

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

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ABSTRACT

This study aims to analyze the phenomena of the digital divide in the community of Tierra Blanca and presents the case of the Agricultural Information Service in Tierra Blanca as a solution to reduce the digital divide in this farming community. Based on the promise that Information and Communication Technologies (ICT) 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. The paper studies the relationship between the digital divide and the productive, political, economic, social, cultural and commercial business development of small farmers. Based on the collaboration of a group of farmers in Tierra Blanca, the impact of the digital divide is considered specifically in this community. The case of the Agricultural Information Service in Tierra Blanca is presented as an automated information system that allows to combat lags generated by this phenomena. The study concludes that the case of the Agricultural Information Service in 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

1 Introduction

This paper deals with issues around the Agricultural Information Service in 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 northern 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 contributors 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 about 12 kilometers from Cartago's downtown. This duality makes it a place where grows is directly linked to agriculture while it enjoys various facilities and benefits of city environments.

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

2 The Digital Divide: A multifactorial topic in our current context

The topic of Information and Communication Technologies (ICT) has initiated a debate on the profound restructuring of the economic and social systems in Latin America and the Caribbean, which implies certain changes that have generated both progress and challenges. In this sense, the exclusion or inclusion of certain sectors from the information society depends heavily on how can each country handle their technological, economic, social, political and cultural factors and the dynamics involved in them (ECLAC, 2009).

It's worth noting that those dynamics involve three factors which are - today more than ever - indistinguishable: technology, information, and communication. Nowadays, as the technology is the main media for the communication of information, a strong phenomena is visible: the digital divide. The following is an overview of its meaning and its major axes: access, connectivity and digital literacy.

2.1 What is the Digital Divide?

From a simplistic view, the digital divide is defined as the social and economic exclusion of a group of people or sectors by ICT lack in their development activities. However, this problem can be analyzed from other points of view. For example, Peres and Martin (2009) suggest that the digital divide is the line that divides a group of the population that benefits from ICT from those who are unable to do so, regardless of the reasons involved: "...in other words, is a line that separates people who already communicate and coordinate activities through digital networks and who have not yet reached this advanced stage of development..." (p. 16). They also add that the digital divide can be noted as the division between the "informationally rich" and "informationally poor" collectives, where those with abundance in social technologies receive more benefits than those who don't have these technological facilities.

Likewise, Serrano and Martinez (2003) point to the digital divide as "...the gap that exists between people (communities, states, countries) that use Information and Communication Technologies (ICT) as part of their daily life routine and those who don't have access to them, and even having them, don't know how to use them..." (p. 8).

Mancinelli (2008) also provides another definition of digital divide and indicates that:

There has always been a gap between those people and communities who can make effective use of information and communications technology (ICT) and those who cannot. Now, more than ever, unequal adoption of ICT and access to opportunities exclude many from benefiting from the advantages related to the introduction of technologies in many fields of social life. 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).

The digital divide can be determined, mostly, as a low-income countries phenomena, as it is related to other factors, such as per capita income, educational level, age, residence area, ethnicity, etc. (ECLAC, 2003). Thus, the digital divide is more than just a result of the technological immersion on the economic and social society's paradigm; in fact, it is an issue related to other components: "...the digital divide is essentially a byproduct of the existing socioeconomic gaps ... There is a direct relationship between income and Internet access, and countries with lower income levels tend to have lower penetration rates..." (ECLAC, 2003, p. 24).

Mancinelli (2008) also notes that there is not only one type of digital divide but several types depending on which feature is being analyzed:

While a consensus does not exist on the extent of the divide (and whether the divide is growing or narrowing), researchers are nearly unanimous in acknowledging that some sort of divide exists at this

point in time. In fact there is not just one digital divide but multiple divides which relate to a variety of factors such as: gender, age, “ethnic clustering”, uncertainty of living/financial conditions, work insecurity, and social insecurity. In the light of this, social exclusion principles and policies need to be rethought to take into account the fact that the digital divide is basically about social access to digital technologies (p. 174).

