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How SMEs adopt information and communication technologies in Mexico

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Abstract: The Adoption of information and communication technologies in small and medium-sized companies in Mexico is little exploited by small and medium-sized companies in Mexico. This article shows qualitative research carried out by applying a methodology based on grounded theory; the preliminary results highlight the predictive elements that influence how a company is managed under these conditions to make the best decisions.The main axes of this research are based on the advantages of adopting information technologies and their perception of three critical technologies for exploitation, innovation, and development, such as computers, the Internet, and mobile phones. In addition, a behavioral model was developed based on research collected from the literature on technology adoption in SMEs.

Keywords: Adoption of information and communication technologies, Economics, Business.SME, behavior model, technology acceptance perception, ICT.

1. Introduction

Small businesses in Mexico have an essential role in the national economy. The recent rapid changes potentially influence this role in information technology. According to Touryalai H., Stoller, K., & Murphy, A. (2018), in 2018 it is shown that the number of small businesses in Mexico was 4,191,600.00, which contributes 42% of the Gross Domestic Product (GDP) and generates the 78% of employment in the country. Furthermore, the number of workers involved in this industry is 88.59 percent of the total International workers (Finance Corporation., 2018).
The weaknesses of the small and medium industries in Mexico have to do with the market orientation, the quality of human resources, the technological domain, access to the market, and capital. One of the main weaknesses is related to the application of information technology. Where the rapid growth of information and communication technology affects global economic development. The main

weaknesses of small and medium-sized enterprises (SMEs) in Mexico are the capacity and aggressiveness to access SME markets, which are still restricted, and the limited use of technology (Arana, D., 2018).).

The condition of information technology in Mexico is relatively behind compared to other countries (Sánchez Limón, ML, & De la Garza Cárdenas, MH, 2018), (Rios Manriquez, M., 2016). The availability of information technology infrastructure can note, the number of computers used in companies, or access to the Internet.

The application of information technology in small and medium enterprises is not easy, especially if it is related to the weaknesses in the management of small businesses. These problems can be defined as:

1. The previous perception is that information technology is expensive and complicated to be used by small-scale entrepreneurs.
2. Lack of availability of information technology infrastructure that is incompatible with the implementation of information technology.
3. Little education and lack of human resources skills in using information technology.

In-depth research on small-scale information technology is essential to analyze and thereby define the aspects of the application of information technology in Mexico, in particular, to identify to what extent the above problems become the determining factors in the application of information technology and what are its implications for increasing the performance of small businesses in Mexico.

The success of the application of information technology provides a wide range of dimensions that cover the parameters used to measure the effectiveness of the functions of information technology and the parties or groups that use the applications of the technology of the information.

In small companies, decision-making is defined by the owner and executives, who assume all the administrative roles.

2. Theoretical framework

The literature shows various studies on the application of information technology in small and medium enterprises, which have been limited compared to the application of this technology in corporations or large companies.

The results of the descriptive meta-analysis of ten published studies that focused on the application of information technology in SMEs showed that all studies are classified as follows:

1. As a post-adoption process: focusing on the types of technology of the information that has been used.
2. Studies on the Adoption of information technology in SMEs that used the Technology Acceptance Model
3. Studies on the Adoption of information technology in SMEs that used the Structural Equation Model

The methods of analysis used in studies on the application of Information technology within corporations and the Technology Acceptance Model are other statistical analyzes that aim to analyze the effects of investments in information technology on the performance of large-scale companies.

The number of studies on the effects of TICS in information technology in SMEs is relatively limited compared to the number of their counterparts.

The application of technology within companies will be initiated by individuals using said technology. To take into account that the key person in SMEs is the owner of SMEs, therefore, it is assumed that the intensity of the use of information technology by the owner of SMEs influences the Adoption of

computer technology by organizations or companies. Although this Adoption will be reviewed in this research, the endpoint of this chain of Adoption is the influence of the intensity of the use of technology on the performance of SMEs (Van de Vrande, V., de Jong, JPJ, Vanhaverbeke, W ., & de Rochemont, M., 2009).

