

Analysis of ICT in the HUB MasAgro program for the state of Chiapas, Mexico

P. González and R. Rendón¹

¹CIESTAAM, Universidad Autónoma Chapingo, Texcoco, Estado de México

Coordination Unit Specialized Technical Innovation Management, responsible for the operation of the Agency for Innovation Management

pgonzalez@ciestaam.edu.com

ABSTRACT

The new information and communication technologies (ICT) have become an essential part of business. Because of this, we have developed a lot of scientific research on adoption issues and benefits of using ICT in all types of businesses. In agriculture and agribusiness are no exception. However, there is little research conducted in developing countries and virtually no studies of this type for countries in Latin America. This paper presents the results of an exploratory research developed in a group of technicians and producers MasAgro program in the state of Chiapas by the Secretary of State SAGARPA, Mexico. The study examined the factors of value creation in the ICT decision-making according to the perception of the program directors. The survey used was applied to 90 producers representing corn producers in the region. The instrument designed to obtain information was a questionnaire with a total of 60 questions, the questionnaire is divided into four sections, the first of which collects the information about the interviewee and performance. The next section asks about the use of ICT, the third section aims to analyze the perception of the companies surveyed in relation to ICT, and the last part is dedicated to analyze the factors that influenced the adoption of these technologies. The results show that the degree of adoption of ICT presents technical and program producers in the state of Chiapas is still basic, since the use that is given to the use of Internet is not going beyond the banking, the consultation climate and information searches. This research contributes to knowledge in this area helping the understanding of the different facets of ICT adoption in rural enterprises in developing countries. Proposing a second phase to the adoption of the proposed model which depends on the initial level of use of ICT in the study group as well as the technical characteristics and producers, and the process of promoting innovation for use. The adoption shows differences in knowledge management to define the model of use for the development of their daily activities, aimed at harnessing the potential based on the current situation of ICT, which will make up an integrated system for decision-making in real time. The most influential factors in the adoption of innovations are the characteristics and level of knowledge of ICT, where the digitization of information is based on the use of computer technology, and implementing the widespread use of ICT in transactions economic and trade MasAgro program in the state of Chiapas, México.

Keywords: ICT, Agribusiness, Adoption, Integration Technology, Mexico

1. INTRODUCTION

This paper presents the results of an exploratory research project aimed at determining the extent of adoption and use of new information and communication technologies (ICT), specifically, the Internet and the WWW in agribusiness in Mexico. As the universe of study, we selected a group of technicians and producers MasAgro program in the state of Chiapas, which although not representative of the conditions under which the adoption and use of ICT across the Mexican agribusiness, if you can make common in Mexico information to agribusiness SMEs.

1.1 The Mexican agribusiness

The present work aims to study the technicians and producers of corn in the state of Chiapas, but their activity is not exclusively agricultural, but that such activity also covers the marketing of their products so we can call them as part of the agribusiness sector. Agribusiness is considered as economic activity that combines agricultural production process with industry. In this process, agriculture and industry can achieve different degrees of horizontal and vertical integration which may eventually reach the integration of marketing activities and providing insumos¹. Agribusiness has the ability to reduce the perfectibility of products and post-harvest losses, reduce the seasonality of supply, increase the value added of the primary product; accommodate urban patterns of demand (CEPAL, 1998: 31). The term was coined by Ray agribusiness Goldberg of Harvard University, during the 50s. It refers to the chain of individuals, companies and institutions, ranging from input supply to processing and distribution of food (Ramirez, 2003). In Mexico dominate micro food agro industrial activity (Council for Standardization and Certification of Labor Competence, 2000). According to a study by the Council, the average age of the agro-food establishments ranges from four to fifteen years of operation.

1.2 The agribusiness sector and ICT.

Among the external phenomena that have impacted the agricultural industry is the adoption and diffusion of the new technological (IT, biotechnology and new materials). ECLAC argues that this paradigm will reduce the comparative advantages of the endowment of natural resources and cheap labor (1998: 19). The Internet is much more than just a simple and effective way to exchange e-mail and documents, the Internet emerges as a major dorsal spine not only trade, but also of development (Rakesh, 2003). An essential element of competitiveness in production methods is its capacity for innovation, allowing the opportunities created by scientific and technological developments translate into advantages and benefits for those who fail to adapt to the changes. The agribusiness sector is no exception and like other economic sectors have not only adopted but have succeeded in developing communications technology and specializes in your particular needs arising from this specialized Web sites, the Internet marketing, creating specialized software for agricultural and industrial needs, etc.. However, even though we might think that the use of these technologies would naturally, Day and Schoemaker (2001:24.) Argue, "the management of emerging technologies requires a different set of skills, environments and strategies which are required to handle existing technologies".