Thus, it can be determined that the digital divide is more than a lack of technology access: “...this dimension of the digital divide, which goes far beyond mere access to computers and focuses on who is taking advantage of digital opportunity and who cannot, raises crucial issues for development...” (ECLAC, 2003, p. 64). For this reason, this paper will analyze the digital divide in agriculture from the perspective of the three inseparable axes: access, connectivity and digital literacy.

2.2 Access, connectivity and digital literacy in the context of the Digital Divide

When the word access is firstly approached it refers to the possibilities on entering any particular item. By the way, in graphic terms it is commonly associated with images of keys or tools that provide access to locked doors or padlocks. It can be said that the access is the enter key for places that don't allow income. In the technology context, the access is not away from this perception, and is generally used to indicate circumstances - or rather the lack of them - where technology is available.

Thus, for those communities where no technological tools are available it is said that they are living in a situation of lack of technological access. This particular issue has put governments under pressure, as it implies a serious matter in the social and economical level, because nowadays the lack of access to technology hints to the social and economic exclusion of a group or sector, hindering their proper development. In this sense Mancinelli (2008) notes that the principles of social exclusion and the political needs should consider that the digital divide is basically a topic that has to do with social access to digital technologies: “...this goes beyond the idea of ‘access to the technical kit’ and considers social relations around the uses of ICT and the socio-technical aspects of the emergent Information Society...” (p. 174).

Furthermore, this subject addresses other questions: “What level” of technology access should be reached? Should it be a full or partial access? Which level should access be reached to ensure the development and socio-economic inclusion of the regions? These questions seem to answer themselves through the statistics presented by the governmental and international agencies about the number of people who own a mobile phone, a T.V. and a computer.

In the Costa Rican context, it is important to consider the latest data from the University of Costa Rica's Information Society and Knowledge Program (PROSIC, for its acronym in Spanish) on access of ICT in public administration, businesses and homes. In this respect, 82% of the Costa Rican businesses reported having computers (where two-thirds reported having equal employee and computers quantity) and 30% mobile devices in their daily activity. In addition, 91% have access to cell phones.

Regarding households, 97% of these have cable TV and 92% a cell phone. Likewise, 49% own a computer and 47% have Internet access (PROSIC, 2013). While this data indicate a high percentage of technology ownership, the fact that almost half of Costa Rican households own a computer and have internet access is a call of attention to these areas, compared to the fact that almost the whole collective has a T.V. and a cell phone.

With regard to this point it is important to state the difference between access and connectivity. While both terms commonly tend to confuse each other, they are not necessarily the same. The following example presented by Muñoz and Nicaragua is helpful when aiming to make the distinction: “...the Valley Municipality has provided ... wireless internet that can be used in parks, cafes, shops, schools and other community sites. However, 40% of individuals cannot use this tool, due to a lack of resources...” (p. 7). Therefore, although connectivity could have been set, if people cannot access the technological devices, then the technological infrastructure cannot be used. Or, as the University of Pamplona states: “...while connectivity capability refers to two or more hardware elements and software that can work together to transmit data and information in a heterogeneous computing environment...” (2012, p. 3), access refers to “...the opportunities that people have to use that connectivity through technological means, including social, economic, geographical, among others...” (p. 7). It is important to say that the connectivity issue also takes into account the Internet, broadband, fixed and mobile telephony issues.

In Costa Rica the technological connectivity is shown by the results of the Networked Readiness Index (NRI) by the World Economic Forum and INSEAD, where the country occupies the 53rd position in the overall ranking score (after Chile, Barbados, Panama and Uruguay). Specifically in the infrastructure area, Costa Rica is ranked at the 76st position (PROSIC, 2013). The report Measuring the Information Society and the Index of ICT Development (RTD) of the International Telecommunication Union (ITU) said that Costa Rica was located at the 60th position in 2012; that means, the country moved five places from the

previous index and now occupies the 8th position in America: "...for the second consecutive year the country manages to increase its score significantly, thanks to ... the opening of the telecommunications market, which highlights the increase in subscribers to mobile telephony (which already exceeds the number of inhabitants) and the penetration of mobile Internet..." (PROSIC, 2013, p. 150). However, this report notes that Costa Rica continues to maintain a significant level of mobile phone lag, as it was the last country in the world to provide the prepaid mobile phone service (PROSIC, 2013).

