multiplier effect for any developmental initiative. Thus, promoters of ICT deployment initiatives should take into account the local expressions of social capital when deciding the implementation of this kind of projects. Launching such initiatives in communities where expressions of social capital are weak might have no beneficial results.

7. CONCLUSION

The ICT intervention in Chanta Alta has not altered common practices and not replaced face-to-face encounters; they are still very part of local culture. However, some individuals, who already participated in active networks outside the town, were able to envisage the potential benefits of the ICT intervention.

When these computer enthusiasts started either interacting with other people or simply obtaining new information they gained a larger degree of exposure compared to their fellow countrymen and women. When they connect Chanta Alta to the external world, they activate weak ties. When they bring the acquired information and knowledge to the town, they not only reinforce the strong ties within the community but also reinforce their leadership and guiding position before their peers.

It seems that the technological intervention is unlikely to be adopted and exploited by the majority of rural inhabitants. Nevertheless, the evidence suggests that some individuals, generally the leaders, the more respected, and the more exposed to different environments,

will be enabled to convey the acquired information and link their external contacts to their strong local network.

8. REFERENCES

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