The Development of Automated Information Systems to reduce the Digital Divide in Agricultural Communities: the Case of the Agricultural Information Service of Tierra Blanca (SIT), Costa Rica

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ABSTRACT

This study aims to analyze the phenomenon of the digital divide in the community of Tierra Blanca and present the case of the Agricultural Information Service of Tierra Blanca as a solution to reduce the digital divide in this farming community. Based on the premise that new information technologies have a great importance in today´s society, the article analyzes the concept of digital divide composed by three components: access to information, connectivity and digital literacy, contextualized in farming communities. Next, the investigation studies the relationship between the digital divide and the productive, political, economic, social, cultural and commercial business development of small farmers. Then, based on the collaboration of a group of farmers in Tierra Blanca, the impact of the digital divide is considered specifically in this community. Finally, the case of the Agricultural Information Service of Tierra Blanca is presented as an automated information system tha t allows combat lags generated by this phenomenon. We conclude that the case of the Agricultural Information Service of Tierra Blanca is an initiative that has reduced the digital divide in a comprehensive way for farmers, but the development of comprehensive policies and strategies at the community and national levels is necessary, seeking the involvement of various institutions and communities

Keywords: Digital divide agricultural library, information systems, information access, digital literacy, Tierra Blanca, Costa Rica

Angulo, C; Brenes, J.J; Brenes, J.M; Brenes, G; Gómez, S; Muñoz, D; Solera, L; Víquez, F "The development of automated information systems to reduce the digital divide in agricultural communities: the case of the Agricultural Information Service of Tierra Blanca (SIT)". World Conference on Computers in Agriculture and Natural Resources, University of Costa Rica, San Jose Costa Rica, July 27th-30th, 2014. http://CIGRProceedings.org

1. INTRODUCTION: ABOUT TIERRA BLANCA COMMUNITY

This text is framed within the context of the Agricultural Information Service of Tierra Blanca (hereinafter called SIT, for its acronym in spanish). Built jointly by a group of farmers of Tierra Blanca, Cartago and two librarians, the SIT is a point of access to agricultural information, connection to institutions that produce such information and companion in the process of application of that information. Why is it located at Tierra Blanca? Cartago´s north area has a strategic importance for the national agricultural production. In fact, it is responsible for the "90% of the potatoes consumed in the country" (Alvarado, McHugh and Ramirez, 2008, p. 54). Among the northern districts one of the bigger contributor to the production is Tierra Blanca, which belongs to the central area of Cartago. Although it is a rural place almost entirely devoted to agriculture, it´s located only at 12 kilometers from Cartago´s downtown. This duality makes it a place that grows directly linked to agriculture while enjoys various facilities and benefits of cities themselves.

One of those benefits is the gradual introduction of Information Technology and Communication tools (ICT). However, digital divide is still a fact in the community and people (specially farmers) are not getting a productivity improvement because of this gap. So: what is the digital divide and why it´s important to bring it to discussion when talking about access to agricultural information? The next section is about this issue.

2. THE DIGITAL DIVIDE: A MULTIFACTORIAL TOPIC

The digital divide has to do directly with ICT, as it refers to "the problem of inequality in the use of digital technologies in computer mediated communication" (Van Dijk & Hacker, 2003, p. 316). According to those authors, this inequality is manifested by four barriers: Lack of elementary digital experience, lack of computers and network connections, lack of skills in digital media and lack of significant opportunities for achievement (2003, cited by Palomino, 2004, p. 9).

Summarizing, the digital divide has three integrating components: access, connection and usage/ skills. In addition, there is a direct link between all these axes. Are all of them equally important? Mancinelli (2008) states that "the term digital divide refers to the gap between those who can effectively use new ICT tools such as the internet, and those who cannot" (p. 173). In addition, Economic Commission for Latin America and the Caribbean (ECLAC) said that "the digital divide goes far beyond mere access to computers and focuses on who is taking advantage of the digital *opportunity* and who can´t" (2003, p. 64). Therefore, despite the close relationship between the three, the know-how aspect has more weight. However, it is necessary to briefly define each axis, for which the following explanation is presented.

2.1 **Access, Connectivity and Literacy: Three Digital Divide Axis**

As ECLAC states, in the context of technology, those who have no technological tools are told to live in a situation of lack of access that, eventually, will lead to their social and economic exclusion (2003). In Costa Rica´s case, and according to the Information Society and Knowledge Programme (PROSIC, for its acronym in spanish) of the University of Costa Rica (UCR) ICT access goes like

this in the case of households: 97% of them have cable TV and a cell pone; 92%. have at least one cellphone, 49% own a computer and 47% have internet access (PROSIC, 2013).

It´s important to note that even when technological infrastructure exists (connectivity), if people don´t have access to ICT tools (due to an economic issue, for example), they can´t make effective use of technology, and so there is the difference between access and connectivity, as Muñoz and Nicaragua (2014) clarified. In Costa Rica the connectivity issue is shown by the results of the Connectivity Index (NRI). By this, the country is in the 53rd position of the overall ranking score (PROSIC, 2013).

