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> The Informational Life of the Marginalized: A study of digital access in three Mexican towns

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Abstract

This study is part of the discussion about the impact of the adoption of information and communication technologies (ICTs), particularly broadband, on poverty reduction. It identifies the opportunities and challenges regarding the impact of ICT adoption in rural communities with different levels of marginalization and connectivity: Las Margaritas in Catorce, San Luis Potosí; Santiago Nuyoo in Tlaxiaco, Oaxaca; Cruz del Palmar, Estancia de Canal and Los Torres in San Miguel de Allende, Guanajuato.

One of the main advantages of broadband access is that it provides information and services that would otherwise be unavailable in communities with low socio-economic development. However, our results suggest that in order to exploit this advantage, access must be accompanied by a goal designed to improve residents' livelihoods. Comparing communities with different modes of access highlights the transformative role of training, particularly of training by infomediaries, in altering community members' previous conceptions of the potential of the Internet. The case of San Miguel Allende demonstrated the effectivenes of the role of young family members as infomediaries as they share common assets and thus have the right incentives to search for information that would increase family incomes. Likewise, "learning by doing" and "learning by watching" are especially important in ensuring that the impact of ICTs extends beyond the youths who attend school and constitute the majority of users of shared access centers. Our results indicate that mobile connectivity accompanied by effective training is a very powerful universal access tool.

Testimonials from the town of Las Margaritas, the control case without connectivity, reflect the costs associated with isolation. The main industry in the community, the Flor del Desierto Cooperative, already has a demand for its products on a website its members cannot access.

In summary, research shows that permanent access to broadband and effective learning-by-doing training enables populations at the base of the pyramid to develop new skills; engage in new practices; and find useful applications and functionalities for old and new abilities and interests. Thus, mobile access and an unlimited Internet connection help improve the relative position of the sectors studied while enabling them to accumulate human, social and financial capital.

1. INTRODUCCIÓN

The technological optimism that began in the 1990s with the expansion of information- and knowledge-based economies not only promised to promote economic growth but also to reduce social exclusion. This optimism was fueled in academic circles where the sub-discipline known as ICT4D (Information Communication Technology for Development) arose. From this perspective, information and communication technologies (ICT) are conceived as a disruptive innovation and a revolutionary step towards development, which Manuel Castells has called the "Information Age" (Castells, 1998).

Since then, however, this optimism, particularly in academic circles, has declined. Advances in ICTs have undoubtedly had a significant impact on the lives of the poor. The phenomenon of mobile phone adoption has facilitated communication, thereby decreasing transaction costs and strengthening the social capital of the most vulnerable population. However, the expected quantum leap in the "information age" for marginalized groups has yet to take place. Initial analysis as to why initiatives seeking to spread the adoption of ICTs in marginalized communities have not been successful indicates that they tend to focus on providing the technology rather than solving specific community needs by the use of a technology.(Heeks, 2002).

Today, a new impetus has arisen due to the diffusion of broadband, a general-purpose technology offering applications that allow access to services with a potential high development impact such as e-health, e-government and e-education. This has given rise to a second generation of universal access policies. In Latin America, as well as other regions, several countries are developing National Broadband Plans, which will

deploy new ICT infrastructure networks thanks to large public or private investments. In this context, it is relevant to explore the impact of broadband access on marginalized communities and more importantly, to identify the mechanisms through which it contributes to the achievement of development objectives.

This research seeks to contribute to this knowledge by exploring how the adoption of ICT, particularly broadband, contributes to enhancing the development of marginalized communities. To this end, it uses the analytical lens known as the livelihoods framework, which views access to information and communication through ICTs as part of a broader development process, avoiding excessive emphasis on technology as a central tool for alleviating poverty. Going beyond the techno-centric perspective, livelihoods represents a new generation of literature in the area of ICT4D, which views ICT as a tool for strengthening a broad range of economic, social and political assets owned by the poorest populations. The central question is whether ICT access enhances these assets within a context of lack of access to information and communication resources. The underlying hypothesis is that the adoption of new technologies creates a transformation in the livelihoods of people that empowers their capacities through participation with other actors in society.

This study includes an exploratory study of rural communities with different levels of connectivity. It was conducted on the basis of flexible design guidelines (Mendizábal, 2006), using an ethnographic approach. Using this perspective, fieldwork was conducted between November 2012 and April 2013 in three locations: Las Margaritas in San Luis Potosí; Santiago Nuyoo in Oaxaca; and San Miguel de Allende in Guanajuato. These sites represent a rich observation laboratory, making it possible to compare three cases with completely different connectivity levels.

The first case—the community of Las Margaritas, a remote rural locality—lacks ICT access and displays the lowest level of development among the communities studied. The lack of local economic development has resulted in limited employment opportunities and very low exploitation of natural resources due to the ongoing drought. However, Las Margaritas is home to the Cooperativa Flor del Desierto, a cooperative that produces healing creams. This organization has provided resources for families and is an important tourist attraction, which has led social organizations linked to the community to offer these products on the Internet. Due to the lack of connectivity, however, its members have no knowledge of these websites, about their potential buyers or the market prices. This therefore constitutes a fertile case showing the costs associated with the lack of incorporation of ICTs in their daily lives. Connectivity in this community could raise the community's income and expand sources of employment through increased sales.

The second case—the rural indigenous community of Santiago Nuyoo, Oaxaca—has fixed connectivity shared access through the installation of a government sponsored Community and Learning Center, Internet cafés and, recently, a local mobile service that enables residents to access mobile banking.

Lastly, the third case—the town of San Miguel Allende, Guanajuato—combines fixed and mobile access through an intervention led by DIRSI with the support of a local NGO and tablets with unlimited Internet access donated by Nextel. Within this village, three semi-rural, sparsely populated communities were studied: Cruz del Palmar, Estancia de Canal and Los Torres. As a result of the intervention, at least one family in each of these communities has access to an unlimited broadband connection through a mobile device. The direct beneficiaries were students who were

initially trained on the use of searching tools and on how to become instructors within their immediate families.

The comparison of communities with different modes of access shows the importance not only of access but also of training in broadband use beyond the initial conceptions individuals may have of the benefits associated with ICTs, in particular broadband. Through the second and third cases, this paper demonstrates that people discover new potential benefits through effective training. In this task, the role of infomediaries is crucial, as is "learning by doing," since it allows more fluid, permanent communication with primary social ties, and subsequently results in the creation of contacts with institutions, service providers and authorities that enhance their human, social and financial capital.

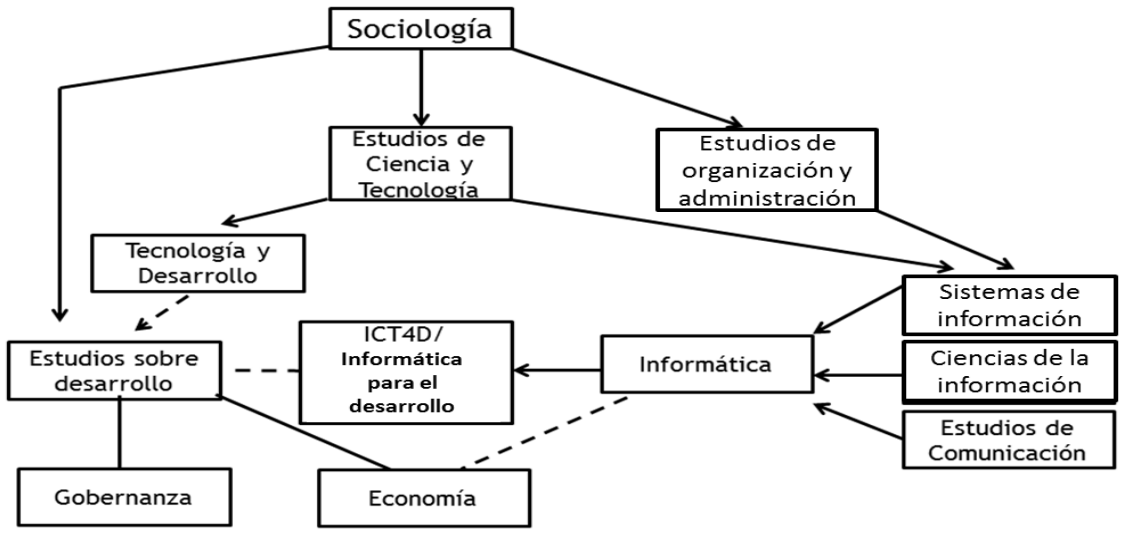
This paper begins with a review of the evolution of the literature used as the analytical lens in this research, which examines the theoretical links between ICTs and poverty. Secondly, it identifies their socioeconomic and connectivity conditions. Thirdly, it analyzes the evidence yielded by this research in the form of testimonials from members of the communities examined. Lastly, the main research findings are summarized with the aim of orienting policymakers in the mechanisms through which ICT access and broadband in particular may contribute to alleviate poverty.

Analytical Framework

The central concept in the literature on information and communications technology for development, known as ICT4D, is development. This concept has been explored by a number of scholars from different fields, each perspective having different interpretations of what this means and therefore how it can be achieved. It comprises a wide range of interpretations related to “progress” or “growth” and it is the subject of a broad debate as to how to achieve them.

It is not the purpose of this study to discuss this concept; it suffices to say that understanding development is at the center of all ICT4D activities. From this perspective, ICTs are a mechanism for achieving the goal of equitable development within society reducing social exclusion as a result. In addition to development studies, Richard Heeks (2007) points out that ICT4D is also influenced by sociology, organizational studies, economics, communication studies and information systems (Figure 1).

