Strategies to promote telework in rural communities of Mexico, the case of the indigenous community of Matlapa, San Luis Potosi, Mexico

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ABSTRACT

This article shows a number of strategies have been used in a pilot project to promote the benefits of teleworking in a rural community in the State of San Luis Potosí (Mexico) in order to enable people to improve their economic and have proved viable for the time that has been operating the project. These strategies can be taken into consideration for future projects of teleworking in other rural communities in Mexico and Latin America.

The investigation founds that once local technical personnel has received technical training to provide remote technical support is necessary to develop a set of strategies aimed at training and increasing good use of language, develop the skills to work under pressure, work and results-oriented team.

Keywords:

Technology transfer, information and communication technologies, marginalized, rural communities, mobile devices, Mexico, Latin America, teleworking and innovation.

1. INTRODUCTION

Commonly found today in different cities the existence of initiatives aimed at teleworking world, as this type of teleworking job represents new opportunities to reach different sectors of the population. However, the common denominator of people who want access to teleworking (and organizations that want to buy services from a distance) is based on the presence and use of a certain level of infrastructure, information and communications technologies that commonly exist in populations with a considerable population density.

However, in many Latin American countries are a lot of small communities with a population less than 2,000 inhabitants and are dispersed over large territories and have limited access to telecommunications networks and therefore to services can offer through this infrastructure.

Coupled with the lack of access to telecommunications infrastructure, there is the problem of low level of knowledge in the use of information and communications technologies, so that combined these two factors (lack of access to infrastructure and the level of knowledge of the use of ICTs) is known as the digital divide. The digital divide is closely related to human marginalize index, so that we can expect very low levels of penetration of ICTs in communities with high rates of exclusion.

This is the case of Mexico, where there are about 198.000 rural communities [1] scattered throughout the national territory and which only about 28% have access to basic telephone service through the Public Switched Telecommunications Network (PSTN) and the remaining 72 % of rural communities have no access to such infrastructure. Similarly we found high levels of marginalization in different areas (central, south and southeast) of Mexico (Figure 1), then so any teleworking initiative in these communities will be expensive and complicated by the high cost of using alternative telecommunications networks (primarily satellite) for access to basic voice communications and data coupled with the low level of knowledge in the use of information and communications technologies.
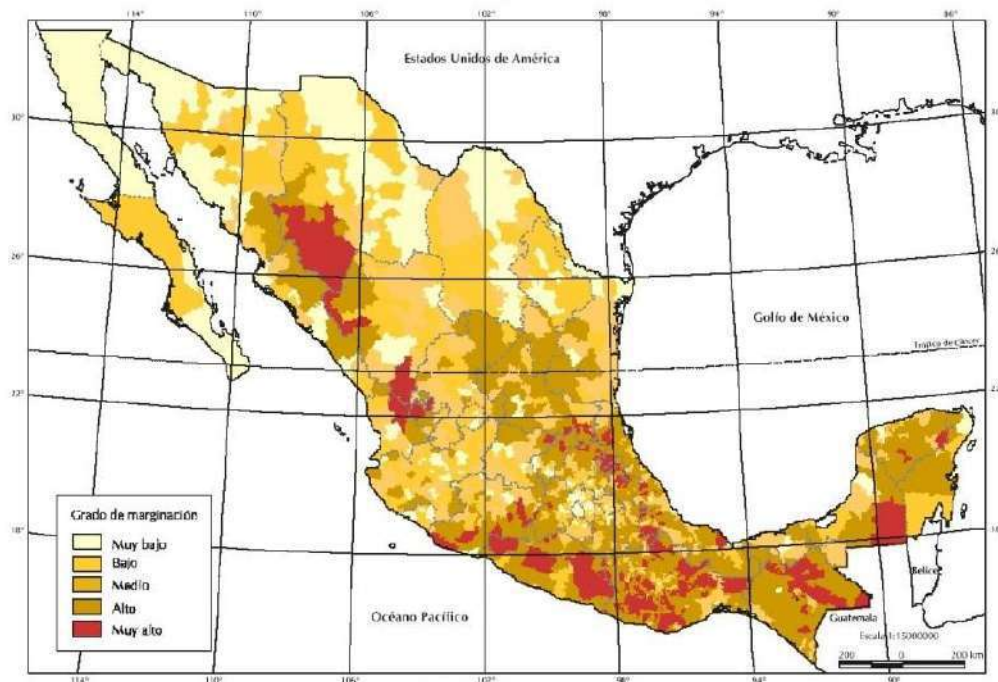
Figure 1 Municipalities in Mexico according to degree of marginalization.