Other connectivity statistics state that 88% of Costa Rican businesses have internet, 87% have internet connection and 22% a wireless connection. In detail, 25% have an internet connection between 1 megabyte (Mb) and 2 Mb, while 33% are between 2Mb and 100Mb. Only 0.3% have more than 100Mb. Similarly, Costa Rican companies make use of flash drives, hard drives, CD, DVD and servers to store digital information (respectively 61%, 59%, 36% and 23%) (PROSIC, 2013). On the other hand, only 32% of Costa Rican households indicated having internet access by modem cable internet, while 36% by mobile devices and 12% by high-speed systems: "...the remaining 20% of the households access the Internet by devices that are almost obsolete because of their low speed and other limits, eg, in some cases the connection is lost when the home phone rings..." (PROSIC, 2013, p. 184).

On the other hand, the digital divide could be observed through the lack of knowledge in the usage of technology, ie digital literacy. Just as people and society's behavior adapts to the context and the changing socio-economic dynamics, nowadays there is a need to develop all those knowledges related to technology management, in order to adapt knowledge to what is demanded or what is considered necessary for proper integration into society. By this, a very specific feature of the digital divide is the educational perspective of technology, a situation that is much more than access or connectivity by physical devices, because it reaches the cognitive dynamics of people.

In this respect the social, economical, personal and cultural factors mix in order to determine the way in which each person approaches his or her technological experience, in other words, how much a person is prepared or not to use a computer? However, beyond the possible answers, it is a fact that society's socio economic components have determined that anyone who wants to generate an adequate development must possess certain technology skills, at least at a basic level.

In this sense, IFLA (2013) confirms that the digital divide is a gap that includes the people who do not possess the necessary skills to use technology tools, and that these people will be alienated from the socio-economic development:

[Around a] billion new Internet users in developing countries are changing the landscape of the online world. However, deficiencies in reading and digital literacy skills remain as barriers to access online resources, this can lead to the growth of the digital divide and global inequalities ... The digital universe is expanding and increasingly it will give them greater value to information literacy skills, in addition to basic reading skills with digital tools. People who lack these skills face barriers to be included in an increasing range of areas (p. 11).

Similarly, Castaño (2014) points out that this concept is determined by various dimensions: the learning, technological, informational, communicative and digital culture dimensions. The first dimension includes the entire process that converts information into knowledge; the second one, the technology dimension, includes the skills to use the technology tools and digital environments; the informational dimension consists of knowing how to collect and evaluate process information in digital formats. The communicative dimension covers communication, personal and social interaction with other people. Finally, the digital culture dimension is related to all those practices and social and cultural trends emerging in the digital environment

Therefore, it's necessary to point out the following question based on those digital literacy characteristics: does a person need to manage all those five dimensions before reaching a digitally literate status? Since each of these dimensions implies a certain level of complexity in its analysis, it is clear that further studies are crucial in these specialized areas of digital literacy. As noted by Castaño (2014), "...digital literacy implies more than the ability to use computer programs and manipulate electronic devices. It includes a complex of cognitive, sociological and emotional skills necessary for a efficiently manage of the digital environments..." (p. 4). Finally, it must be said that unlike the statistics related to the access and connectivity matter, studies on digital literacy in Costa Rica are few, and they concentrate on the aspect of usage but not on management skills (PROSIC, 2013).

After this general multifactorial overview, the next section aims to analyze the phenomena in the specific context and matter of interest of the paper: the rural areas.

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 the digital divide is higher, because according to PROSIC (2013): "...the rural area has well below conditions of ... computer ownership, internet access and internet connection type..." (p. 201).