Illustration 1. ICT4D Disciplinary Base



Source Heeks, 2007

Some authors trace the emergence of the sub-discipline of ICT4D to the late 1990s, driven mainly by the optimism of researchers and policymakers for the potential of ICTs. The conception of ICT4D perceives the role of these technologies as a disruptive innovation and a revolutionary step in the history of mankind, a process which Manuel Castells has called the "Age of Information" (Urwin, 2009). One of the main reasons behind this optimism is the possibility of a quantum leap in development through the use of technologies such as the Internet that would increase productivity and give rise to the knowledge society (Urwin, 2009). Internationally, this perspective has been reflected since 2000 in the inclusion of ICTs in the Millennium Development Goals designed to eradicate poverty.

Since then, however, optimism has declined, particularly in academic circles. The numerous criticisms of the concept of ICT4D identify two types of failure: a) the fact that projects do not work in the particular way in which they are implemented, in other words, they are not adopted by the communities they are intended to serve or become unsustainable for economic or technological reasons, and b) projects fail because even if they function as planned, the main social and economic objectives of ICT4D—alleviate poverty, improve education, reduce mortality rates and so on—are not met or reflected in a specific set of social and economic indicators.

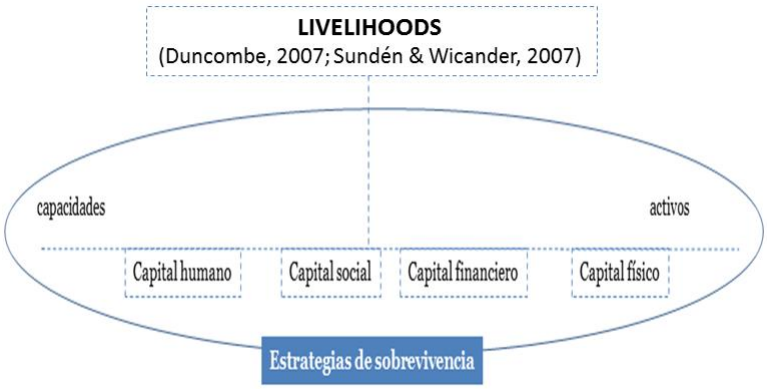
The first lessons regarding the lack of success of these initiatives indicate that they tend to focus on technology rather than community needs (Heeks, 2002). It is also suggested that the failure of ICT4D initiatives may be due to inadequate tools and a lack of understanding of problems in practice due to weak theoretical foundations (Urwin, 2009).

This has resulted in constraints on both the execution and evaluation of the programs. Thus, the initial excitement regarding ICT4D has turned into serious doubts about the impact of these programs (Heeks, 2002; Urwin and Kleine, 2009).

A growing number of scholars have recently addressed this weakness by building analytical frameworks to implement and evaluate ICT4D initiatives. For example, a branch of the ICT4D community has turned its attention to the concepts of "knowledge" and "communication," based mainly on Castells and Habermas, to develop a conceptual framework for ICT4D (Urwin, 2009). Dorothea Klein (2009) uses Amartya Sen's capability approach as an analytical framework, which is basically "a process of expanding the freedoms we have reason to value" (Sen, 1999).

Related to this perspective, other lines of study have imported central concepts from the "Livelihoods" literature into the field of ICT4D (Duncombe: 2007, Sudén and Wicander, 2007). This literature identifies the assets and activities required for the poor to achieve a better quality of life through the empowerment of their own resources. The livelihood concept was initially used in the largest study on poverty in rural areas.

Illustration 2. Livelihoods explanatory scheme



Source: Produced by the author based on Duncombe, 2007

According to Scoones (2009), the livelihood approach begins by identifying the means of subsistence (resources and activities used) by different people in different places. These include occupations (agriculture, livestock, fisheries), social differences (gender, age), directions (means of subsistence, trajectories) and dynamic patterns (sustainable or resilient livelihoods). One of the features distinguishing this approach is the use of the term “asset,” which refers to the means used by the poor to survive. This perspective offers a way of understanding the complexity of people’s lives and the various dimensions of a person’s life: their strategies, achievements, opportunities and constraints.

For Chambers and Conway (1991), livelihoods include the skills, assets (reserves, resources and access) and activities required to subsist. A livelihood is sustainable when it can cope with and recover from shocks, stress and crises, maintain or enhance its capabilities and assets and provide sustainable livelihood opportunities for the following generation. It also helps benefit the livelihoods of other individuals both locally and globally.

For Bebbington (1999), the livelihoods approach focuses on access to five assets (human, natural, financial, physical and social capital). These assets are combined and transformed in the construction of livelihoods so that people can expand their own base of assets through participation with other actors in society.

Both perspectives have been used as working definitions for the development of knowledge on poor people’s assets and capabilities. The poor have access to a set of resources mobilized through specific

activities conditioned by the context in which they occur. This is the social space in which coping strategies are deployed by the poor.

Livelihoods view ICTs as a tool for strengthening these assets so as to contribute to the construction of more efficient structures and processes in the lives of the poor. The livelihoods approach seeks to understand the role of information and its uses in the various everyday activities, including its role in subsistence strategies. It is therefore possible to identify the mechanisms by which ICTs can make a difference for individuals, families and communities living on the social and geographical margins of contemporary society. The livelihoods framework therefore focuses on understanding the role played by information and communication in the community and evaluates areas of vulnerability, as well as the opportunities provided by the community's assets.

In short, ICT4D is an area of research that has been driven by the optimism of ICTs in addressing old, unresolved scenarios of underdevelopment. The weaknesses of traditional approaches have created new analytical frameworks, giving rise to more coherent, consistent work. This is the case of the livelihoods framework in ICT.

2. METHODOLOGY

Ethnographic techniques define both the purpose for which the researcher approaches the object of study and the reflectivity of the observer's intervention. According to Flick (2002, p.9), the researcher's experience through observation must in itself be a source of information on the object of study, an explicit part of knowledge production.

As in any study supported by a flexible strategy, the design of the data collection schemes was subject to adjustments that would allow the research to adapt to unexpected events or unforeseen dynamics. As Norma Mendizabal (2006) argues,[1] "The idea of flexibility covers the design of both the written proposal and the research process."

From this perspective, fieldwork was carried out in three low-income communities in Mexico: Las Margaritas in Catorce, San Luis Potosí; Santiago Nuyoo in Tlaxiaco, Oaxaca and three communities near San Miguel de Allende, Guanajuato (Los Torres, Cruz del Palmar and Estancia de Canal). In the first two cases, the work involved observing and analyzing intervention projects led by a nonprofit in Las Margaritas and the Federal government in Santiago Nuyoo. In San Miguel de Allende, the team designed an intervention model whose intermediaries were three young university students with high academic achievement, who trained their family members (mostly adults) to use tablets with broadband connectivity.

1 For more about the characteristics of flexible designs, see Mendizábal, Norma (2006)

Through field observations, diaries and in-depth interviews, the authors attempted to determine whether the availability of broadband services changed the patterns of information searching and the structure of information networks (for example, who talks to whom about what) among local residents, and whether these changes can be linked to relevant development outcomes (such as the diversification of self-employment, the adoption of new farming techniques, increased access to public services, the adoption of basic financial services and so on).

From the livelihoods perspective, we adopt the notion that individuals have their own portfolio of assets and strategies to cope with their vulnerability (Duncombe, 2007 and 2012, p.83).

In the same vein, the study by Susanne Sundén and Gudrun Wicander (Information and Communication Technology Applied for Developing Countries in a Rural Context 2006) serves as a framework not only in terms of the notion of livelihoods (sustainability frameworks) but also offers subcategories and indicators with a qualitative approach that have been taken as the basis for the interpretation of results here. Although this methodological approach is innovative and useful, its comprehensive approach generates a risk of a loss of focus. Thus, we adapted these subcategories to work with a more manageable set of indicators and to simplify the interpretation of results in the field (Appendix 1). In this context, the channels and mechanisms through which ICT use may have an impact on poverty are:

1. Human capital including the acquisition of skills, knowledge and cultural variables (self-esteem, social power)

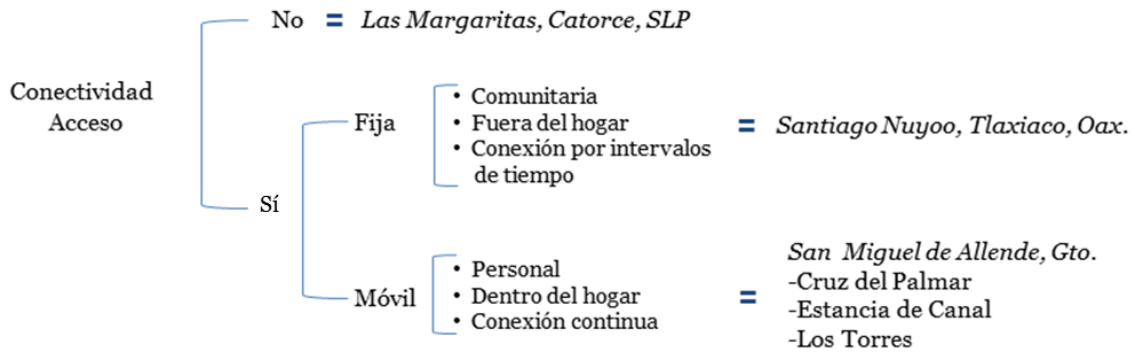
2. Social capital including the mobilization of resources, actors and enhancing capacities for participation in the public sphere.

3. Financial capital, which includes employment and increased income.

Exploration of these variables in each community was enriched by being able to compare different connectivity scenarios. Pre-existing conditions in the communities studied meant different ICT access in each of the towns; a complete lack of connectivity was observed in Las Margaritas, as opposed to access to shared fixed broadband connectivity in Santiago Nuyoo and mobile connectivity without broadband. Lastly, through an intervention in the communities of San Miguel de Allende (Cruz del Palmar, Estancia de Canal and Los Torres), access included mobile broadband through Android tablets with unlimited connectivity.

