

## **The Impact of Information and Communication Technology in Mexican SMEs Growth**

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### **Abstract**

The current century is basically characterized for its globalized economy, business uncertainty and higher levels of markets competitiveness, and above all its knowledge society in which information and information technologies play a fundamental role, not only for the development of society and economy, but also to improve companies' level of growth, fundamentally for small and medium enterprises (SMEs) because technology tools have been converted today in a business strategy that need for enterprises to survive and stay in its market. Therefore, the main objective of this empirical research is the analysis of the effects of information and communication technology on the SMEs' level of growth of Aguascalientes region. The results obtained show that information and communication technology has a positive and significant effect on SMEs' level of growth.

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## **1. Introduction**

In the current literature of computer science and marketing, there is theoretical and empirical evidence that demonstrates that the adoption of information and communication technologies (ICTs) can exert a significant positive influence on the growth of companies, over all of the small and medium-sized enterprises (SMEs) (Sullivan, 1985; Raymond et al., 2005; Qiang et al., 2006; Matthews, 2007). Therefore, ICTs can be adopted to increase both the level of productivity and the level of sales of SMEs, through access to new markets and the efficiency of the management of the business itself (Qureshil, 2005; Matthews, 2007), which can generate more and better results even with the various resource limitations that these types of companies generally have (Qureshil et al., 2009).

In this sense, there is a consensus in the literature that SMEs can significantly increase their level of growth, if they also expand their current capabilities such as more efficient and effective use of ICTs (Servon & Doshna, 2000; Levy, 2001; Matthews, 2007), which will allow SMEs to obtain the required potential and generate the necessary skills to access new markets, reduce their costs and streamline their administrative system (Brown & Lockett, 2004; Pateli & Giaglis, 2004). However, the use and adoption of ICTs requires SMEs to make a series of changes within the organization (Hyman & Dearden, 1998; Honig, 1998; Lichtenstein & Lyons, 2001; Sanders, 2002; Schreiner & Woller, 2003; Piscitello & Sgobbi, 2004), in particular having an Internet connection and making the most of this medium within a globalized market (Piscitello & Sgobbi, 2004).

Similarly, given the uncertainty of the current business environment and the important changes generated in an increasingly globalized and highly competitive market, ICTs have become a fundamental tool to achieve not only a higher level of growth in SMEs, both from developed and emerging economy countries, such as Mexico, but also their own survival (Locke, 2004; Inklaar et al., 2005). Therefore, the adoption and implementation of ICTs shows a close relationship with the growth of SMEs (Locke, 2004; Mohamad & Azizi, 2009), which allows us to affirm that today, compared to a couple of decades ago, it is much simpler and faster the adoption and implementation of ICTs in companies, especially in SMEs (Inklaar et al., 2005), as well as their development is more reliable (Locke & Scrimgeour, 2001).

In addition, with the use of ICTs, SMEs will have significant benefits in various areas such as finance and production (Inklaar et al., 2005), which leads to SMEs not only having significant growth in sales, but also have a better economic and market position, obtaining the necessary economic and financial resources to replace or improve their current information technologies (Jorgenson & Stiroh, 2000; Oliner & Sichel, 2000; Ha & Pyo, 2004; Motohashi & Kanamori, 2008). Therefore, investing in ICTs in the medium and long term will allow SMEs to achieve greater benefits than their main competitors, and if SMEs also make appropriate use of ICTs, the activities of SMEs will generate a higher level of growth (Motohashi & Kanamori, 2008).

Additionally, every SME must have the right team for the activities they carry out and the information they handle, that is, it is important to have a good computer team, with the appropriate software for the information management needs, in addition to specific spaces for the ICT staff to carry out their work in an ethical and responsible manner (Ha & Pyo, 2004; Jorgenson & Motohashi, 2005). Therefore, following the recommendations of Raymond et al. (2005), Qiang et al. (2006), Matthews (2007) and Qureshi et al. (2009) to analyze in greater depth the effects of ICTs on the growth of SMEs, the main contribution of this empirical study is the analysis of both constructs in SMEs in an emerging economy country, as is the case in Mexico.

## **2. Literature Review**

The current 21st century is characterized by the existence of an uncertain business environment, economy globalization, increasingly higher demand for competitiveness, but above all it is characterized by having a knowledge society in the which ICTs play a fundamental role, and are increasingly pressing companies, especially SMEs, for their adoption and implementation as an operation and administration strategy, to achieve not only their growth but also their permanence in the market in which participate (Locke, 2004). Therefore, SMEs managers are increasingly using these important tools for the development of their daily activities, which combined with their work experience favor the fulfillment of the objectives and goals established in their planning (Westhead & Cowling, 1995; Bruque & Moyano, 2007), which indicates that for managers to add to their planning system the use of ICTs in more than a priority, a need to survive (Kim & Galliers, 2004; Burke, 2010).

For this reason, it is important that the managers of SMEs constantly train those responsible for the use and management of these important technological tools, so that they are prepared to give them proper use, making the most of the ICTs to obtain the greatest benefits for the organization (Burke, 2010). Likewise, the adoption and implementation of ICTs must also be based on the type and characteristics of the company, so that its use and exploitation is the most optimal, effective and efficient (Kagan et al., 1990; Thong, 1999; Burke, 2005; Yeh & Chang, 2007; Burke & Sewark, 2008; Mohamed & Azizi, 2009). Therefore, the adoption and implementation of ICTs in the SMEs allows higher levels of growth, especially in important areas such as finance, and this is feasible to observe in companies when they have few problems for investment or for the specific adoption of new technological tools (Oulton, 2001; Colecchia & Schreyer, 2002; Timmer & Van Ark, 2005; Inklaar et al., 2005).