Now, the literacy aspect is concerned, according to the International Federation of Library Associations and Institutions (IFLA, for its acronym in spanish) to a cognitive training in order to use ICT and the so called "information literacy skills" (p.11). As mentioned in the previous section, between all the three axes this is the most important, because according to IFLA those without this skill "will face obstacles to be included in a growing range of areas" (p. 11). As literacy isn´t measured by the ICT rankings, it´s not possibly to give any quantitative data about this variable (PROSIC, 2013).

Finally, it must be said that the intrinsic relationship between the therre axis is based on the fact that there are three divisions of the same *barrier*, as postulated by Van Dijk and Hacker (2003). In addition, following the same authors, the gap has to do with ICT and according to Reddy (1995) ICT is based on the transfer of information by the "creation, dissemination, organization, diffusion, and use of information (cited by Eswara, 2007, p.5). By this, information transfer isn´t possibly if there are no conditions for access, connectivity and use of devices and information.

3. THE DIGITAL DIVIDE IN THE AGRICULTURAL CONTEXT

If in the national context the digital divide is itself a barrier (Van Dijk and Hacker, 2003), in the rural and agricultural environment is higher, because according to PROSIC (2013): "The rural area has very below conditions of… computer ownership, internet access and internet connection type "(p. 201).

Among the triad composed by the access, connectivity and literacy capability, when refering to the rural and agricultural context there should also be considered several factors that transcends the purely technical aspects, such as economic, social, political and cultural local/national dynamics, as explained by ECLAC (2009) and also the "uncertainty of life/financial conditions, job insecurity, and social insecurity "(Mancinelli, 2008, p. 174). For this it must be analized how those factors deal with the access, connectivity and use of ICT and information in Tierra Blanca.

4. MULTIFACTORIAL ASPECTS OF THE DIGITAL DIVIDE IN TIERRA BLANCA

As been said, Tierra Blanca has some urban/rural hybridization. Its downtown closeness may be the reason why the community is in the 191st place among the whole 472 Costa Rica districts in the ICT access and connectivity ranking, according to the National Institute of Statistics and Census (INEC, 2011). Compared to other rural areas, Tierra Blanca is in a privileged position. However, locals say that "the community feels disconnected and plunged into a deep sleep from about 20 years ago"

(June 12, 2014, Personal Communication). What's going on, if access and digital connectivity are exisits? The answer lies in the fact that the community isn´t implementing the third axis of literacy; they don´t how to use the information that they get with ICT tools and therefore information can´t contribute to reduce their" life and financial uncertainties", as Macinelli (2008, p. 174) raised.

Moreover, although Tierra Blanca ranks the 191st position in access to ICT, there is still a lack of information that authors such as Eswara (2007) considered strategically important for small and medium farmers, such as: innovative markets information, effective ways to access them, new possibilities for partnerships in agricultural groups, and so on.

In economic terms, Tierra Blanca farmers don´t know "how fast the market moves, which innovators niches exists and how we can find alternative ways to participate in the market" (June 12, 2014, Personal Communication), despite the fact that organizations such as the Agricultural Marketing Integral Programme (PIMA, for its acronym in spanish) and the Interamerican Institute for Cooperation on Agriculture (IICA, also for its acronym in spanish) have a lot of information resources available.

Now, into politics, little is known about the everyday actions of government institutions and the opportunities that community can seek in order to build solutions together with the entities. In the specific case of the Agricultural Ministry (MAG, for its acronym in spanish), a farmer explained this: "when MAG´s people comes here they confuses us, because when the engineer left we can´t do anything until he comes back the next time, because we don´t have the information that he has "(June 12, 2014, Personal Communication).

Finally, with regard to the social and cultural factor, it happens like this: although traditionally Tierra Blanca producers have been “a rural community with strong cultural identity and agriculture roots” (Alvarado, McHugh and Ramirez, 2008, p. 54), today´s composition of the community, where most of the habitants are between 10-39 years (INEC, 2011) faced a scenario in which youth feels uprooted by the agricultural identity. Why, if access and ICT connectivity should provide new scenarios for rural youth to join? About this a farmer stated that "it is necessary to keep one hand on the ground, but another on the technology. Although most of us don´t expect our children wish to be farmers, we can help them to use the technology in order to change the tradicional agriculture without ignoring our traditions at all" (June 12, 2014, Personal Communication).

So, how does literacy axis can integrate a scenario in which access and connectivity exists? An option is through the transfer of information, where "the agricultural information transfer system consists of four independent and interrelated components: development, documentation, dissemination, and diffusion of information" (Eswara, 2007, p.5). Next, the SIT case is presented as a place that integrates the triad of axes from an automated information system that transfer information and helps to reduce the digital divide within the farming community.

5. RESPONSE TO THE DIGITAL DIVIDE: THE CASE OF THE AGRICULTURAL INFORMATION SERVICE OF TIERRA BLANCA (SIT)1 [1]AS AN AUTOMATED INFORMATION SERVICE

Library science contribute a lot to reach the previously mentioned scenario because it works primary with information and according to Abdullahi (sf): "information, if well articulated, could eradicate ignorance and helps to achieve economic, educational, social, political and cultural objectives towards the development of the entire community (p. 3).