The owners of SMEs are the most important people to determine the company's instructions and policies, including the computer's use. The research results show a close relationship between the owner of the perception of small businesses with the computer system and the actual use of said computer system (Lu, JW, & Beamish, PW .2001).

Lee and Runge (2001) concluded that the company's innovation had a real influence on the Adoption of the information system by SMEs; however, in the case of internet adoption, these variables had no influence (Beck, T., &Demirguc-Kunt, A., 2006, Lee, Jungwoo (2004). However, they stated that their innovative capacity influences the Adoption of email by owners or SME managers. Based on the research carried out by Bresnahan, Brynjolfsson, and Hitt (2000), there were relationships between the education and skills of computer end users. However, the relationship is relatively minor with the computerization of work and the intensity of the use of information technology in the end-Users.

The review of the use of information technology in companies today is generally divided into two main categories or investigations:

1. Review how technology is adopted, and
2. Reviews the influence of investment in information technology on the company's performance, the recommendation of both research categories. It can be used as an argument to combine both types of research by combining the investment effect, the level of Adoption, and various changes caused by the company's performance.

The measure of Adoption itself is in the form of a categorical or binary system. So this does not apply to non-adopters and adopters. However, the result of Dulipovici's research, Andrea (2002), generally shows a difference between the demographic variable and the performance between the adopting and the non-adopting companies.

Dulipovici and Andrea (2002) discovered that the use of the Internet by SMEs has increased compared to the performance that occurred in the last year and the estimation of the following years.

3. Method

Quantitative research was conducted through participant observation, including informal conversations and sixty structured interviews. The observations, integrated into the work routine, were carried out between January and December 2019 in fifty SMEs in Mexico City.

Structured interviews, as a selection criterion, it was applied to all owners and managers of SMEs. The topics discussed have been related to their experience in technology, work roles, and secondary activities. The data obtained after each observation and interview was recorded in a field diary, then proceeded to its coding and qualitative analysis.

There are three main components to qualitative research:

1. First, data may come from different sources, such as interviews, observations, documents, records, and films.
2. The procedures used to interpret and organize the data such as:
   a. Conceptualize and
   b. Reduce data,
   c. Develop categories, in terms of their properties and dimensions,
   d. Relate the data employing a series of propositional sentences; the previous four are known as coding.
3. Written and verbal reports can be presented as articles in scientific journals, talks (for example, in congresses), or books.

According to the purpose of this study, the methodology used for data analysis is the grounded theory proposed by Glaser and Strauss (1967) and described in (Campo-Redondo, M. & Labarca Reverol, C., 2009), as shown in Figure 1.

Figure 1. The grounded theory proposed by Glaser and Strauss (1967)

4. Findings and Discussions

The most common type of ICT was using the computer, the Internet, and the mobile phone. Therefore, the level of Adoption measured in a categorical variable is adopters, not adopters. The characteristics of the sample are shown in Table 1.

Table 1: Characteristics of the sample

	Attribute		Number of SMEs
1.	Gender	Female	10
		Male	50
2.	Type of business	Trade	36
		Production	10
		Services	5
		Cooperation	5

		Crafts	4
3.	computer	Adoption	24
		No Adoption	39
4.	Internet	Adoption	3
		No Adoption	60
5.	Mobile phone	No Adoption	6
		Adoption	54

Source: Author's findings

Figure 3 shows the values obtained for adopting computers, Figure 4 the adoption of the Internet, and Figure 5 for adopting mobile phones.

In Figure 6.The perception of ICT use is based on the cost of acquisition or access; it is perceived as easy to use, worthy of ICT, ICT productivity, and effectiveness.

The survey shows a more significant advantage for business people who already used computers in their place of work than those who have not used them.

From the use of the computer, the most significant proportion of the gap lies in the convenient use.

The following proportions are the following: the importance of using the computer, the advantage of the computer to increase effectiveness and productivity. Meanwhile, on the Internet, all the elements show a more significant gap in this than in the perception of the computer.