Thus, we were able to observe the behavior of those with continuous Internet connection and those who have access only at different time intervals.. We were also able to observe the information needs of those who are not yet connected. A trained team conducted field work from November 24, 2012 to April 5, 2013. This involved a qualitative strategy comprising 31 in-depth interviews, field observations, diaries and visual records with key community members.

Illustration 3: Methodology



2.1 Three Localities Explored

Las Margaritas

Las Margaritas, a community characterized by not being connected to any ICT service, was founded on July 19, 1816.[2] It belongs to the municipality of Catorce[3] located in the state of San Luis Potosí.[4] Part of the Huiricuta natural sacred site,[5] its trade zones are the communities of Watley and Estación Catorce. It is a community inhabited by a total of 54 people living in 15 dwellings.[6] The small number of residents is due to recurrent migration, mainly to Monterrey and to the United States. This

2 INEGI, territorial division of the state of San Luis Potosí 1810-1995, Graphic workshops, 1st edition, Mexico, 1997

3 According to the Social Gap Index published by Coneval (2010), Catorce has a total of 10,772 inhabitants distributed among 16 ejidos, 64.3% of which live in poverty (11% in extreme poverty). The municipality is characterized both by a lack of social security (59.6%) and the fact that 67.4% of the population has an income below the welfare line.

4 San Luis Potosi is set in an area linking the south and north of the country. The state is made up of three natural regions: the highland region, the Intermediate region and the Huasteca region. The largest one is the highland region.

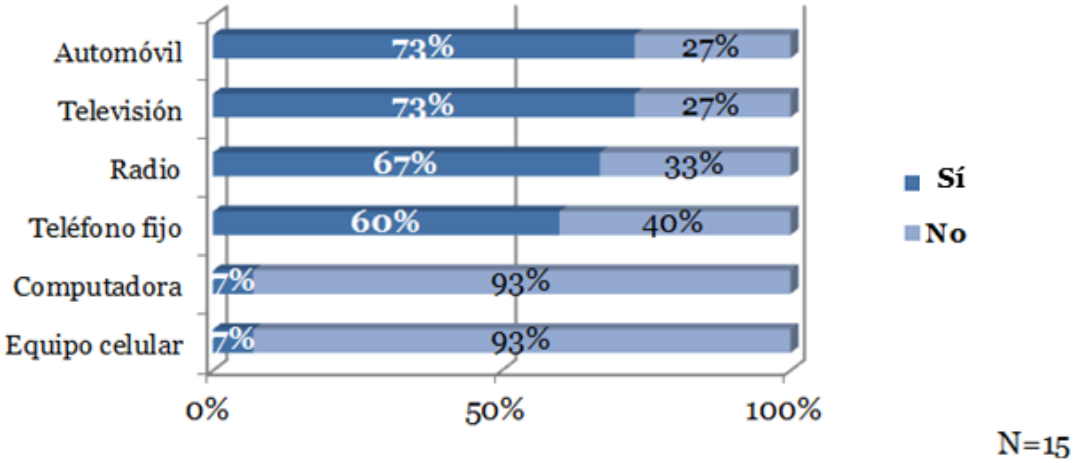
5 Huiricuta is the Huichol name of the region adjacent to the historic town of Real de Catorce north of San Luis Potosí. It is a cultural heritage site as well as constituting a nature reserve for the Huichol indigenous group; it is one of the most important sacred landscapes and crucial to their cosmogony.

6 Its population is 50% male and 50% female, 57% of whom are married with an average of 5.27 live-born children (Population and Housing Census 2010, INEGI).

lack of local economic development has resulted in limited employment opportunities and no exploitation of natural resources due to the ongoing drought.

The information available to date is drawn from two sources: mass media (radio and television) and rural telephony (nine telephone lines installed in private homes). Due to its location, it does not have network services for mobile services or broadband communication.

Illustration 4: Margaritas. Transport and communication services by home

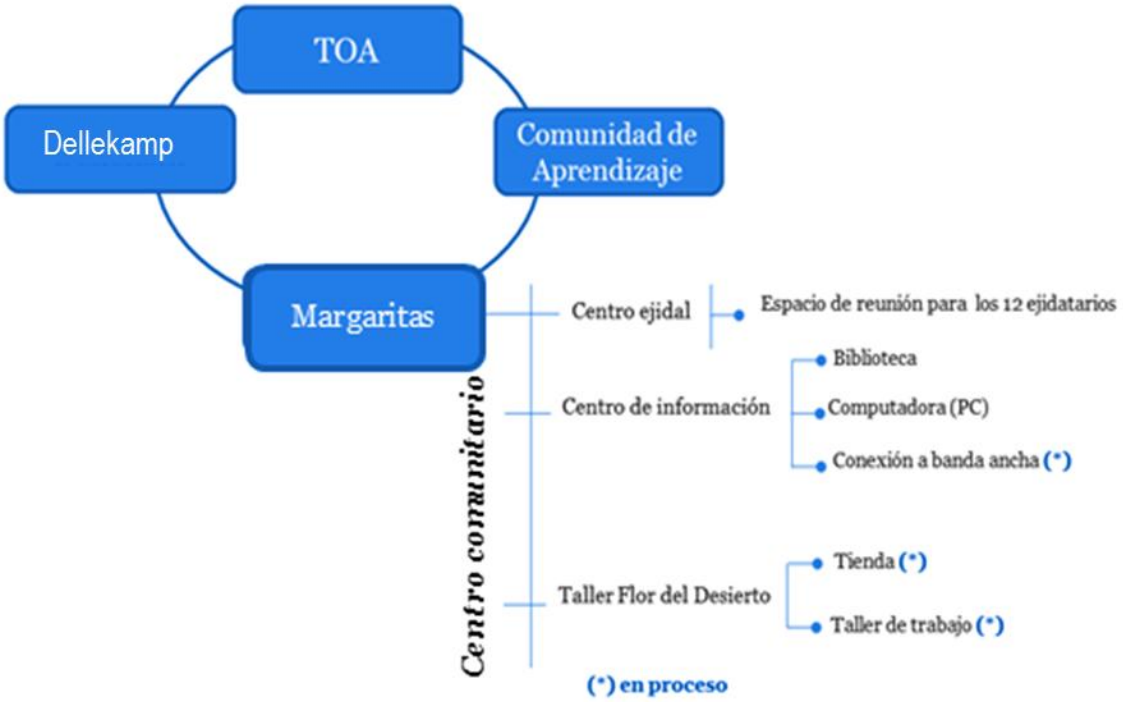


Source: authors' calculations based on 2010 Census data.7

Over the past ten years, the social organization Taller de Operaciones Ambientales (TOA) has spearheaded a community project that includes best practices for design, construction, water management, energy, waste and food production. In the context of extreme water shortage, innovative architectural techniques were employed in the construction of dry toilets and cisterns utilizing PET bottles, among others.

7 The 2010 Census indicates that in the entire ejido, there is one computer and one mobile device, both without service or broadband connection.

Figure 5: Diagram of Margaritas Operation



Source: compiled by the authors

In order to encourage social interaction, TOA, in collaboration with Dellekamp Architects and the leaders of the community, built a community center. Results of a consultation process with the community indicated that a space was required to encourage learning, socialization and communication activities.

As shown in Figure 6, the right wing is intended for the production and sale of goods produced by the Coorperative Flor del Desierto, the main activity of women in the community. The left wing, designed to house an information center, already has a library and a computer (although no connectivity). Moreover, a space has been built for the committee meeting across from the documentation center and shop.

COOPERATIVE FLOR DEL DESIERTO

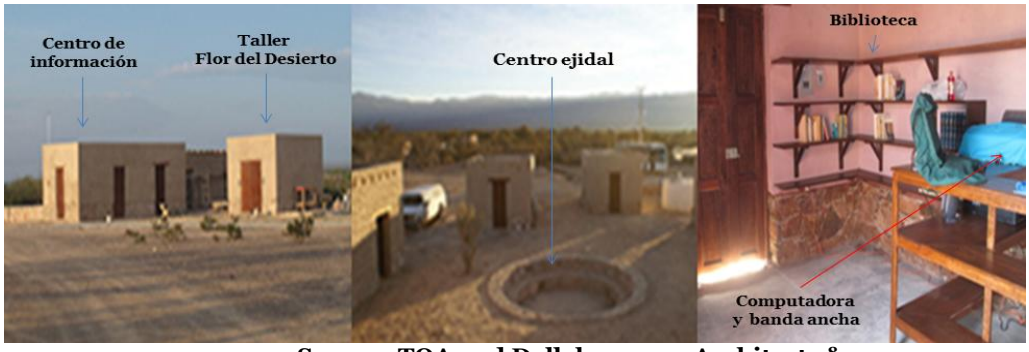
This cooperative has been operating for over nine years. The production scheme was originally restricted to the production of 100 jars of healing creams As part of their marketing strategy, they approached tourists in the village and occasionally traveled to Monterrey (Nuevo León) to sell their remaining stock.

Today, this organization has over 15 members, including a president and a treasurer. This re-structuring has involved a collaboration scheme in which each member is entitled to speak and cast a vote. One of the most significant changes has been the expansion of their production line from healing creams (for different types of pains) to other products such as mouthwashes, talcum powder, shampoo, among other products. They also occasionally produce embroidery (carpets, bags, pillow cases, etc.) to provide variety and increase their opportunities to obtain an income. Since joining the cooperative is voluntary, no formal invitations are issued. Instead, female heads of household tend to invite members of their close family circle (daughters, daughters-in-law, neighbors).