This scenario seems to be the norm in other Latin American countries, as ECLAC notes that "...the greatest delay in incorporating ICT into productive, social and cultural activity appears to be in the rural and agricultural sector..." (2012, p. 5). This is paradoxical when considering the great importance that agriculture has for Latin American economies. In 2003, an IICA study showed that the real contribution of agriculture to the economies was greater than the quantity presented as official for several decades. Specifically in the case of Costa Rica, IICA noted that the statistics presented in 1997 were flawed because:

The actual contribution of the expanded agriculture to GDP is higher ranging from a minimum of about 3 times for Costa Rica, up to 11.6 times in the case of the United States. Thus, for the studied countries the expanded agriculture contributes about 30% to GDP in 1997, well above the 7% of official statistics (p. 10).

So, it is urgent to ask the next question: why does a strategically important area such as the agricultural area rank the highest lag? It is necessary to rise the awareness of the fact that, as digital divide reduces, the competitiveness of the agricultural area increases, because "...ICT may be applied in almost all areas of management and production companies and food chains..." (ECLAC, 2012, p. 7).

Also, just as the digital divide cannot be analyzed in a simplistic way, the dynamics within the agricultural environment cannot ignore the triad of access, connectivity and literacy. Regarding the access axis, Costa Rica has made efforts to increase the possibilities for this, because as ECLAC notes, Uruguay, Costa Rica, Chile, Mexico and Brazil form a group that "...seems to have made special efforts in providing connectivity and community access points..."(2012, p. 15).

In addition, Costa Rica is taking part in the regional trend in which "...the high penetration of mobile phones in rural areas is a common phenomena to all countries in the region ... in some of them, more than half of the rural population has cell phones and even in four countries the percentages rise to 70% of rural inhabitants..." (ECLAC, 2012, p. 15). Foregoing, ECLAC presented the graph displayed as figure 1 (ECLAC, 2012, p. 16).

It is worth noting that a cell phone is "...an instrument with potential for expansion strategies of ICT..." (ECLAC, 2012, p. 15). Regarding the cell phone use, it is important to note that while ECLAC points out that many Latin American countries are making efforts on providing information to the farmers by SMS, Costa Rica is not mentioned, even that this country is taking specific actions, such as IICA's agricultural SMS initiative.

On the computer and internet access and connectivity issue, ECLAC indicates that the implementation levels are lower than the with the cell phone case. However, this same entity observes as a matter of interest the "...differences in access to each other. Apparently there is a penetration of computers in rural households, regardless of the availability of connectivity ... In any case, the presence of a computer without Internet, although a limitation, opens the possibility of using local applications and starts the familiarization with the digital world..."(ECLAC, 2012, p. 15).

Now, about the third axis (the digital literacy), ECLAC highlights an important issue: "...the internet does not necessarily guarantee that it will be used by farmers. In most cases, the farmers use is always less than the access possibilities. This is endorsed by research that shows that even having a computer at home or at work, farmers claim not using it or do it through a proxy user who is the son or daughter..." (Nagel, 2005, FIA, 2009a, cited by ECLAC, 2012, p. 18).