¹ See INFOCIR, Monthly Bulletin <http://www.focir.gob.mx/documentos/boletin/infocirfebrero.pdf> agribusiness intelligence (accessed April 3, 2007)

1.3 ICT and agribusiness.

The term information technology (IT) refers to "any technology both teams as the software used to store, process and transmit information in digital form" (Carr, 2005:14). Some of the advantages of its use in agribusiness are (ibid.):

- a) Check and monitor the weather forecast
- b) Finding the supply of seeds, fertilizers and all kinds of inputs
- c) Get information about the general analysis and forecasts for each sector
- d) Be informed of logistics service, transportation and storage of commercially available
- e) Get updated catalogs of agricultural machinery, equipment and parts
- f) Exchange views and experiences with other farmers and experts from different regions
- g) Provide financial management information obtaining loans, etc.
- h) Dealing with bureaucratic barriers, keep abreast of legislation and get the latest documents and certificates through internet.

All these benefits can be availed as competitive advantages for each of the agents involved in the value chain of the agricultural sector.

1.4 The adoption of ICT in SMEs.

The adoption of ICT in different areas of business has been extensively studied worldwide, and Latin America has been the exception, but in this area of the world, studies are less abundant. In fact Palacios (2003:119) argues that "the issue is already part of the government agenda, scientific, technological, educational and industrial Latin America.

In this paper the term adoption refers to "the decision to make full use of an innovation, in this case technology, which is regarded as necessary to make things better"². The how you give such adoption and the factors influencing it, is one of the objectives of this inquiry. Day (et 2001a) provides a description of the characteristics of adopters of technologies, providing a segmentation in the adoption curve in each of the segments has identities, behaviors and different requirements (Ibid 170-171):

- a) Innovative technology enthusiasts
- b) Visionary early adopters
- c) First most pragmatic
- d) Last most conservative
- e) The tradition-bound behind

Not found in the scientific literature, studies on ICT adoption in Mexican SMEs, hence has had to analyze this phenomenon from studies conducted in other countries, where studies are more abundant,-Alexander (2006) recounts these studies. There are already several specific studies on agribusiness SMEs adoption (Premkumar, 1999, Barton, 2003; Pollard, 2003; Cetyl, 2004, Henderson, 2004; Sellitto, 2004, Thomas, 2004; Baer, 2006, Kim, 2006), although none of them to Mexican companies.

²This concept is based on the presented by Afzaal (2003) which has in turn cited Rogers. In the section of the state of the matter is discussed

Pollard (2003) presents a study in Australia that aimed to evaluate government-sponsored actions (e-services) to improve communication between small farmers and their supply chain and to identify factors affecting the adoption of the use of these services. According to their literature review identified six factors through which bears his approach: 1) perceived usefulness, 2) ease of use, 3) the attitudes towards e-services, 4) the standards used, 5) perception involving control and 6) support for their activities. The study provides evidence of the limited success of government policies implemented leading to the adoption of e-services, but also prevents the importance of contextual variables such as region, external pressures, geographical distances, which denies the author the possibility to generalize their findings.

Barton (2003), carried out an approach through a qualitative method of case study using semi structured interviews describing experiences, perceptions and attitudes of farmers regarding the use of Internet. The questions that guided the research were: Why use the Internet? How they discovered their use?, How and why did your introduction to using the Internet?, What are the common uses that give them? And what are the advantages I perceived problems regarding their use? In general, the authors find that the literature on the subject identifies internal and external factors on the process of adoption of the EC. Some of the internal factors studied are: the resistance of the administrators, the technology factor, use of resources, lack of awareness and information in this group and add what they call market orientation (ibid.: 37). Regarding external factors are: environmental uncertainty, the pressure of other actors, the influence of the government, the infrastructure aspect, and technology standards. (Ibid.). There the other hand, research focused on the analysis of the websites specialized Singh (2003). In this study the author focuses on how different types of portals on the Internet (governmental, commercial, service and specialized) facilitate access to and understanding of the users as well as the impact of these sites on the technology adoption processes.