A unique characteristic of their production is the use of natural ingredients such as marigolds, creosote bush and aloe vera, all of which are attractive to visitors to the community. As a result, non-profit organizations, such as Rumbo Nómada (http://www.rumbonomada.com.mx/tienda/), sell the Cooperative's merchandise on their website. This action, according to the testimonials in this research, was not done with the participation of the community

members, as they do not have Internet access to enable them to trade with buyers without this intermediary.

IIllustration 6: View of the Las Margaritas Community Center 2012



Source: TOA and Dellekamparq Architects.[8]

Santiago Nuyoo

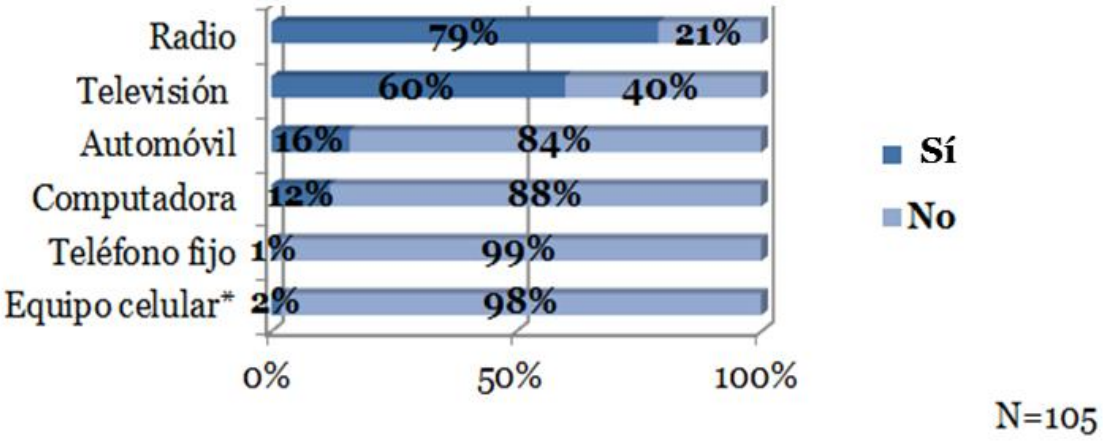
Santiago Nuyoo, the second community in our analysis, is located in the Oaxacan Mixteca Alta, in the southwestern part of the district of Tlaxiaco. The municipality to which it belongs is divided into six agencies, 10 districts and a municipal capital of the same name (Plan Municipal del Desarrollo: 2011-2013). Nuyoo has a total of 105 homes inhabited by 403 people, 45% of which are of school age (Census: 2010, INEGI). It is an indigenous rural community with a high rate of marginalization (Coneval: 2010), where the dynamics are based on traditional Ñu and Mixtec "usos y costumbres" (a traditional system of indigenous laws).

Unlike Las Margaritas, Nuyoo residents not only have access to television, radio and rural telephony (at booths set up in two shops), they also have a community learning center (CCA for its abbreviation in Spanish) with seven computers connected to the Internet. The CCA created three years ago through a public-private initiative with the joint

8 http://www.tallertoa.com/v1/index.php?/proyectos-comunitarios/centro-ejidal-margaritas/ http://dellekamparq.com/esp/?p=1800

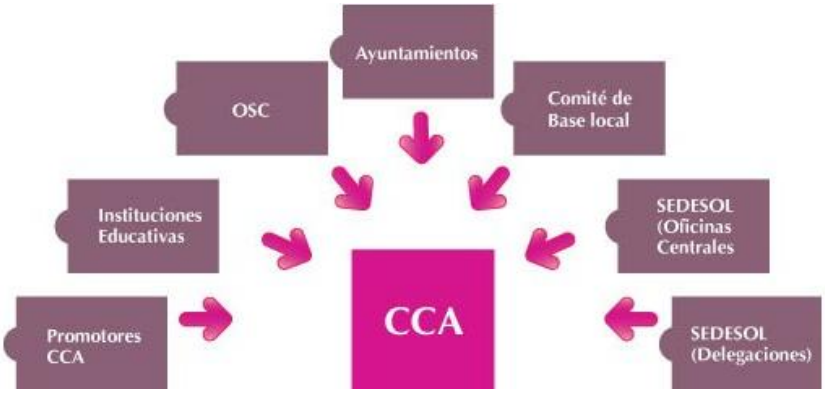
participation of the Ministry of Social Development, local government and private university Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM) (Secretaría de Gobernación 2013). Members of the Town Hall perform the role of "promoters" and operate this service; they rotate every three years in exchange for a symbolic financial support. Promoters have basic technology skills with only elementary or intermediate formal education.

Illustration 7: Santiago Nuyoo. Transport and communication services by home



Source: Authors' calculations based on data from the 2010 Census.

Illustration 8: CCA Operating Diagram in Santiago Nuyoo.[9]



Source: Secretaría de Gobernación.

9 According to the 2010 Census, there are two people with cell phones without signal and one computer without broadband access.

Services offered at the CCA focus on continuous, secondary and higher education through ITESM's virtual platform. Internet access is permitted to those engaged in academic activities and only during the last hour of service is it possible to access sites for entertainment or socialization. Furthermore, in order to promote users' sense of ownership, and as a way of promoting the center's long-term sustainability, a recovery quota has been established according to the community's economic capacity, which is used for its care and maintenance (Official Gazette No. 38, 2011).

Illustration 9: CCA Development Strategy Diagram

Source: Tecnológico de Monterrey

Over a period of two years, the CCA's existence in this community has coincided with Internet service in senior high school (access restricted to teachers and students) and two Internet cafés.

Furthermore, a pilot project was implemented in February 2012 to provide local calls and financial transactions through mobile banking. This initiative was led by Telecomm-Telégrafos (a public entity) in

collaboration with private banks (Banorte, Red, MasterCard) and philanthropic Foundation (Banamex Foundation) and the municipal government. A crucial feature of this pilot project was the training in financial tools undertaken by a specialized institution (Banamex Foundation) using specially designed educational tools. A 3G connection planned for this platform has not yet been installed (Accountability Report: 2006-2012, Telecomm-Telégrafos).

The target population for this scheme is adults who are able to prove permanent residence in the municipal capital and complete their training in equipment use and financial skills. The first stage of this project has been completed. Telecomm developed a two-stage strategy: during the first stage, it set up an office so that residents could handle cash (cash in, cash out) since the closest bank branches are located in the municipality of Tlaxiaco, over three hours from Nuyoo. During the second phase, satellite technology was used to equip the community with mobile communication, thereby enabling mobile banking services. Radio-base technology was selected to provide inhabitants with access to low-cost mobile devices.

San Miguel de Allende

In San Miguel de Allende, Guanajuato, we studied the communities of Cruz del Palmar, Estancia de Canal and Los Torres, located at the outskirts of the city.i Communications infrastructure, television and radio signal are available in the three communities. Although households have fixed and mobile telephony, there is usually no Internet connection, except when people obtain the service through a wireless modem that connects

via USB. People in these semi-rural places tend to go to Internet cafés to connect to the Internet.

Illustration 10: Availability of electrical apparatuses and information technologies in the communities in San Miguel de Allende

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Objetos	Estancia de Canal		Los Torres		Cruz del Palmar	
Radio	48	**18%**	50	**13%**	173	**17%**
Televisión	54	**20%**	65	**17%**	189	**19%**
Automóvil	32	**12%**	17	**4%**	79	**8%**
Computadora	6	**2%**	1	**0%**	6	**1%**
Teléfono fijo	0	**0%**	5	**1%**	48	**5%**
Celular	44	**16%**	20	**5%**	85	**8%**
Internet	3	**1%**	1	**0%**	3	**0%**

Source: Compiled by the author, INEGI Population and Housing Census 2010.

In December 2012, DIRSI initiated an intervention to implement a digital inclusion model to explore the role of broadband and related technologies in improving livelihoods, such as the localization of jobs and educational progress.

In conjunction with Jóvenes Adelante, a nonprofit that offers college scholarships to high school graduates from localities close to San Miguel de Allende, three university students, members of the communities of Cruz del Palmar, Estancia de Canal and Los Torres were selected to fulfill a role as instructors for their families. These places were chosen as they were within the reach of the broadband spectrum operated by Nextel,

which, through its foundation, donated tablets with an Android operating system and Internet access with unlimited connectivity.

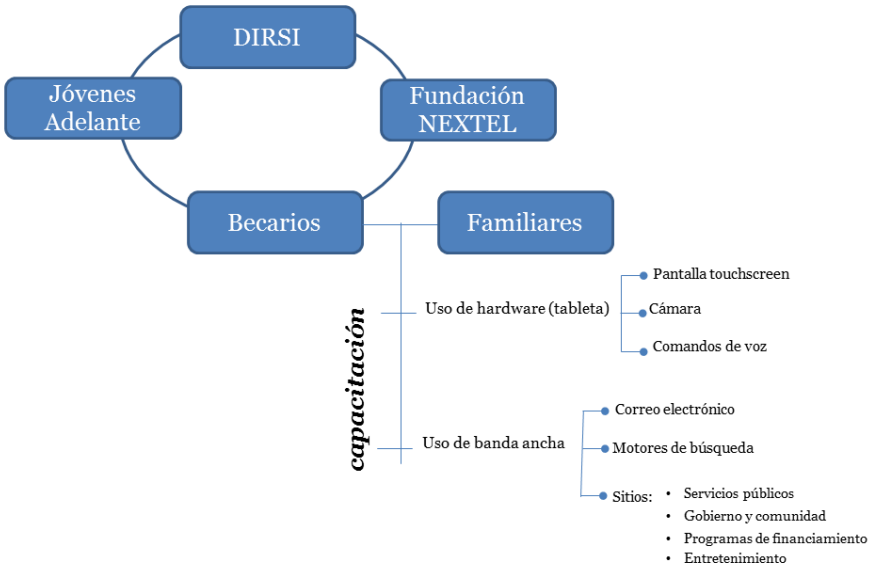
Once collaboration between these organizations was achieved, grant holders were given the tablets with the accorded responsibility to teach their parents and siblings how to use them and record their activities in diaries.