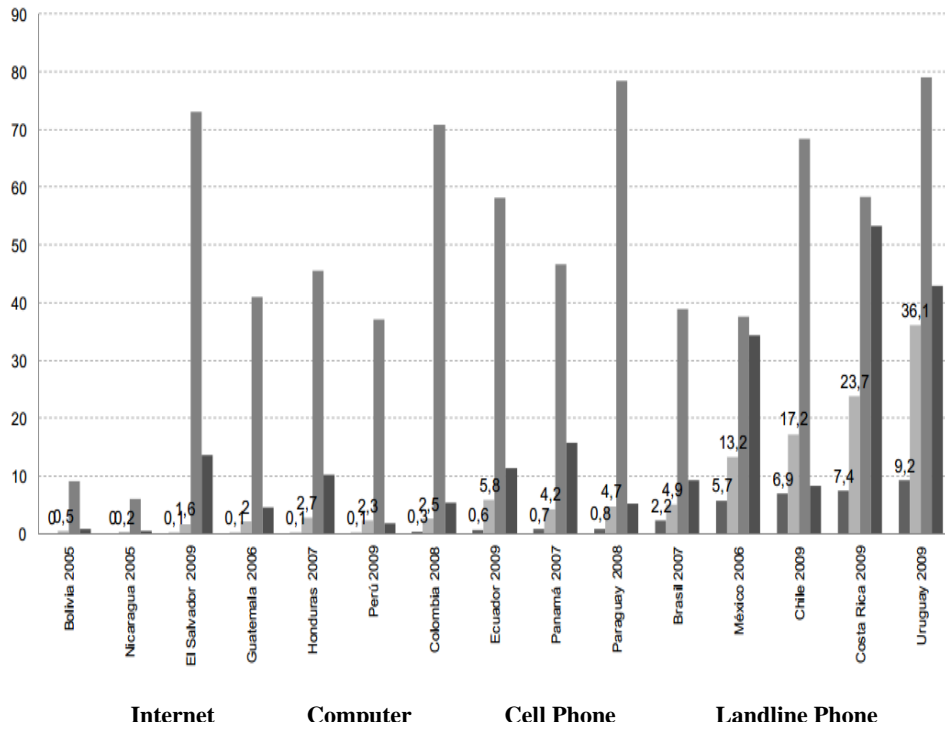


Figure 1. Landline phones, cell phones, computer and internet access on rural homes*

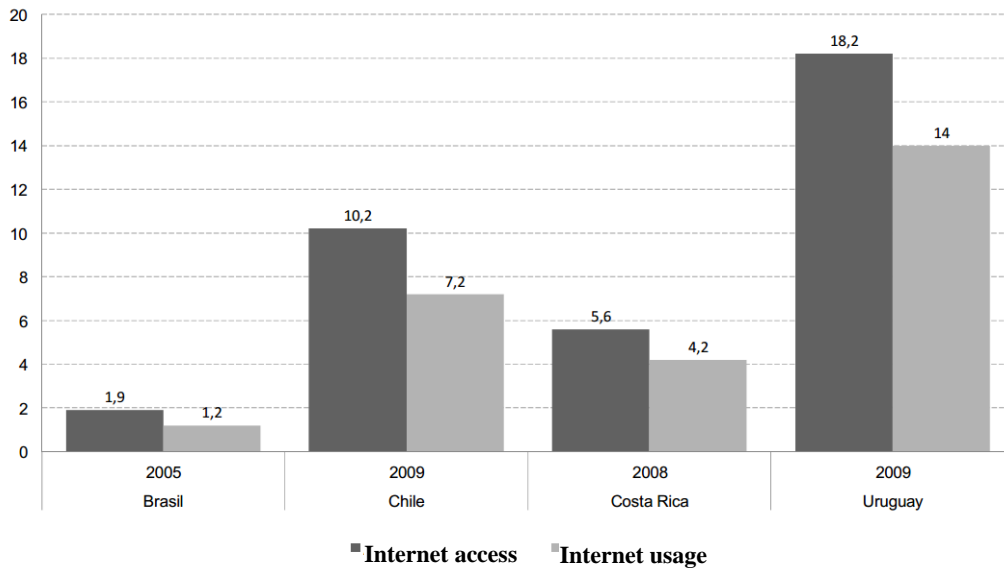


Figure 2. Internet access on agricultural homes and internet usage by farmers†

* Source: OSILAC's Home survey data. Note: as the original graph had its captions in Spanish, the authors have translated the captions to English. Of course, the graph's statistics stay in the same way as the original version. This also applies for the graph that will be presented as figure 2.

So, if the adoption of ICT brings benefits for the producers, why would they show such a low interest to get closer to them? Why, if according to ECLAC, it is a reality that ICT "...has generated a global platform with unsuspected possibilities for expansion and impact..."? (Mohsen 2009 cited by ECLAC, 2012, p. 5).

The answer could lay on the fact that, among the triad composed by the access, connectivity and digital literacy, when referring to the rural and agricultural context one should also consider (as explained by ECLAC, 2009) several factors that transcend the purely technical aspects, such as economic, social, political, and cultural local/national dynamics. For this it must be analyzed how those factors deal with the access, connectivity and digital literacy of ICT and information in Tierra Blanca.