2. METHODOLOGY

The instrument designed to obtain information was a questionnaire with a total of 60 questions. The questionnaire is divided into four sections, the first of which collects the information about the interviewee and your company. The next section asks about the use of ICT, the third section aims to analyze the perception of the companies surveyed in relation to ICT, and the last part is dedicated to analyze the factors that influenced the adoption of these technologies ICT.

The total group of technicians and producers MasAgro program in the state of Chiapas in this case were 91 who were interviewed in their entirety. Regarding schooling, 38% of farmers have minimum basic education studies. It is important to note that the majority (55%) stated that the company has only one or two administrative employees, which indicates the degree of structuring of the company, which may also be an indicator for the organization of work and the complexity of the processes that follow.

3. DATA ANALYSIS AND RESULTS

As seen in Table 1 and Figure 1, almost all of the sample reported having a computer for work, although the use of laptops is less widespread. For activities that have been conducted and performed with the help of computer equipment, found that 55% have "down" or listened to music,

64% use it to play, 73% is used in planning activities, 91% to read some document, and all the farmers have drafted documents and budgets and surfed the Internet.

Technology used	% Of farmers who used
Telephone	70%
Mobile Phone	90%
Fax	100%
Radio	64%
GPS	9%
Desktop pc	91%
Laptop	27%
PDA	9%

Table 1. ICT used by farmers (own source)

Regarding the use of specialized software, 64% reported having any of these for your work. Among those mentioned are: Money, Chiconet, Excel, Compac I Nomipac and SUA. 45% of respondents have Internet access. Only 91% use email. Figure 1 shows the detailed information. Emphasizes the use of electronic banking in 81% of cases, and consultation of climate information and pricing for all respondents. One thing that stands out is the null electronic marketing activity undertaken by farmers in the sample.

Of the 63% of farmers who have made purchases via the Internet, 42.8% have done so for personal products, 42.8% have purchased office products, agricultural inputs and hired traffic and logistics services. Only 14.3% agricultural machinery acquired by this means. Regarding those who reported searching for information using the Internet, 100% said they had looked for information about products and climate, almost 73% have done so in relation to agricultural technical information, and 64% have consulted government procedures, 91% ever consulted about sale prices of products and only 36.36% have done so in matters of traffic and logistics. The 91% of respondents said knowing any Web page on useful information for producers, however, only 34% said the name referring to a marketer of seeds. They said the aim of the search was updated in agricultural techniques, product information and prices. None of the farmers surveyed have website for your company or business.

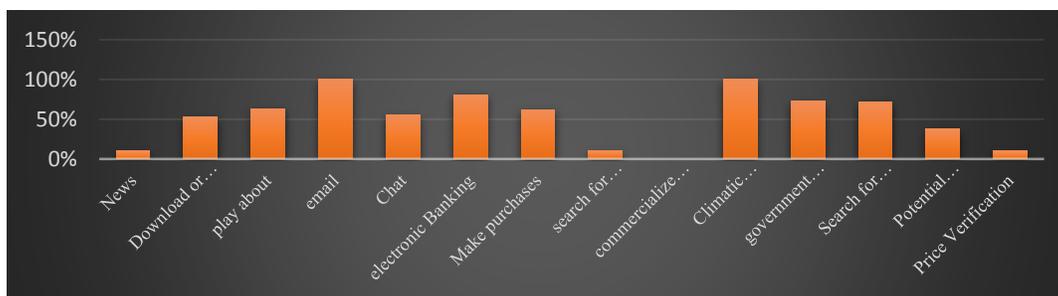


Figure 1. Activities that use the Internet

Perception of ICT. Perception can be defined simply as an inner sense that it made an impression on our senses. Material That feeling positive impact or not our decisions and behaviors. The perception is mediated by representations and cultural imaginary, this represents a major obstacle

to the adoption of technology, even greater than the infrastructure or the capital required to appropriate ICT. According to what is observed in Figure 2, the way they are perceived not only technologies, but also the need for its use and benefits they carry can be decisive for adoption. As you can see the use of the computer or PC, is very poor, limiting their use mainly to writing documents, preparation of accounting records and payroll. Other activities such as planning, production, supply, marketing, traffic and logistics are perceived mostly as activities where it is not essential to use a computer.