Illustration 11: Images of the first point of intervention in San Miguel de Allende

Source: Compiled by the author (Video: http://youtu.be/pnUhYVY_mi0)

The research team taught these students how to use the tablets, how to search for useful content, how to complete the journals and fulfill their role as instructors. They also gave an initial presentation of the project to families, during which they interviewed all those involved before and after training.

Figure 12: San Miguel de Allende Operating Diagram



3. RESULTS

The analysis of the selected communities focuses on the impact of access to ICT, and broadband in particular, on human, social and financial capital. From this perspective, the guiding question is From this perspective, the guiding question is whether it results in the empowerment (or not) of the individual´s capabilities.

The first relevant observation was that people have initial preconceptions about the potential benefits of Internet use. It is interesting that people construct certain conceptions about the specific, potential or imaginary uses of ICTs regardless of its availability or if the connectivity to Internet is fixed or mobile.

The evidence gathered in the study conducted in the three communities confirms the role of social representations and the influence of friends and relatives on the approach to and socialization of ICT. Most people believe access to the Internet would improve their lives.

> *"If they teach me, I can learn how to use the computer so that I can work; they are going to need someone to operate the Internet, aren't they? It does not scare me" [Interview, María, 45, member of Flor del Desierto Cooperative, Las Margaritas, 07/09/2012].*

> *"My brother-in-law said that they are going to bring in computers and that they are going to teach the children... I do not know much about computers, but my daughter learned a bit when we lived in Monterrey ... I want to learn, it would help us find out about things*

they do not have here" [Interview, Leobarda, 40, housewife, Las Margaritas, 07/09 / 2012].

"My children have left because there is no work and also their children have to go to school. I have not seen one of them for fifteen years, but when we talk she says: Mom, we are better off here, and the children already know how to use computers" [Interview, Ángeles, 52, Flor del Desierto Cooperative, Las Margaritas, 07/09/2012].

This analysis also captures the uncertainties and fears these devices elicit. Indeed, as one can infer from the stories collected, the prevailing idea is that those who can reap the most benefits and advantages from the new technologies are children and youth. Thus, knowing how to use the Internet is experienced as a requirement imposed by schools and, at the same time, as a hope placed in children as a vital instrument for social mobility through education.

"Little kids who go to school need computers. They ask them to do their homework on it and because there are none here, they stay on at school." [Interview, Mary, 45, member of Flor del Desierto Cooperative, Las Margaritas, 07/09/2012].

"The truth is that I just studied up to junior high school but that is not enough and yes, I find it very difficult with my daughter because things are not the same as they used to be. Before it was different, and I took a course because I cannot help my daughter with her homework anymore. They give them very difficult homework and it is wonderful to learn how to use a

computer and have one; it is essential for children nowadays." [Interview, Eulalia, 50, housewife, Santiago Nuyoo, 24/11/2012]

"Just think how much I have spent at the Internet Café, 10 pesos a day every time they go to their school work. It's not bad, they need it for their training or after that for work, but teachers do not stop to think that sometimes we cannot afford it." [Interview, mother of Omar, a recipient of one of the tablets, 40, San Miguel, 04/04/2013]

A similar reflection is put forward by Winocur (2007), who argues that the Internet is part of a social mobility strategy devised by the popular classes whose material and symbolic engine revolves around education. But according to this perception , it is young people who can best achieve this. For adults at the bottom of the pyramid, computers represent a completely alien world they don't feel they have the training to use and can't take advantage of. The testimonials gathered during the fieldwork in San Miguel reflect this from the first moment when the young beneficiaries received the tablets and they questioned their parents' ability or need to even use and take advantage of computers. Furthermore, their mothers have grown up with the idea that education is not for them, a representation they extend to digital skills.

"The thing is that they are very closed-minded [people], they do not like to stand out or solve their economic problems. These people [her parents and the adults in her community in general] want everything to be handed to them on a plate without their having to go out to seek support." [Interview, Leontina, 23, grant holder, San Miguel, 25/03/2013].

"At the moment, there is no point in [my mother] getting into the computer just to open a Word page or an Excel spreadsheet, a computer. Why would she need to

get into a computer except to see a movie?" [Interview, Omar, 20, grant holder, San Miguel, 24/03/2013].

As Winocur concludes, the computer is perceived as a need of the young and children, insofar as they remain the custodians of the aspirations for progress and social mobility (Winocur, 2007: 210). This is where the link between access to ICTs (mainly Internet) and skills acquisition plays a crucial role. Indeed, in terms of skills, the impact of ICTs does not imply a direct, immediate link between increased access and improved livelihoods (Gigler: 2012). One of the first conclusions provided by our exploratory studies involves thinking of the link between ICT and access to knowledge in a more complex setting, since the route between the two is certainly not automatic. As numerous studies have pointed out, the positive impact on human capital requires a training process. The following section explores the results of this study in terms of the link between training and impact on human capital.

Impact on Human Capital

"Despite earlier beliefs that ICT access results in disintermediation, giving individuals direct access to information and knowledge, it is now accepted by most practitioners that intermediaries are often needed to translate this information for users." (Gigler, 2012: 6)

This emphasizes the important role of infomediaries, those who facilitate, promote and guide the search and processing of information and knowledge by people who do not yet have the skills to do so themselves. Several studies have already highlighted the need for training and the importance of infomediaries in this process. A long-term study, the Global Impact Study (GIS) dedicated one of its in-depth studies

conducted in Ghana to the role of infomediaries. Infomediation is crucial in contexts where penetration and dissemination of computers and the Internet is limited. The more people are unfamiliar with ICTs, the more highly valued the presence of infomediaries is. (GIS, 2013: 89-91). In the words of a grant holder from San Miguel:

> *"For example, in elementary school, when I was there, there was none of that, there was no Internet and only computer teachers used it. We did not have access to them. So the little I learned before entering high school was from my older brother. Since he had already finished, he knew a bit more. He was the one who taught us and so we think we have been taking turns to play the role of instructor: my older brother taught me and I taught my younger brother and my younger sister; that is how we have learned." [Interview, Isela, 23, grant holder, San Miguel, 24/03/2013]*

In the case of Santiago Nuyoo, the role of the Banamex Foundation in providing financial education through educational tools for the use of mobile banking was crucial in achieving the financial inclusion of community members. This case shows the efficiency of horizontal training, in which the majority of the community chose to participate. This system, combined with the incentive of enabling a practical tool for everyday life (mobile banking) yielded positive results not only in the adoption of mobile phones, but also in the practice of remote banking transactions and new strategies for trade negotiations at the local level. This project, despite not having broadband, promoted different web consultations from those already used in the Learning Community Center, which does have access to broadband.

> *"Even I said I'd never learn … I could not even imagine having a phone in my hand … and I learned to dial and text and now I say, that's good. I can also send payments, not many because we don't spend much but there are some." [Interview, Agustina, 47, housewife Nuyoo, 25/10/2012]*

> *"There was only one person who used to look for information on SAGARPA and other organizations. I saw another one looking for fertilizer for his orchards. He came back to start a course and did not finish … now that some young people have cell phones, I have seen a few looking for applications …" [Interview, Micaela, 25, CCA promoter Nuyoo, 07/02/2013]*

In San Miguel de Allende, we found that promoting training and the adoption of broadband through the use of instructors belonging to the immediate family yields positive results in terms of the following:

1. Instructors with previous experience in handling ICT skills increase their capacities by detecting their own fields of opportunity while passing on their knowledge.

2. Training parents and siblings encouraged learning and boosted self-esteem and trust within the family, since members of this nucleus share the use of this tool for the benefit of the family.

3. Since family members share common assets, there are incentives to seek information to strengthen these family assets. This elicited data queries related to payment for services, access and financing authorities and created interest in exploring business or production ventures based on family or community needs. Introduction of this mobile sharing therefore becomes a tool that contributes to their social capital and empowers their financial capital.

The experience of grant holders as infomediaries generated a transformation of the initial conceptions of mothers who excluded themselves from technological issues. After the first weeks during which the kids trained their parents, housewives reacted most enthusiastically to the exercise. On realizing that they were able to operate the tool, gain access to new information resources and convey them to other members of their community, they felt a sense of empowerment and social distinction:

> *"I thought this was only for those who are young. "We are here in the kitchen and looking for something to eat, but when they taught me, I realized that I can learn. I liked it because I can see things I like and I told my neighbor: "I can do things now. I was pleased to boast about it." [Interview, mother of Leontina, 43, San Miguel, 04/04/2013].*
>
> *"I feel that I have always been different from other women. I'm not afraid, if I set out to learn, I learn, that's how it was. I know how to use the damn tablet. I wrote to my daughter, although with lots of mistakes. I'm not like the other women who don't like change." [Interview, Omar's mother, 43, San Miguel, 04/04/2013].*

As one can see, the weight of family networks plays a crucial role in learning about ICTs. These networks fuel a sense of confidence required to handle knowledge and practices that are initially alien to sectors at the base of the pyramid. Moreover, training in ICT use helps create conditions for the most vulnerable social groups to feel confident, empowered and better positioned for the accumulation of human capital and financial resources to alleviate their poverty. In the adoption and strategic use of information, self-esteem and level of confidence are undoubtedly important not only for using the equipment, but also for accepting the fact

that data obtained from digital media are as reliable as knowledge they have obtained from experience (for example, knowledge associated with farming).