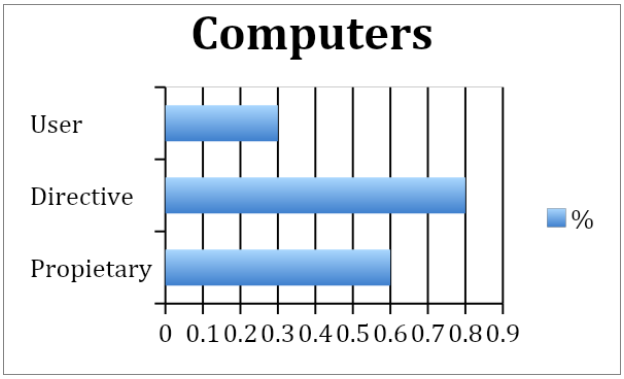

Figure 3. Perception of the use of the computer.***Source:*** Author's findings

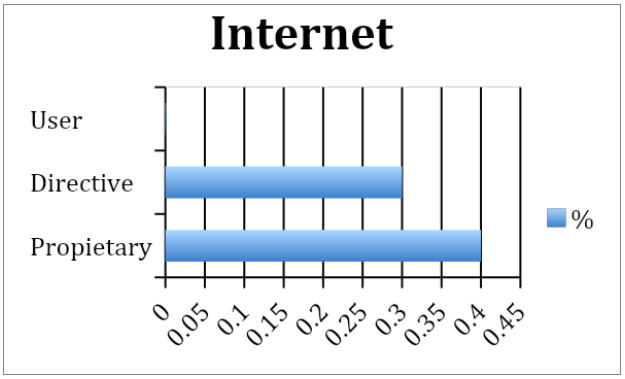

Figure 4. Perception of the use of the internet***Source:*** Author's findings

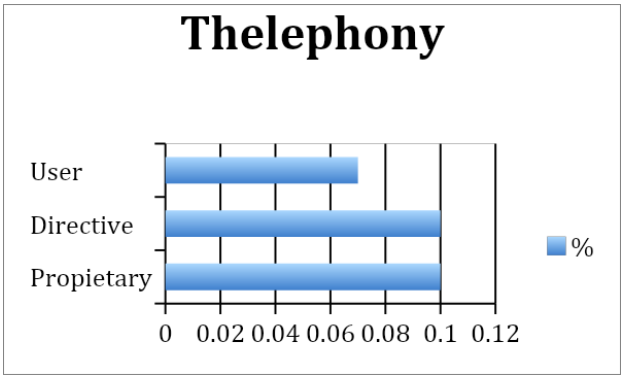

Figure 5. Perception of the use of mobile phones.***Source:*** Author's findings

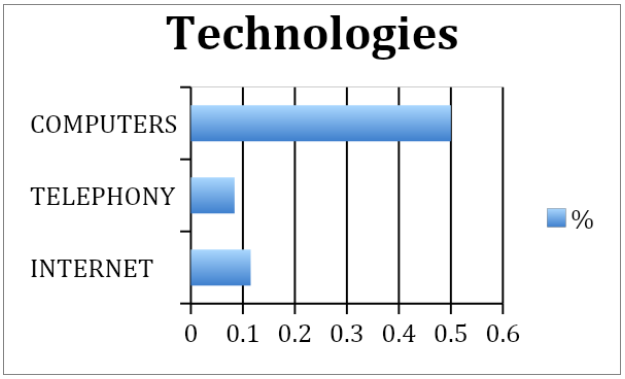

Figure 6. Comparison of the technologies.***Source:*** Author's findings

Figure 7 shows the perception of the cost of adopting the technology.

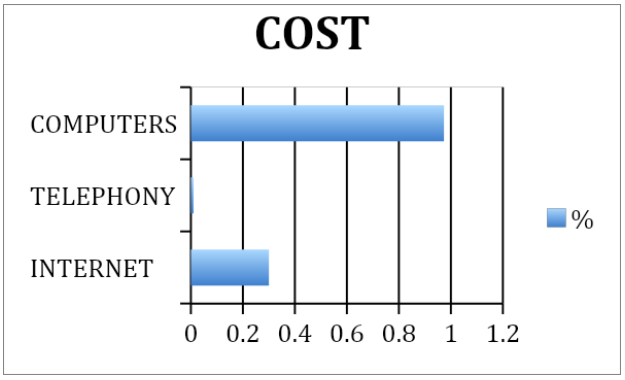

Figure 7. Cost-benefit comparison in SMEs calculated by the owner.***Source:*** Author's findings

It is possible to predict the decision of being a non-adopting adopter based on the perception of the use of the computer, the use of the Internet, or the mobile phone; the detailed result can be seen in Table 2. This table shows the Adoption of computers in small and medium enterprises.