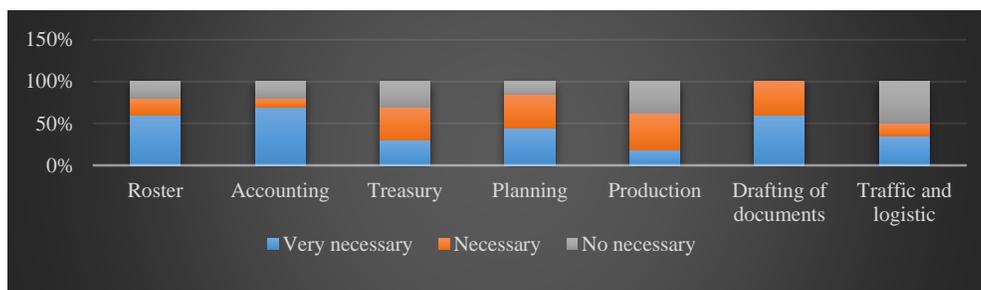


Figure 2. Perceived importance of ICT by business

Regarding the perception of Internet use in the different activities carried out it was found that the search of information on prices and quotes are the activities where it is considered necessary to have more technological tool (see Figure 3), followed by sending and receiving documents.

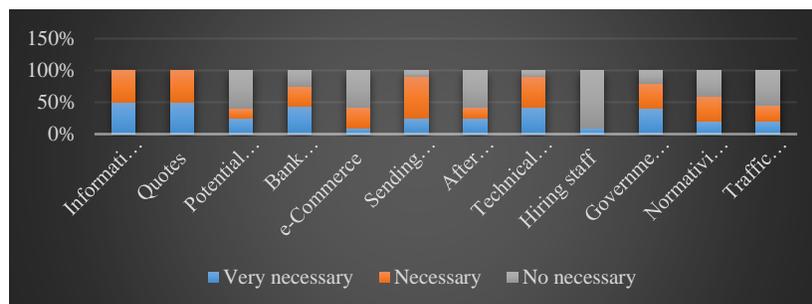


Chart 3. Perceived importance of ICT processes

The employers interviewed said they had received benefits such as cost reduction (77%), efficiency and delivery orders (74%), resource optimization (54%), control of information (53%), supply assurance (33%) and increased sales (36%). Another aspect that can be seen in the graph above is that of the above activities CE and finding customers are the activities to what is considered less necessary to use the Internet after recruitment. This is an important aspect since it is these activities that can be considered cutting edge in the use of ICT, which indicates the lack of vision you have in terms of the ways in which it is possible to exploit this resource. Furthermore, it was received during the implementation of the survey for several farmers these activities were not thought of as activities that could be conducted via the Internet. The consultation of technical and governmental procedures are apparently common activities for respondents, with 91% and 82% respectively considering the use of the Internet for these activities as necessary or very necessary.

Respondents were asked about their perceived usefulness of the Internet in terms of optimization of different business processes, obtaining the following information (see Figure 4). The 45% of respondents noted that Internet use does not see any advantages in terms of increased production and a little over 36% perceived no advantage in terms of speed up processing. On the other hand the biggest perceived advantage has to do with the possibility of avoiding middlemen (27.27%) followed by obtaining first-hand information (direct information) and optimization times (18.2%). Obvious answers besides "Do not know" which mostly were of the order of 10% (reaching in one case up to 18%), indicating the lack of information on the benefits that the use of ICT can bring. The above information shows then the degree "primitive" (Chaffey, quoted by mcole & Ramsey, 2005: 44) having Internet use in this sample of farmers.

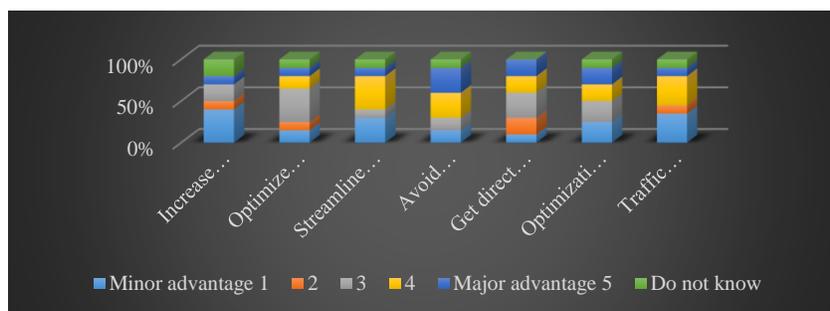


Figure 4. Perceived benefits in using the Internet

This also can be corroborated since none of them has a Web page of your company or business, and also 50% consider it unnecessary to reach new customers, 60% consider it unnecessary also to advertise their products, diversify its market and conduct electronic commerce (see figure 5).