Despite these indicators of the digital divide and marginality index in Mexico, we find that there are alternatives to deploy telecommunications infrastructure at lower cost in marginalized communities, but always pursuing a clear and tangible objective to bring to the residents and local organizations information and communication technologies. This is the case of the project named "Information and communication technologies for rural communities in Mexico," which leads the Polytechnic University of San Luis Potosi to impact mainly on the State of San Luis Potosi, where a pilot project since 2007 runs in an indigenous community in the municipality of Matlapa and where one of the ultimate goals is to bring its people teleworking initiatives to improve their economic status.

The following paragraphs will explain each of the strategies we have developed and applied in this project to assess the following research questions: *¿What is the level of current understanding of the people who have taken formal training in information and communications technologies to offer their services through teleworking?, and ¿Is it possible to consolidate a working partnership between an external company that requires teleworking services and this group of people?*

2. STRATEGIES TO ACHIEVE TELEWORKING IN THE RURAL COMMUNITY OF MATLAPA, SAN LUIS POTOSI

Matlapa rural community is located in the southern region of San Luis Potosi State in the central region of the Mexican Republic (coordinates 21° 20' North and 98° 50' W). The town has a largely indigenous population and with a very high level of marginalization.

 The strategies have been used in the project are:

2.1 Establishment of strategic alliances among members of the pilot project.

The project stems from the participation of the Polytechnic University of San Luis Potosi in an international competition organized by Latin American School of Networks in Merida, Venezuela in conjunction with the International Development Research Centre (IDRC) of Canada in which we received a donation of basic telecommunications infrastructure to be installed in a rural community.

The commitment of the University of San Luis Potosi was achieved by selecting a community with majority indigenous population and with a very high rate of exclusion and where four participants are highly important for the sustainability of a project of this nature: local government, health services, educational services and representation of local commerce. The role of the Polytechnic University of San Luis Potosi in the project was related to a center of innovation and technology transfer under well-defined processes [2]. The partnerships established between the participants are oriented mainly to academic and scientific collaboration because anybody seek a monetary reward to participate in the project, for instance the objective is the entire development of the community through the different strengths that each can give to others .

2.2 Deployment of basic telecommunications infrastructure

The deployment and implementation processes of technological infrastructure are based in a systematic sequence and can be summarized as follows:

2.2.1 Training for technical staff that installed the infrastructure

The training process was carried out in the facilities of the Universidad de los Andes in Merida, Venezuela during the month of March 2007. During the event specific knowledge were obtained:

- Telecommunications basics
- Wireless communications for rural areas
- Means of transmission and access techniques, voice over IP
- Outcome Mapping as a methodology to measure the impact
- Energy and protection
- Among others.

2.2.2 Laboratory testing

Upon receipt of the equipment on the Polytechnic University of San Luis Potosi, a series of activities conducted to verify the performance of technology received. These activities can be summarized as follows:

- Unpacking the equipment in our facilities.
- Individually tests each of the received equipment and accessories to verify that they had no physical damage.
- Testing with the operating system of the server
- Local connectivity tests using all the microwave radios linked to the central node, with a positive result.
- Networking test with equipment received using wireless Internet service of our University in order to verify this action and proof tested positive.