Beyond the central role of infomediaries, the studies conducted allow us to draw comparisons between strategies for the acquisition and socialization of skills developed in Santiago Nuyoo and San Miguel respectively. In both contexts, self-learning and learning by doing predominate. At the same time, both public access areas (Santiago Nuyoo) and the individual use of tablets (San Miguel) allow the possibility of implementing the knowledge acquired at school.

> *"What little I learned about the Internet was through practice. They teach us at school, but by using it you eventually understand by doing your homework" [Interview, Jesús, 16, student, Santiago Nuyoo, 25/11/2012]*

In addition to the similarities between the two communities, the quality and nature of the device enables different practices and intensities. Whereas in Santiago Nuyoo self-learning combined with the training provided at the Community Learning Center, in the case of San Miguel, accessibility via mobile devices such as tablets extended and intensified learning by doing as well as facilitated the process of sharing these skills onto parents and siblings.

The literature shows that those who use the Internet, for whatever purpose, acquire new skills, interests and motivations that subsequently expand their opportunities in the labor market. The findings of this research validate this and other hypotheses. Firstly, the training experience extended to parents by their children (the grant holders) in

San Miguel de Allende reinforces the importance of infomediation in the socialization of ICTs among the adult population at the base of the pyramid. Although access is individual and mobile, within the home, instances and moments of collective learning are reproduced. Secondly, the findings reinforce the idea that ICTs become socially relevant once people explore them for their own purposes. So in both Santiago Nuyoo and San Miguel, those who use computers and the Internet for their own needs manage to develop new skills and discover new interests.

Thus, the results confirm that so-called "non-instrumental uses" promote "instrumental uses" involving new digital skills and human capital, and, as will be seen in subsequent sections, contribute to the accumulation of social, economic and political capital.

In short, in this section, a clear channel between Internet access and use, digital poverty reduction[10] and its consequent contribution to poverty alleviation, in general, has been detected. Diachronic and synchronic interaction of various elements such as abstract learning of knowledge in school is is reinforced through computer courses offered at community centers, Internet cafés and specialized institutes. Here self-learning by doing takes place and the acquired knowledge is implemented and transmitted among family members. This yields intermediate results such as increased confidence and self-esteem, which may strengthen the processes of job searching and/or re-entry into or continuity in the education system.

10 The term refers to either lack of access, knowledge or information through digital technologies (Barrantes:2009).

Given the importance of social networks in terms of access strategies and informal learning, the following section explores the link between Internet ownership, sociability and social capital accumulation in greater depth.

Social Capital

This research shows a process whereby different contexts condition and motivate communication uses and how they form part of the everyday dynamics of families and communities. Thus, initial resistance—cemented by both the self-exclusion of adults with low educational attainment and the youth's prejudice—gives way to interest and curiosity. Once young adults teach their parents basic skills, parents begin to experience greater interest in ICTs insofar as their everyday needs and interests are met by the potential of the Internet:

> *"We saw part of one of the El Chavo del Ocho programs and we looked up how to make a cake, [my mother] realized that you can find interesting information on youtube. A distant aunt also showed interest; when they realized that there are lots of videos on how to make food, they were excited." [Diary, Omar, 20, grant holder, San Miguel, 26/03/2013].*

> *"I asked her what she wanted to find out about and she mentioned several things, including knowing about breast cancer. She said she had always been curious to find out what is and what causes it." [Diary, Leontina, 23, grant holder, San Miguel, 27/03/2013]*

Thus, we see that in the context of a traditional community, where a woman's contribution to society is scarcely acknowledged beyond

housework, broadband access empowered women's self-esteem and their ability to socialize.

From another perspective, this research detected how a lack of access to broadband Internet and a shortage of skills limit the possibility of establishing a network required for the sustainability of business ventures. This is the case of a housewife and occasional saleswoman in Santiago Nuyoo seeking to improve her income. To achieve this, she went into a partnership with her older brother, who lives in Texas, with the aim of formally commercializing a US brand (Forever Living). Although mobile phone use (such as for bank payments) has been useful in certain transactions, she realizes that her lack of Internet skills has limited her growth horizons insofar as she is unable to establish contacts, a condition that excludes her from crucial information circuits for her business:

> *They use the phone to notify me of any of the products they need or tell me that my brother called me at the local telephone booth … but the Internet is important because I only completed junior high school but that is not enough. I find it hard because it's not the same any more. You have to find out about things and have more communication because you do not know what's going on outside. They have Forever in Oaxaca but I don't know what is going on because there is no way to find out; you get left behind" [Interview, Eulalia, 50, housewife, Nuyoo, 25/10/2012].*

This testimonial is of great interest for two reasons. On the one hand, it allows one to differentiate between the advantages of mobile telephony and broadband Internet in creating social and economic capital. According to the woman's personal account, more fluid contact through the Internet (both with her brother and the US-based firm) would enable

her to be included in a communications network within which information that is inaccessible by mobile phone circulates. On the other hand, research has shown how social capital and income generation are closely linked, as pointed out, among others, by Donner (2009) and Duncombe (2007).

Another significant form of strengthening social capital is through the possibility of everyday communication between community members and their relatives who have migrated. In Mexican communities, Internet access acquires enormous significance, becoming almost a natural part of family routines. Thus, email, social networking sites and video calls appear at the center of users' motivation.

> *"I have a brother who lives in Culiacán, Sinaloa. He went there to study and stayed. He spends a lot of time on the Internet and I can see him on Facebook and see how his daughter has grown. Communication with the family is an advantage. Yesterday we had a case in which my wife's brother, who is studying in Veracruz, needed a document and so she sent it to him on the Internet" [Interview, Carlos, 32, merchant, Nuyoo, 24/10/2012]*

In San Miguel de Allende, the availability of broadband access encourages family members to seek information that strengthens family assets. Internet connectivity permits both access to relevant information and the generation of new contacts, which subsequently translate into an increase in economic-financial assets and participation with other actors in society. It also provides greater flexibility and ease of communication with migrant relatives and friends, who share moments of everyday life, strengthening emotional ties and a sense of belonging as well as relevant information, through electronic communication.

At the same time, we observed the micro-social processes that constitute the everyday link between individuals, social groups and state institutions. Incorporating Internet access may potentially strengthen social capital by creating greater trust and collaboration with the government. This improves the quality of life of these actors, helping to improve both material and symbolic poverty through more inclusive institutions and the growth of civic commitment and civic participation.

Clearly, the diffusion of broadband does not guarantee greater transparency alone since a certain predisposition on the part of governments is required to disseminate information about their actions. However, the potential to enhance public oversight, reduce opportunities for corruption and promote a response to citizens' needs is easy to see. In the medium and long term, this could lead to the generation of more inclusive political and economic institutions.

Regarding the negative impact of the lack of interaction with the government, the case of the virtually isolated community of Las Margaritas and its lack of connectivity coupled with social dynamics shows that this impoverishes and reduces access to key information regarding local government actions and the provision of resources for obtaining support. There, one of the community members centralizes all the public information and functions as a true gatekeeper, filtering the news that deserves to be disseminated and concentrating knowledge about subsidies and social benefits.

> *"He is the person who taught us to make the Cooperative products; he also brought electricity and flattened the main road. The truth is that we owe him and his wife a lot; without*

them, we would not have these orchards." [Interview, María, 43, member of the Flor del Desierto Cooperative, Las Margaritas, 07/09/2012].

This concentration and centralization of information allows this community member to gain authority and legitimacy while most of the community remains dependent on his actions in the absence of a strong presence of the state.

The opposite happens in the communities of Santiago Nuyoo and San Miguel Allende where, despite their higher populations, they have established more efficient communication with the authorities. In the first case, the greatest efficiency is achieved through a combination of traditional and modern media, which helps offset the centralization of information in the municipal delegate.

"When there is an important official matter to be dealt with by the authorities, they make an announcement by microphone, over open-air loudspeakers. For example, they have just announced that a Commission is going to arrive to check the floors. Those who wish sign up, which is how people move. All those in the Internet Café are informed that it has just arrived, and they are told that tomorrow there will be a meeting on a particular subject." [Interview, Carlos, 32, merchant, Nuyoo, 24/10/2012]

However, communication in Santiago Nuyoo continues to be mediated by these figures and when the need arises to resort to other government agencies, remote access to them (Internet) is only possible through the office and among local government actors. Conversely, in the case of San Miguel, the unlimited connectivity of the grant holders who received the tablets made them realize that they could directly access federal

assistance programs. Although here, as in Santiago Nuyoo, there is a smooth flow of information between the community and the authorities, grant holders stand out and benefit due to their level of Internet access and the skills they have acquired through training. They can therefore find out about how the municipality operates and its key events, which leads to greater commitment to public community life.

> *"At night we took some time to explore the tablet. One of the pages we visited on that occasion was the municipality website to see what is going on here, in a place that seems close but in certain situations appears alien because of our ignorance about it." [Diary, Isela, 23, grant holder, San Miguel, 28/03/2013]*

Through the tablets, queries were made about service payment and the authorities and sources of financing were contacted. Further information was sought on possible businesses based on family or community needs. The introduction of this shared mobile device therefore became a tool that contributes to the users' social capital and promotes their financial capital.