Table 2: Classification Results of Approval

Role	Computer%		Internet%		mobile phone%	
	Adopt	Not	Adopt	Not	Adopt	No
Owner	60	40	30	70	20	80
Directive	30	70	20	80	10	90

Source: Author's findings

5. Conclusions

After the analysis of the results, the answer to the research question "What is the level of Technological Adoption in SMEs in Mexico? " is concluded that it is a low level.

It complies with the proposed null hypothesis because less than half of SMEs adopt ITC and use few computing resources with very limited or almost no use.

The most used resources in the companies surveyed were the telephone, the computer, and the internet service. As for the assigned uses, they are very few to almost null because what proliferated the most was the use of computers and smartphones for internet access, as a form of consultation, to look for suppliers, and a few companies register inventories with the help of some computer program. On the other hand, it did not take full advantage of the facilities that could give them this type of resources, such as the management of an email for the company, such as the creation of a website for promotion or implementation, the use of electronic banking to facilitate transactions or the implementation of an intranet or extranet. However, the latter two could be considered unnecessary if the business is too small; they are beneficial when the company begins to grow.

The supplier relationship is significant, as communication is always maintained to stock up on products. On the other hand, the relationship with customers has been left aside a little because they only have direct contact when the sale is generated, and the opportunity to generate customer loyalty is neglected, as well as finding potential customers with the help of the Internet and promotion through social networks. These actions could make a difference in generating more sales because the customers have the power in this type of business. More than at present they are better informed and decide how are the products they want to acquire and what price is it to consider better.

However, it is also important to mention that the digitalization of processes such as management, order history, and control of customers and suppliers is wasted.

As for the knowledge of the staff, it has basic skills and can solve problems presented, however, due to the few computer resources available, this panorama does not present much difficulty, in addition to this, there are very few companies that train their staff on the management of computer resources. Therefore, the latter is more related to the perception of managers about the training of their staff.

The perception comes directly from the point of view of managers. Although most are inclined to be interested in computer resources to facilitate the management of the business and position themselves better in the competitive field, it is not very easy to carry this out. The main reason for this is that it was too expensive an implementation process, which would imply a considerable investment.

There was also disinterest of some managers because they did not consider the use of computer resources necessary. As an additional comment to the questionnaires, they claimed to use other strategies such as the location of the business and the prices accessible to the clientele.

These opinions may mostly be related to managers being older people unfamiliar with using CIT or to a resistance to change.

Finally, from the panorama described above, it can be concluded that information C IT is a competitive agent wasted by microenterprises. This situation could slow down their growth and reach compared to other larger companies, especially now that an era of robust technological innovation is being lived, so a change of perspective on the part of entrepreneurs regarding the management of their businesses is necessary.

In Mexico, as already mentioned above in the contextual framework, SMEs are an important sector in the country's economy, as they are the ones that produce the most jobs since they are the main generators of jobs. Unfortunately, however, many of them do not manage to survive the first five years due to a lack of knowledge regarding business management. Moreover, using information technologies is one way to gain a competitive advantage, especially since today's society is very familiar with using this type of resources to the extent that they are already indispensable for everyday life.

The situation presented is very worrying because we are in an environment of constant changes, and more when there is the possibility of entry of new businesses that can suppose an intense competition and more when innovation constitutes a differentiating agent to remain competing in the current market.

The preliminary investigation results show that the decision to adopt the technology is dominated by the perceptions of the cost, the level of convenience, and the advantage of using the computer. Therefore, it can be used as initial and valuable information to perform additional research focused on the longitudinal study within the framework of a completely innovative adoption process. The process begins with disseminating innovations in the form of training in electronic commerce systems explicitly designed for small entrepreneurs.

The study will show the perception of the owners and managers of SMEs; it is now necessary to quantitatively show the benefits obtained to support this industry and change the perception of technology.

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