2.2.3 Installation of infrastructure in the different facilities of project participants

The low cost wireless telecommunications infrastructure was installed in the facilities of the Indigenous University of San Luis Potosi, the City Council of Matlapa and the Maternity local Hospital with the successful result of in each wireless link that interconnects all participants.

The main strategy was used to integrate Matlapa population in the project was the participation during the installation of four students at university's degree in computer science from the Indigenous University of San Luis Potosí, so this group of people developed the technical skills necessary to give further support to the infrastructure without the need for staff of the Polytechnic University of San Luis Potosi have to be present to develop local support.

Figure 2. Installation of telecommunications node

Figure 3. Interconnected classrooms at the Indigenous University of San Luis Potosi in Matlapa.

2.3 Training a key sector of the population in the use of information and communications technologies

Were given a period of training on information and communications technologies to technical operators that finally manages the infrastructure deployed. The concepts of training are aimed primarily at fault resolution and optimization of telecommunications equipment of their own infrastructure.

Similarly were given basic training on the importance of the project to the end users of telecommunications infrastructure and Internet service. Emphasized the potential benefits that the people can get to access the Internet as a development tool.

Some of the courses that were offered to end users are:

- Introduction to Computers
- Introduction to Internet
- Search for specific information on the Internet
- E-mail and messaging services for people to communicate with relatives in other locations.

2.3 **Remote Assistance for infrastructure**

Currently, the Polytechnic University of San Luis Potosi offers remote assistance to the project through the Indigenous University of San Luis Potosi (as they currently manage the project).

Among the main activities within this strategy are:

- Resolution of questions to detect infrastructure failures
- Support for use of IT tools (word processors, spreadsheets and administrative applications).

2.5 Building partnerships with leading companies of information and communication technologies

In order to bring to students of computer science degree the teleworking benefits, we took on the task of seeking strategic alliances with companies that offer distance education models in these subjects.

We established a collaboration agreement with Cisco Systems company in order to offer to their students courses in IT Essentials. In those courses are basic issues about personal computers and computer network issues (it should be mentioned that this alliance is the first of its kind which provides a Cisco Academy in an indigenous community in Latin America).

It was found that although there isn´t a potential local market where graduates of computer science to exercise and apply their knowledge, there is a demand in the major cities of Mexico of technical expertise that can provide remote support to clients of these telecommunications companies, this is the point that the current project is combined with teleworking activities.

Until now the persons that have taken the course of Cisco IT Essentials is a total of 35 students in the career of Bachelor of Computer science and all are assigned to the Indigenous University of San Luis Potosi.

Figure 4. A group of students taking information and communications technologies training

2.6 Training of personnel on information and communications technologies to provide remote technical support

In order to analyze and assess the possibility that students who have received training in the areas of Cisco can access to teleworking opportunities we established a rapprochement with a telecommunications company in Mexico which offers Internet access services to its customers through its infrastructure, but also offers technical support services to customers once they have contracted such services.

The technical support is based on process fault detection and treatment and where there are well-defined levels of attention to problems depending on the technical complexity of the case.

Two processes were used for basic level of failures attention (basic level of a problem reported by a customer) in order to train a group of students at the Indigenous University of San Luis Potosi and thus of assessing the level of knowledge gained by students.

The training received was using two strategies: a) by sending in electronic form the procedures of failures attention to students and b) through a personal explanation of each one of the procedures by an instructor at the facilities of Indigenous University of San Luis Potosi.

The training was offered to a total of 30 persons, all of whom have received training in Cisco IT Essentials.

2.7 Application of tests to assess level of knowledge

Tests were applied to 30 students of the Indigenous University of San Luis Potosi which currently enrolled in Bachelor in Computer Science career and are between the fourth and eighth semester.