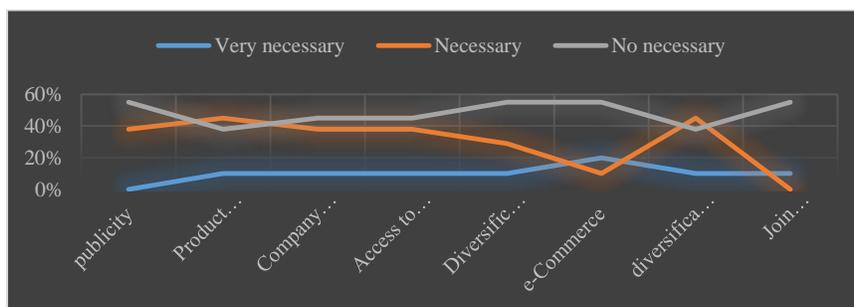


Figure 5. Perceived need for presence in the WWW

In regard to how safe the use of Internet considered responses were varied. Only 45.5% gave a value of 5 (on a scale of 1 = least safe, 5 = greater security) to the category of monetary transfers, which is somewhat contradictory to the 81% who have used online banking service. Regarding the document shipments ratio was the same (45.5%). One of the activities according to respondents is the most by farmers through technological tools is the search for information. By questioning about how safe Internet use in this case, was surprised to find that 36.4% gave a value of 3, followed by 27.3% who gave it a 4. Only 18.2% maximum value granted. While the above results show some caution as to the use of Internet, excelled in terms of making purchases and sales through this, this distrust was increased considerably. Thus we have for example that when it comes to buy a 45.5%

gave a value of 1, and only 9% gave it a 5. In what has to do with sales, 72.7% gave a value of 1, the minimum security, and as in the previous case only 9% gave it a 5. One of the disadvantages that farmers perceive electronic marketing first factor was found as ignorance on the use of ICT (36.4%), followed by mistrust and the risk of outdated information (9%). Regarding finding suppliers opinions are more evenly distributed (see figure 6).

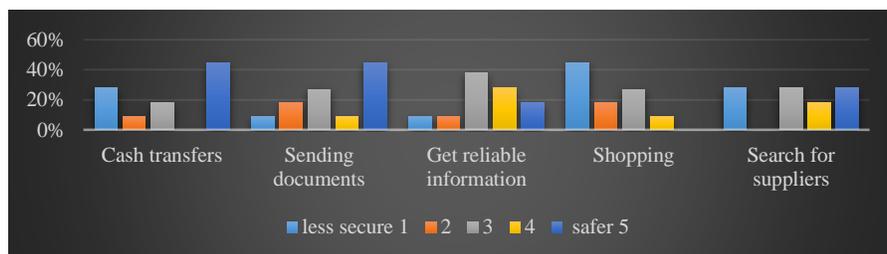


Figure 6. Perception of security in the use of Internet.

Adoption of ICT. According to research in the field of technology adoption (Oaks and Gomez, 2007) the factors that influence ICT adoption can be classified into two types: external and internal features. Among the external factors are: environmental uncertainty, pressure from other actors, government influence, the aspect of infrastructure, technology standards and technological innovation (McCole & Ramsey, 2005). In this study we asked about those external factors that could have affected the adoption of Tais. Farmers were asked to give a value of 1 to 5 (5 being the highest value) to the factors they perceived influenced ICT adoption and the results were other interesting.

As to whether they adopted the use of computers by government requirement to perform certain procedures, etc. found that only 18.2% gave the maximum value and the same percentage awarded a one. The greatest concentration of value is in the range of 1 to 3, which also indicates the limited impact of government factor, perhaps given the almost non-existent policy to promote the use of technologies. Another external factor that was considered was the requirement of suppliers, here the influence was still lower than the 45.5% and gave a value of 1. In this sense it is that although providers are consulted or searched via the Internet, for example, did not exert any pressure for the farmer to adopt the use of the computer. It was thus that the request by the clients in this sector no differences according to the respondents (63.6% gave 1). In this case, it is considered that external factors studied here were not decisive in the adoption of the computer as a tool, and if it was a necessity instead of an administrative nature, ie the advantages of this tool for such tasks. Thus we have for example the category of time optimizing the maximum value obtained in 54.5% of the responses, but not the optimization of resources for that value obtained only 18.2%, which also demonstrates the use of inefficient PC. However, 81.8% believe that the adoption of the computer was simply for personal initiative. In terms of Internet usage, the responses dealt in similar vein to the previous. However, in the search for technical information category 63.6% responded by granting values 4 and 5. There remember that this activity is the most commonly performed by the farmers surveyed, along with the location of suppliers. Regarding the use of the Internet to find customers is low, 72.7% gave the minimum value. To the question regarding the ease of use of the computer 72.7% answered that the adoption has been relatively easy, the rest very easily said. As