Moreover, grant holders' skills and ability to connect to the Internet in San Miguel appear to alter the directionality of communication and change the power relations and dependence present in Las Margaritas. Government delegates and officials often approach grant holders to access, process, generate and convey key information, as evident from the following accounts:

> *"Now, [with the tablet] it will be easier for me when my delegate calls me to help write e-mails or whatever. [As] I'm the only one in the town who knows how to use the Internet, [that] is an advantage" [Interview, Isela, 23, grant holder, San Miguel, 24/03/2013]*

> *"The bossy one [the delegate] already told me: "Hey, you, come and send these documents by Internet." They think that since I have the tablet, I can be there all the time" [Interview, Omar, 20, grant holder, San Miguel, 24/03/2013]*

We can see that grant holders' social position changes because of their assets and skills in appropriating the Internet. This is a process of empowerment, still in its infancy, of these youths who have begun to be recognized and appreciated in the community both because of their connectivity and because of the knowledge they have acquired to exploit the information available on the Internet. Thus, in the case of San Miguel, it is possible to observe a certain degree of tension between the community hierarchies since, at least in some respects, those who have always possessed knowledge—and therefore power—now depend on younger members who have the physical and human capital (equipment and skills) to achieve swifter, smoother communication with federal government agencies.

Moreover, evidence from this research provides clues about the ways in which access to broadband could influence the processes of political clientelism. Unlike what happens in Las Margaritas, where one member of the community concentrates access to information, thereby partly offsetting the absence of the federal government by becoming a privileged mediator who is highly valued by the villagers themselves, the San Miguel experience reflects the fact that lack of mobile access and above all a lack of skills among the delegates partially alters the directionality of government departments between the latter and grant holders. Thus, these research findings link ICT4D literature with the phenomenon of political clientelism. The hypothesis is that the availability of unlimited Internet access coupled with knowledge management would appear to

become factors capable of creating tension among the existing hierarchies and the dynamics of current clientelistic relationships in the community.

The following section shows the effects, whether direct or indirect, of the Internet access in socio-economic terms.

Financial Capital

There is a broad consensus that one of the main benefits of access to ICTs is achieved by being able to obtain information that creates new job opportunities and, above all, reduces transactions costs. For example, Greenberg (2005) describes the visibility provided by web pages and how this makes it possible to expand markets and increase the sales of small community projects.

This potential positive impact of Internet access on micro-enterprises is absent in the case of Las Margaritas, which, being totally isolated serves as a "negative" or "counter case." This is borne out by the microenterprise, Flor del Desierto Cooperative, which sells regional products to tourists, trusted networks and sporadic visitors. As mentioned earlier, due to spontaneous initiatives by civil society organizations, the cooperative has websites devoted to promoting its products yet none of its members have any knowledge of their potential buyers or market prices.

Consequently, the cooperative loses numerous business opportunities. At the same time, there is a high economic cost in terms of the time the community has to spend as a result of being completely digitally excluded. Testimonies show that people have to travel long distances and spend the whole day performing simple transactions that could be

addressed in a minimum amount of time by email. This is undoubtedly a fertile ground for the incorporation of ICTs, which would result in an improvement of community income through an increase in the Cooperative sales and an expansion of labor sources. Members of this micro-enterprise are therefore the ones who are keenest to learn to use the computer and the Internet:

> *"If they teach me, I would learn how to use the computer so that I could work; they are going to need someone to operate the Internet, aren't they? I am not afraid of it," [Interview, María, 45, member of Flor del Desierto Cooperative, Las Margaritas, 07/09/2012].*
>
> *"We need to be taught to use the computer and the Internet; they say that we can talk to outsiders." [Interview, Ángeles, 52, member of Flor del Desierto Cooperative, Las Margaritas, 07/09/2012].*

When ICTs become socially meaningful, the representations constructed around them create feverish expectations about their appropriation.

Also, in the community of Santiago Nuyoo, in the context of mobile phone usage, people managed to develop strategies to contact customers to take orders without the need for face-to-face transactions. Moreover, they carried out transfers and received mobile money, thereby reducing transaction costs.

> "*Mobile payments help, because if we want to purchase a product or whatever they can do a money transfer by... phone, by cell phone and make some payments to businesses ... you can do that here without having to travel to the city of Tlaxiaco "[Interview, Carlos, 32, merchant, Nuyoo, 24/10/2012]*

> *"During that time, I was doing a little analysis of the bakery that I planned to set up, but I discovered more weaknesses than strengths, and I realized it was a bad choice. So I started looking for information on how to set up an Internet café because this is another option that could work in my community. I found that the minimum capital I would have to have was $20,000 pesos, (2,000 U.S. dollars) which would enable me to buy five to six PCs. In the information collected, I also realized that I would have to get some training on maintaining the machines as well as installing them. I know a little about installations and formatting but not about programming." [Leontina, diary, 31/03/13].*

Figure 13 provides a summary of the community members' perceptions regarding the value associated with ICT access. It is clear that, in general, community members found value in ICT access when they obtained information that supported their homework, or were able to communicate with family members outside their communities. This happened regardless of whether connectivity was fixed or mobile. People in San Miguel de Allende also valued access because they were able to obtain information about public services, particularly those associated with social programs. For those who already had experiences in Internet cybercafés the mobility of the device was also important because this made information queries easier without being restricted to a single space.

Illustration 13. Comparative Table of Results

Community	Connection	Access assessment		Impact
Las Margaritas	No	They think that students could access academic information, women from Flor del Desierto could market their products and people in general could communicate with relatives living outside the village.	-	None because they cannot access the website.
Santiago Nuyoo	Fixed and community	They found that access to information was useful and said that thanks to broadband, they were able to increase communication with people from elsewhere.	+	Access to academic information Access to communication outside their communities
		They think the CCA is only useful for academic activities.	-	Consultation limited to certain services and information on their productive activities
	Mobile and Personal	They stated that they regularly use mobile banking services to engage in commercial transactions	+	Inclusion and financial training
		They did not express a link between access to the Internet and mobile banking or cellular telephony services.	-	Local communication without broadband.
Los Torres, Cruz del Palmar, Estancia de Canal.	Mobile and community	They perceive that the tablet with connectivity is a useful family asset for their information needs.	+	Access to academic information, financial services, social programs and links with the authorities. Planning of productive projects Link with the authorities among the actors who have received tablets
		They think it is necessary to extend this benefit, either as a business provided by the beneficiaries or by donating more equipment with the same training model.	-	Limited to three families.

Source: compiled by the authors

4. CONCLUSIONS:

Using the analytical lens offered by the livelihoods approach, the research carried out in the three communities identified different mechanisms through which ICT access—broadband in particular—has an impact on poverty reduction. Several conclusions can be drawn from the results of this study.

One of the main advantages of broadband access is that it provides information and services that would otherwise be unavailable in communities with low socio-economic development. The results show that connecting skills to the needs of the population is an important pre-requisite for a positive impact of broadband use on alleviating poverty.. Even in marginalized communities, there is a preconception about the benefits of the Internet access; however, these initial ideas may limit the community members' queries once they have connectivity. Thus, training is needed for people to enhance their various assets by using information in a strategic manner.

Among the sectors at the base of the pyramid, children are the main repository of the hopes and expectations concerning the potential of ICTs. These conceptions constructed in adverse conditions (poverty, unemployment, informal work and a weak State) operate to make the Internet significant in terms of social mobility acquired through education and sociability. Homework and communication with relatives and friends are the main activities resulting from the appropriation of ICTs. Moreover, although young people stress the knowledge gap in relation to their parents, this can be overcome when parents find uses that exceed their expectations.

The comparison of communities with different modes of access highlights the transformative role training plays in altering previous conceptions. The San Miguel case showed how the use of permanent high quality broadband and instructors' initial training made it possible for people to discover new possibilities and to realize that certain information found over the Internet helped them with their everyday tasks and in achieving some of their life goals. This level of success was not observed in the shared public access in Santiago Nuyoo. Although the role of community centers is useful as means of introduction to broadband use, our results indicate that mobile access generates a more direct appropriation of broadband.

As in many other studies, we found that training regarding the use of information geared to the needs of each context is important. The case of Santiago Nuyoo confirmed the importance of infomediaries, which in this case, provided education in financial tools before they ventured into the use of mobile banking. However, one element that has scarcely been explored in the literature is the role of the family as infomediaries. The case of San Miguel demonstrated the usefulness of children sharing their skills with the rest of the family. Moreover, sharing common assets created incentives to conduct queries for information that could generate family income. These factors were found to be important in breaking barriers such as age or resistance to ICT adoption.

Likewise, "learning by doing" and "learning by watching" is especially important in ensuring that ICTs have an impact beyond the youths who attend school and constitute the majority of community center and Internet café users.

Thus, as knowledge increases and skills are developed, community members begin to discover unexpected benefits. One of the most highly valued benefits is establishing more fluid, permanent communication with migrant relatives and friends, which can then result in significant contacts in terms of sociability, education and employment. Thus broadband access contributes to the accumulation of social capital.

People also found they could search for information to set up a business or increase the family´s economy. Transportation costs and times were reduced, procedures were streamlined and information was obtained for the sustainability of micro-enterprises. These advantages can directly impact job creation and income and therefore on financial capital.

From the perspective of stronger links with institutions and public services, users accessed key information that offer different forms of subsidies (which impacts financial capital). Familiarity with search inquiries generated an improvement in the direct relations with government authorities. Access elicited a commitment to community public life and streamlined communication with the authorities, which increased trust and therefore social capital.

Lastly, testimonials from the town of Las Margaritas, the control case without connectivity, reflect the costs associated with isolation.

In short, research shows that unlimited access to broadband and constant, effective training that involves learning by doing enables populations at the base of the pyramid to develop new skills, engage in new practices and discover useful applications and functionalities for old and new skills and interests. It enables them to accumulate human, social and financial capital. Since the three projects are still at an early stage of

development in terms of ownership, further study is required to measure the scope of training regarding new uses in greater depth.