3.1 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 472 Costa Rica districts in the rankings of ICT access and connectivity (according to the National Institute of Statistics and Census, INEC, 2011). Compared to other rural areas, Tierra Blanca is in a privileged position. This characteristic of the digital divide is not unique of Costa Rica, as ECLAC had already referred to this issue as a general rule for the Latin American region, indicating that there are differences between access, connectivity and digital literacy between urban and rural farmers (2012).

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 is going on, if access and digital connectivity exists? The answer lies in the fact that the community is not implementing the third axis of literacy; they do not know how to use the information that they get with ICT tools. Therefore, as Macinelli (2008, p. 174) wrote, information cannot contribute to reducing their "life and financial uncertainties".

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

In economic terms, Tierra Blanca farmers do not know "how fast the market moves, which innovator niches exist 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) have a lot of information resources available.

Regarding this market information request, ECLAC states that for farmers "...climate information and prices seem to be the main areas of interest..." (FIA, 2009a; Interviews, 2011) (ECLAC, 2012, p 19). By the way, it is important to highlight the need for greater efforts towards promoting market information, as "...the greatest perceived impact of the farmers's ICT use relates to improved communications and access to new markets..." (ECLAC, 2012, p. 20).

Now, into politics, little is known about the everyday actions of government institutions and the opportunities that communities 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 come here they confuses us, because when the engineer left we cannot 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, regarding the social and cultural factor: 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) face a scenario in which youths feel uprooted by the agricultural identity. Why, if access and ICT connectivity should provide new scenarios for rural youths to join? 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 to wish being farmers, we can help them to use the technology in order to change the traditional agriculture without ignoring our traditions at all..." (June 12, 2014, Personal Communication).

So, how can the literacy axis integrate a scenario in which access and connectivity exist? An option is through the transferring of information, where "...the agricultural information transfer system consists of four independent and interrelated components: development, documentation, dissemination, and

† Source: OSILAC's Home survey data.

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 transfers information and helps to reduce the digital divide within the farming community.

4 Response to the Digital Divide: The case of the agricultural information service in Tierra Blanca (Sit)[‡] as an automated information service

Following ECLAC (2012), Latin America has taken several actions to reduce the digital divide, by public institutions, private entities and NGOs. The entity notes that some countries like Chile and Bolivia have made significant efforts in the digital literacy field, but does not mention what is happening in Costa Rica. In this country, the Agricultural Information Service in Tierra Blanca is a recent initiative that should be taken into consideration.

As the SIT is directly related with the librarian area, it is important to say that library science contributes in a great way to reach the previously mentioned scenario because it works primarily with information and according to Abdullahi (n.d.): "...information, if well articulated, could eradicate ignorance and help 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 its 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) go unnoticed among the community? According to UNESCO (1999): "...access content, copyright and self-learning require 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 addressed is with the automated information systems.

4.1 About automation

When implementing an information service, the establishment of a digital or physical library collection is necessary. However, this collection should follow the principles of cataloging and information retrieval in order to accomplish its purpose. For this, one of the standards is the selection and installation of an LMIS (Library Management Integrated System) software to manage the bibliographic resources. It is important that the software is adapted to the needs of the users of the information service as well as their characteristics, so it is necessary to conduct a study and diagnosis to acquire the software that best fits the context (Chinchilla and Fernández, 2013).

So, the automation is the process that incorporates data from the library collection into the LMIS software by building a database with the bibliographic information, which allows to facilitate the information retrieval and the control of assets.

According to Chinchilla (2005), the automation establishes a relational model in which data tables are related with the various information resources that the library has. This allows to relating the information resources and its characteristics in efficient ways that provide a better information retrieval for the users.

The automation is important for reducing the digital divide through its axis of use and literacy because it focuses on improving the information retrieval experience and has a direct impact on the new library paradigm in which 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 communal information projection and reduces the digital divide by providing the tools the community needs to increase the access, connection and use of information. Without it, the information would be untraceable.

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

[‡] SIT born from the University Communal Work Program of the University of Costa Rica. The specifically from 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.