for the factors that favored the adoption of the computer or the Internet found that 100% believe that schooling, the cost of equipment and Internet connection, 81.8% think that the adoption was facilitated by previous courses systems area, 63.6% also believe it is important that employees are trained makes them easier to use in business. Other factors that positively influence are both friends and family who use these technologies. The competitors from using these ICTs appears to represent any kind of pressure, since none of the respondents are considered as one of the factors that influenced their decision to use the computer I the Internet.

On the other hand 100% believe that the use of these technologies is very useful, 90.9% do not consider that such use is complex or expensive, nevertheless only 18.2% consider it essential. Finally, we asked about whether they would be willing to invest in training for handling these and other technologies, the entire sample answered yes.

4. CONCLUSIONS

The results of the empirical work did not produce many surprises, mostly made merely confirmed most of the hypotheses at the beginning of the research. Nevertheless, the data and information obtained was interesting because it reveals situations, perceptions and characteristics, which although cannot be generalized, if they are representative at least in the region.

In response to the first research question, we say that the degree of adoption of ICT technicians and producers presented MasAgro program in the state of Chiapas, is still basic or primitive. That is, although the producers use basic technology tools such as telephone and mobile phone, radio, fax and computer, do so to routine and operational activities rather than activities or strategic processes. The case of the Internet is also similar, since the use which gives the network goes beyond banking, climate query and search for information, the latter apparently also with serious deficiencies.

Using the classification given by Day (2001a), could place farmers under study between so-called conservatives who adopt technology only when the majority has and have doubts about the value of such adoption and this is where we find a disgruntled, theory tells us that adoption is the decision to make full use of an innovation, in this case technology, which is considered necessary to make things better (Rogers cited by Afzaal, 2003), but what happens when adopts a particular technological tool appears necessary but not a general trend? The answer to such an approach is not simple but important. The use of a PC that is "used" to have one in the office is not precisely defined technology adoption, at least not in the terms in which this concept has been developed so far. So it is necessary to differentiate between "adoption" and "acquisition" of ICT, the latter defined as the appropriation of a technological tool, which does not necessarily mean that you will appreciate as essential, or that he knows to use appropriate.

Finally, what kind of barriers are faced by the process of adoption of technologies by members of the program? Mainly it was found that there is a cultural and language barrier, which proved even more interesting is the lack of knowledge about the benefits of ICTs. It is not just the natural resistance that anyone might have to change, but the barrier that was identified as most important was undoubtedly the ignorance of ICT with farmers, because of their low level of education studies. An important aspect that impacts the adoption of ICT is one that has to do with the internal

organization of the business. Apparently traditionally, farmers who participated in the survey did not have a complex business organization. This also represents an internal factor at the same time becomes a barrier to the adoption of ICT. The work came to the issues raised from two levels: the first has to do with the accessibility regarding technological resources, which exists not only given the existent infrastructure in parts of the region, but also because the most of the subjects under study do not have the financial resources to acquire, and the second, with its concept having to do with the representations regarding its use have.

The importance of the study and promotion of ICTs is not discussion. However, if the issue is a priority or not local governments seems to be the central point for our country. In the "Plan of Action of the World Summit on the Information Society" emphasizing the role of national electronic strategies as key instruments for the advancement of the information society in developing countries. It also calls for measures to promote ICT applications oriented development, particularly for use in SMEs to foster innovation, increase productivity, and reduce transaction costs and fighting poverty. "(UN, 2004:7). Public policies in Mexico have been rare, not only in promoting the adoption of ICT, but also in ensuring an environment that strengthens confidence in business processes electronically. It is therefore necessary to have a specific promotion policy that provides not only technical knowledge but also able to disseminate to farmers the advantages of the adoption of these technologies.

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