Moreover, as the digital divide is also linked to ICT, it is essential that those affected by this phenomenon become part of it solutions by using the "cultural and local infrastructure of museums, science centers and libraries" (UNESCO, 1999 p. 9). But how to achieve this in an agricultural community as Tierra Blanca, where the tenure, access and connectivity to ICTs could make the library (in this case the SIT) goes unnoticed among the community? According to (UNESCO, 1999): "access content ... copyright and self-learning requiered new approaches to the implementation of technology in the education of adults in such areas as needed" (p. 9). One way in which those approaches could be adresses is with the automated information systems.

5.1 **About Automation**

According to Chinchilla (2005) automation is an alternative to improve customer service through a "relational model" (p. 45) in which "data tables are related" (p. 45) with the various information resources that library has. Automation is important to reduce the digital divide through its axis of use and literacy because it focuses on customer service and have direct impact on the new library paradigm in wich there is a need of: "new ways to manage resources, imagine new ways to reach the user and innovate ways to provide services "(Herrera, 2012, p. 2). As automation uses the relational model, it has an effect on the comunal information projection and reduce the digital divide by providing the whole access, connection and use of information.

However, automation must be done under certain parameters to have a positive impact and fully cover the three axes of the digital divide. Now, for the technical aspects, it is useful to follow the evaluation matrix developed by Chinchilla and Fernandez (2013), who proposed four general categories, namely: 1) *General*, to technically identify the applications and how to get them; 2) *International standards*, to achieve interoperability models files; 3) *technical aspects of the software;* and 4) *Functionality.* Thus, if the need for the agricultural community is focused on the aspect of the use/ know-how, library can choose a management software that facilitate information use by a friendly module interface design.

About the needed software, the market offers a wide variety of both free and privative software. But when "... the information units are in the last place in the investment priorities in organizations"

[1] SIT born from the University Communal Work Program of the University of Costa Rica. The specifically form the 573st project, called "Beyond traditional agriculture: strengthening organizational and productive in Tierra Blanca de Cartago" coordinated since 2010 by Mrs. Sonia Angulo, with collaboration of Mr. Juan Chin.

(Chinchilla, 2011, p.2), free software becomes a viable alternative, especially for the economic aspect (there is no need to incur in licenses fees).

Beside the economic aspect is also the social. Eswara (2007) indicates that information transfer in rural areas should use a platform to facilitate "interaction, networking, feedback and collaboration by serving each other in a dynamic dual function as both a resource basis and a customer base" (p .5). Also, other very important aspect to note is if the platform is flexible enough to avoid privatization of certain information by the community (Eswara, 2007). In the specific case of SIT and Tierra Blanca, OpenBiblio (spanish versión of OpenBiblio software) is the option.

What about the benefits that it has brought to the SIT?, in terms of helping to reduce the digital divide in the community the group of farmers who coordinate the SIT has prioritized the use/ literacy axis because they understand that connectivity and access to information cannot help, themselves alone, to reduce the digital divide *barrier*, as indicated by Van Dijk and Hacker (2003). It´s in the information use, in the data relationships that are matched to find a source of information and in how anyone can be autonomous in it´s own search and recovery of information.

Finally, it is appropriate to recall the words of Abdullahi (sf), who advocate for the understanding of the third axis of literacy/use for the reduction of the digital divide indicating that, when talking about information, systems and services "a community can only become knowledgeable if they recognize and use the information as a tool for development " (Abdullahi, nd, p. 3).

6. CONCLUSION: IT´S NEEDED TO EXTENDED TO OTHER COMMUNITIES

The digital divide phenomenon is complex because is composed by three axes (access, connectivity and usage) and has a multifactorial origin that impacts the economically, politically, social and cultural development of national and local dynamics, according to Van Dijk and Hacker (2003) and CEPAL (2009). By focusing the digital divide in rural (and specifically agricultural) area, it should be considered another factor: the everyday uncertainties, both financial and personal (Mancinelli, 2008), and how the use of information can help to reduce them.

Specifically in the case of the SIT, coordinators farmers have reach innovative ideas on how to improve their work by understanding how information and ICTs operates, and how to facilitate access and connectivity to information by focusing on the use of information through an automated information system. A community, and therefore a country, cannot move forward in its mission to reduce the digital divide if only access points and connectivity is provided.

Beyond that, it should be promoted in other districts the understanding of the three axes that make up the digital divide. Finally, in this sense is useful to rescue, once again, the PROSIC voice: "A country that wants to move towards the information and knowledge society should promote ownership and efficient use of these technologies in the daily lives of people" (2013, p. 181), and an automated information service as the SIT is an alternative to achieve it.

7. ACKNOWLEDGMENT

Mrs. Sonia Angulo, Social Worker, Mr. Juan Chin, Chemical and the Student´s Social Action Initiatives Program, all from the University of Costa Rica, for their great support during the SIT development.

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