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 use/know-how, the library can choose an LMIS software that facilitates 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..." (Chinchilla, 2011, p. 2), free software becomes a viable alternative, especially for the economic aspect (there is no need to incur in licenses fees).

Besides the economic aspect, the automation with LMIS software also contributes to the social aspect through what 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, an essential 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 version of OpenBiblio software) is a good option.

What about the benefits that it has brought to the SIT? 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 by itself to reduce the digital divide *barrier*, as indicated by Van Dijk and Hacker (2003). It is the information use and the data relationships that support in finding a source of information and the individual autonomy in searching for, and recovering of, information.

When pointing out the automation and virtual environments an important issue should not be ignored: the way in which such automated information is presented and communicated. According to ECLAC "...farmers require three conditions: updated information, local information and simple and friendly portals..." (ECLAC Survey, 2011, cited by ECLAC, 2012, p 27).

In addition, "...there are studies that show that, for a strata of farmers, digital content is often inadequate and does not meet the immediate needs of them..." (Bossio, 2005, in ECLAC, 2012, p. 27). So, there is a need for advocating a conscious automation, not merely an automation that focuses on the technical part. The efforts undertaken for reducing the digital divide within the agricultural community should always have the farmer in mind, even if the approach is based on an informatic perspective.

Finally, it is appropriate to recall the words of Abdullahi (n.d.), who advocates for understanding the third axis of literacy 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, n.d., p. 3).

5 Conclusion: It is needed to extended to other communities

The digital divide phenomenon is complex because it is composed by three axes (access, connectivity and usage) and has a multifactorial origin that impacts according to Van Dijk and Hacker (2003) and CEPAL (2009) the economical, political, social and cultural development of national and local dynamics. By focusing on the digital divide in rural (and specifically agricultural) areas, one should consider 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, coordinator farmers have reached 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, the understanding of the three axes that make up the digital divide should be promoted in other districts. With this understanding it is useful to revert, once again, to 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). An automated information service such as the SIT is an alternative to achieve it.

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References

- Abdullahi, M. (n.d.). *Access to Information: The Dilemma for Rural Community Development in Africa*. Retrieved from https://smartech.gatech.edu/jspui/bitstream/1853/36694/1/1238296264_MA.pdf
- Alvarado, A., Ramirez, L., and McHugh, A. (2008). Historical and Socio-Economic Development of the Middle Reventado River Basin, Cartago, Costa Rica. *Agronomía Costarricense*, **32** (2): 53-72. Retrieved from http://www.mag.go.cr/rev_agr/v32n02-053.pdf
- Álvarez, V. (2012). Notes on the digital divide. In Society Programme in Information and Knowledge [PROSIC]. *ICT at coffee time* (pp. 36-45). San José, CR: PROSIC. Retrieved from <http://www.prosic.ucr.ac.cr/sites/default/files/documentos/tic.pdf>
- Castaño, W. (2014). About literacies and competencies in the digital age. Case study. *e-Ciencias de la Información*, **4**(1):1-12. Retrieved from <http://revistas.ucr.ac.cr/index.php/eciencias/article/view/12861/12355>
- Castaño, W. (2014). Literacies and competencies in the digital age: a case study. *e-Ciencias de la Información* **4**(1): 1-12. Retrieved from <http://revistas.ucr.ac.cr/index.php/eciencias/article/view/12861/12355>
- Chinchilla, R. (2005). Automation catalogs and library automation: from the parts to the whole. *Revista de Bibliotecología y Ciencias de la Información*, **19**(1/2), 1-7. Retrieved from <http://kerwa.ucr.ac.cr/handle/10669/339>
- Chinchilla, R. (2011). Free software: an alternative to automate information units. *Revista Bibliotecas*, **29**(1): 1-17. Retrieved from <http://www.kerwa.ucr.ac.cr/handle/10669/526>
- Chinchilla, R., Fernández, M. (2013). Automation of information units. Technique matrix for the evaluation of free software. *Revista Interamericana de Bibliotecología y Ciencias de la Información*, **36**(3): 207-219. Retrieved from <http://www.kerwa.ucr.ac.cr/handle/10669/8954>
- Economic Commission for Latin America and the Caribbean [ECLAC] (2012). *Main barriers for ICT usage on the agricultural and rural areas*. Santiago, Chile: ECLAC. Retrieved from <http://www.cepal.org/publicaciones/xml/7/48377/PrincipalesBarrerasParaAdopcionTIC.pdf>
- Economic Commission for Latin America and the Caribbean [ECLAC] (2003). *Paths towards Information Society in Latin America and the Caribbean*. Santiago, Chile: ECLAC. Retrieved from <http://www.eclac.cl/publicaciones/xml/9/12899/lcg2195e2.pdf>
- Eswara, D. (August 2007). Impact of Globalization on Small Farmers Worldwide: Implications on Information Transfer. In *Agricultural Libraries. World Library and Information Congress: 73rd IFLA General Conference And Council*. Retrieved from http://www.academia.edu/913755/Impact_of_Globalization_on_Small_Farmers_Worldwide_Implications_on_Information_Transfer
- Herrera, R. (2012). Implementation of Computer-based applications Free Software in Libraries and Information Units. *e-Información*, **2**(1): 1-14. Retrieved from <http://www.kerwa.ucr.ac.cr/handle/10669/7349>
- International Federation of Library Associations and Institutions [IFLA] (2013). *Riding the waves or trapped in the tide*. Retrieved from http://trends.ifla.org/files/trends/assets/surcando_las_olas_o_atrapados_en_la_marea.pdf
- International Institute for Agricultural Cooperation [IICA] (2003). *More than just food on our tables: the real contribution of agriculture to the economies*. San José, Costa Rica: Author. Retrieved from <http://www.territorioscentroamericanos.org/redesar/Diversificacin%20de%20Economias%20Rurales/Contribuci%C3%B3n%20a%20la%20agricultura.pdf>
- Mancinelli, E. (2008). e-Inclusion in the Information Society. In *Information Society: from theoretical to political practice* (pp. 171-182). Budapest: Gondolat Kiadó, NET-IS. Retrieved from http://www.ittk.hu/netis/doc/NETIS_Course_Book_English.pdf