The profile of participants is as follows:

- Ages between 18 to 23 years
- From the municipality of Matlapa, San Luis Potosi, Mexico
- Spanish as native language and knowledge of indigenous languages like Nahuatl and Tenek
- All the students has indigenous origin
- Everyone living in a geographical area with a very high level of marginalization

The test consisted of applying two tests:

a. Written exam based on strategies to solve problems according the procedures of technical support and
b. Distance interview to observe the student's confidence level and how telephone address a particular situation based on the procedures for technical support.

3. RESULTS AND DISCUSSION

The results show that in the first instance there are the possibilities that students who have received basic training on information and communication technologies could offer technical support through teleworking. This is because the knowledge and awareness of issues technicians required for this activity can be developed with relative ease.

In this first activity it was analyzed the feasibility of solving problems oriented to possible failure of a communications equipment which is connected to the public telecommunications network and allows connection to the Internet by the subscriber.

Another evaluation was oriented to possible problems with navigation on the Internet that a user can externalize to the telecommunications company.

In both exercises it was found that students have a certain level of technical knowledge that could be useful in situations close to reality. Of course, formal training is required about the different brands of communications equipment that can handle the telecom companies to their clients.

In the personal interviews it was found that students give accurate answers about solving problems, but the level of the language used is not entirely correct to deal with a customer of a company, as they may confuse the customer with a term not used properly.

The personal security of students is essential for a good conversation with customers, this is because we can found angry customers reporting a fault in its service, or requiring immediate solution to their problem and the student should support a certain level of pressure to resolve the problem.

The work under pressure and objectives oriented (as might be the time to solve a fault and to serve multiple customers simultaneously) is necessary in this type of remote services. Students have developed some type of working under pressure in their school at having to deliver certain academic projects at any

given time and manner, however it is not an indicator that can be approved because the teachers use different learning styles, but at least the student is learning these skills compared to others .

Some issues still must work with the students tested are:

- Provide training and issues of personal security in order to establish a fluent conversation with customers.
- Training / capacity building to get a bigger and better vocabulary.
- Training in the skills required to work under pressure and compliance-oriented objectives.
- Formal training in communications equipment that offer telecommunications companies to their clients.
- Stress in students the importance of compliance with work schedules established or possibly be available when are required the services.
- Training / guidance on personal financial aspect of the students.
- Formal training in issues of teleworking and its benefits, because in rural communities is common to find social pressure to get a job with a company with a presence in the community.
- Training in basic negotiation skills.

4. CONCLUSIONS

The research questions raised in this article are:

¿What is the current level of knowledge of the people who have taken formal training in information and communications technologies to offer their services through teleworking?

The level of technical expertise found in the students of the Indigenous University of San Luis Potosi and have received training on issues of information and communications technologies is acceptable to approach teleworking to the community.

However, some aspects oriented to proper use of language, wider vocabulary, working under pressure, results-oriented, responsibility, among others are necessary higher levels of training and counseling.

A strategy aimed at the telecommunications company that would hire this group of teleworkers which would give support to a geographical region share certain cultural values and beliefs, including some Indigenous languages.

¿Is it possible to consolidate a working partnership between a telecommunications service company that requires teleworkers and this group of students?

If possible, however we must take into account the following considerations:

- Is preferable to group the teleworkers at a site within their community and they have access to basic infrastructure (including telecommunications) to develop the activities.
- Establish formal training programs not only in the technical aspects of communications equipment, but also on issues related to the competencies required for the activity (use of language, extensive vocabulary, work under pressure, etc.).
- It is advisable to establish an alliance between the telecommunications company and an entity in the educative sector within the community, since they could prepare people for this activity.
- Preferably, this group of teleworkers should give technical support to the geographic areas surrounding them, because they share certain cultural values and beliefs that allow them to identify themselves.
- As far as possible to translate into local indigenous languages training manuals, this would allow family members of teleworkers an idea of the importance of the work of young people.
- Use of employment contracts in Spanish and local indigenous languages so they can be interpreted by local authorities and thus provide confidence to the family of teleworkers.
- This model could be replicated to other geographical rural areas of Mexico.

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