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ANNEX - NOTES ON METHODOLOGY USED

TABLE 1. DATA COLLECTION STRATEGIES BY LOCALITY

Community	Technique*
Las Margaritas, located in the municipality of Catorce, San Luis Potosi. Introductions to people were arranged through collaboration with the Operations Workshop (TOA) civil organization. The project consists of the design and construction of a community center with broadband Internet connectivity.	• In-depth interviews • Field diaries • Photographic records • Observation sheets
Santiago Nuyoo in Tlaxiaco, Oaxaca Introductions took place with the help of Telecomm-Telegraph and Community Learning Center (CEC). This project has led to the introduction of Internet services (Center) and mobile banking through the donation of cell phones with local coverage (Telecomm).	• In-depth interviews • Field diaries • Photographic records • Observation sheets
Los Torres, La Cruz del Palmar and Ciénega de Juana Ruiz in San Miguel de Allende, Guanajuato. In collaboration with the Jóvenes Adelante civil association and Fundación Nextel, an intervention was carried out that provided three Android tablets with unlimited broadband connection.	• In-depth interviews • Log books (instructors) • Photographic records • Observation sheets

Las Margaritas Field Distribution.

The field survey was performed on November 24 and 25, 2012. Nine interviews were conducted with people with the following profiles:

Sex	Occupation	Educational attainment
Female	Member of Flor del Desierto Cooperative	Incomplete elementary school
Female	Member of Flor del Desierto Cooperative	Incomplete elementary school
Female	Housewife	Junior high school
Male	Commissioner	Primary
Male	Student	Senior high school (ongoing)
Male	Merchant	BA Degree
Male	Teacher	BA Degree
Female	Peasant	Incomplete elementary school
Male	Peasant	Incomplete elementary school
Female	CCA Promoter	Senior high school

Santiago Nuyoo field distribution.

The field survey was performed on November 24 and 25, 2012. Ten interviews were conducted with people with the following profiles:

Sex	Occupation	Educational attainment	Cell phone
Female	Telecomm-Telegraph Office Manager	BA Degree	Yes
Female	Housewife	Junior high school	Yes
Female	Housewife	Junior high school	No
Male	Missionary	N/A	No
Male	Student	Senior high school (ongoing)	Yes
Male	Merchant	BA Degree	Yes
Male	Teacher	BA Degree	Yes
Female	Peasant	Incomplete elementary school	Yes
Male	Peasant	Incomplete elementary School	Yes
Female	CCA Promoter	Senior high school	Yes

San Miguel de Allende Field Distribution .

The first field survey was performed on March 24 and 25, 2013, while the initial training phase took place from March 26 to April 3. A second round of in-depth interviews was conducted from April 4 to 5.

It is worth noting that the training could only be given to females, since males are usually not home, or, as in one case, live in the US.

The profiles interviewed are given below:

Sex	Occupation	Educational attainment
Female	Grant-holder 1 JA	BA Degree
Female	Grant-holder 2 JA	BA Degree
Male	Grant-holder 3JA	BA Degree
Female	Housewife	Incomplete elementary school
Female	Housewife	Incomplete elementary school
Female	Housewife	Incomplete elementary school
Female	Student	Junior high school
Female	Student	Junior high school
Female	Student	Junior high school

Main characteristics of connectivity in community

	Las Margaritas	Santiago Nuyoo	Cruz del Palmar, Estancia de Canal and Los Torres
Computers	1	7	0*
Tablets	0	0	3
Type of connectivity	None	Broadband	Broadband
Funding:	TOA, Dellekamp Architects and Learning Community	SEDESOL, Tecnológico de Monterrey, municipal capital and users themselves	Nextel Foundation
Services	• Library • Access to data processor • Broadband Access **(Note: not yet available)**	• Internet connection • E-mail: • Web applications • Databases • Virtual libraries • Online courses (tutored or otherwise) • Online high school	• Connection to shared mobile Internet • Web applications • Digital camera • Voice applications
Schedules	Indefinite	Monday - Friday from 2:00 pm to 8:00 pm.	24/7.
Managers' role	Indefinite	Promoter	Undergraduates
User Profile	None	School-age children and teachers	Students (in the role of instructors) and immediate family members.

Source: Authors' compilation based on field results

*Although one of the grant holders has a personal computer connected to broadband in his home, (via a USB device), this information does not apply to the table since the latter is restricted to the features of the connectivity projects.

Data Interpretation Matrix

In particular, the study by Susanne Sundén and Wicander (*Information and Communication Technology Applied for Developing Countries in a Rural Context,* 2006) provides a framework for this study, not only in terms of the notion of livelihoods (sustainability frameworks), but also by offering subcategories and indicators for the four types of capital: human, social, financial and physical that this research has used as the basis for the interpretation of qualitative results, while adapting these categories to the data obtained in the field and to the Mexican context.

The adjustments made to the aforementioned interpretative framework are given below:

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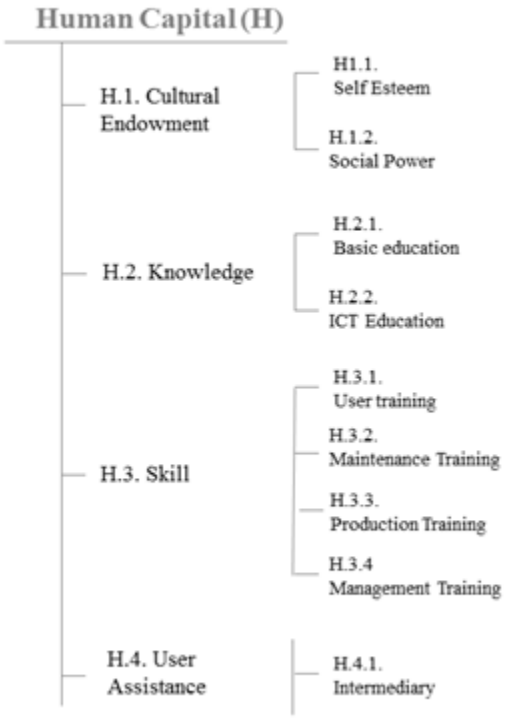
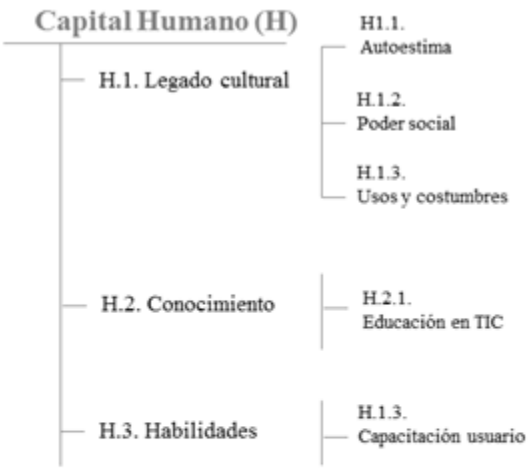


Los Autores (2013)



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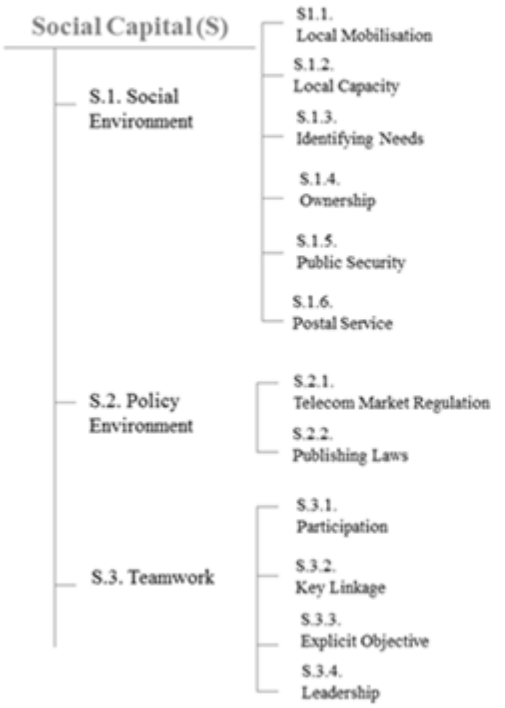
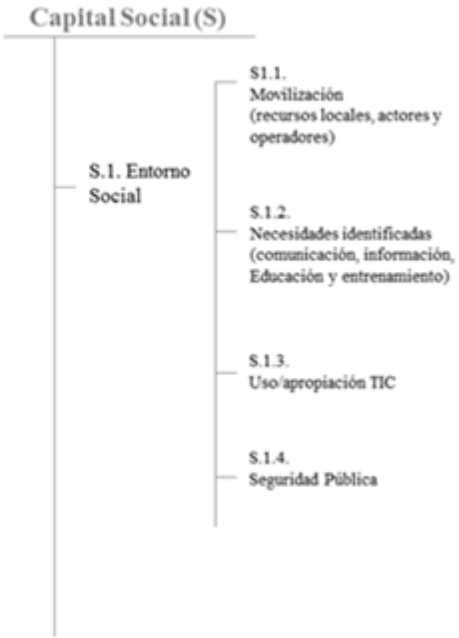


Los Autores (2013)



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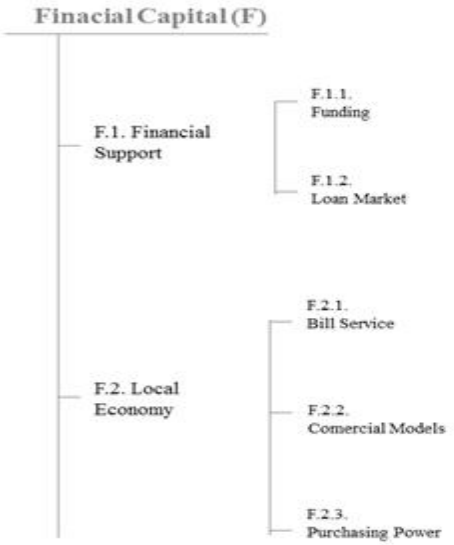

Los Autores (2013)