- Muñoz, M.D., Nicaragua, R. (2014). An approach to the digital divide in Costa Rica from the standpoint of access, connectivity and digital literacy. *e-Ciencias de la Información*, 4(1): 1-29. Retrieved from <http://revistas.ucr.ac.cr/index.php/eciencias/article/view/12866/12328>
- National Institute of Statistics and Census (2011). *X National Census of Population and Housing 2011*. Retrieved from <http://www.inec.go.cr/anda4/index.php/catalog/113>
- Palomino, N. (August 2004). To build and strengthen civilian life with information that promotes action: the role of NGOs. In *Social Science Libraries with Division VIII. Regional. 70th IFLA General Conference and Council, Buenos Aires, Argentina*. Retrieved from <http://dspace.ipu.edu:8080/xmlui/handle/1/199>
- Serrano, A., Martínez, E. (2003). *Digital divide: myths and realities*. México: Editorial UABC.
- Shukla, P., Singh, A. (August 2009). Open Access Initiatives for agricultural information transfer systems in India. In *Agricultural Libraries. World Library And Information Congress: 75th IFLA General Conference And Council, Milan, Italy*. Retrieved from <http://dspace.ipu.edu:8080/xmlui/handle/1/199>
- Society Programme Information and Knowledge [PROSIC] (2013). *2013 Report. Towards the Information Society and Knowledge* [Chapter 3]. San José, CR: Author. Retrieved from <http://www.prosic.ucr.ac.cr/materiales-/informes/informe-2013>
- United Nations Educational, Scientific and Cultural Organization [UNESCO] (1999). *7th information. New information technologies and adult education*. Retrieved from http://www.unesco.org/education/uie-/confintea/pdf/7a_span.pdf
- Universidad of Pamplona (2012). *Glossary of terms. Digital Brochures Materials for the Diploma Office Automation*. Retrieved from http://aulati.unipamplona.edu.co/unipamplona1/hermesoft/aulaTI/material-/medios/arc_2252.pdf