In this sense, it is possible to affirm that the level of growth of SMEs is seriously affected by the factors that have a direct relationship with the achievement of the objectives and goals of the organization (SEAANZ & CPA Australia, 2001), which are easier to achieve if ICTs are properly adopted and used, since these types of technological tools have a direct relationship with financial control, productivity

registration, cost control and results and sales registration (Bhimani, 1996; Bird, 1997; Rose et al., 1999; APEC, 1999; Beale, 1999; OECD, 2000; Ratnasingham, 2001; Lindsay et al., 2001; Ernst & Young, 2001; Hill & Jones, 2001; Light, 2001; Aljitri et al., 2003; Hoi et al., 2003; James, 2003; Limthongchai & Speece, 2003; Locke, 2004; Hussin & Noor, 2005; Koong et al., 2008; Chou et al., 2008).

Thus, the relationship between the adoption and use of ICTs and the level of growth of SMEs is reflected in the benefits obtained by this important type of companies and in the best results, which can be measured and controlled through of an effective and efficient use of ICTs in the areas of vital importance of business (Locke, 2004). Therefore, a high percentage of these results will depend on an adequate adoption and implementation of ICTs in SMEs and, for this, managers must have the necessary knowledge and be well prepared to make the most of the use of ICTs with the aim of the organization having a good business performance and, with it, generating a significant increase in the level of growth of the SME (Lexico, 2003). In addition, managers must be aware that technological advances and changes are so vertiginous, so at any time a technological tool can end its life cycle (Johnson et al., 1999).

In addition, the adoption and implementation of ICTs in SMEs as well as generate various benefits can also generate serious problems within companies, as they can generate over information in the areas of greatest use and application and inappropriate use of the computer equipment that is given by users (Rogers, 1996; Motohashi & Kanamori, 2008), from controlling the privacy of information to the type of preventive and corrective maintenance that you give to the team. Therefore, for companies in general and for SMEs in particular, in their desire to achieve a higher level of growth and development, they require the use and management of technological tools that are profitable, considering that in order to achieve significant growth in business the use of ICTs should be oriented to obtain the maximum possible benefits in the projects generated by the SME (Statistics New Zealand, 2002; Locke, 2004; Inklaar et al., 2005), especially when this relationship between the use of ICTs and growth favors the economic performance of organizations.

As a sample of the various benefits that SMEs can obtain with the adoption and implementation of ICTs is the reduction of costs, the speed of information management, the reliability of information between customers and suppliers, efficiency in coordination of business operations and the identification of new business opportunities (Tan et al., 2009). Therefore, the appropriate use in SMEs of technological tools such as the Internet, favors all those activities that are important for the growth of the organization (Kim & Galliers, 2004), of course that this level of growth also depends greatly measure of the ability of the people who manage the ICTs in the company and the level of adoption that is in the operations of the SME, which is generally not immediately but is gradually and requires a reasonable time to be able to fully implement ICTs in SMEs business activities (Burke, 2010).

In this sense, SMEs will have significant growth if the use and application of ICTs offer significant improvements to the operating and management systems available

to organizations (Triplett & Bosworth, 2004; Jorgenson et al., 2005), where it is also important to know the type of products and/or services offered to customers and the public in general, since good attention will depend largely on the skill and knowledge of employees who handle ICTs (Dholakia & Kshetri, 2004; Beckinsale et al., 2006). Therefore, the use of ICTs allows important activities within the organization such as investment management or operational improvements, through the treatment of information, to generate the SMEs results that allow it to make decisions immediately and trustworthy (Schreyer, 2000; Daveri, 2002; Inklaar et al., 2005; Timmer & Van Ark, 2005), of course with the purpose of not putting at risk the level of growth of the organization (Burke, 2010).

Another of the benefits that ICTs offer to SMEs is the use of the Internet, since currently most companies, regardless of the organizational culture they have, have this important technological tool integrated into their work systems, the which is very useful and facilitates the activities and operations of organizations, but above all it helps to significantly improve business performance in addition to business growth (Tan et al., 2009; Mohamad & Azizi, 2009). In addition, it is also important that SMEs consider not only the adoption and implementation of ICTs, such as the Internet, but also that there is adequate infrastructure so that they are in a position to make efficient and effective use of the tools technological (Tan et al., 2009).

Additionally, the fact that SMEs have an adequate infrastructure for the optimization of the use of ICTs, allows the use of the Internet to provide employees with an optimal management, for example, of electronic mail, of searching for information online, especially for in the case of raw material acquisitions, information management with banks, instant messages and the use of social pages that currently play a fundamental role between customers and consumers (Tan et al., 2009). In addition, SMEs can also obtain other benefits if they use ICTs properly and have the appropriate infrastructure for this, such as cost reduction, potential market analysis and the search for new business opportunities, which will allow SMEs increase their level growth (Grandon & Pearson, 2004; OECD, 2004; Beck et al., 2005; Fink & Disterer, 2006).

Similarly, SMEs that adopt and implement ICTs as part of their daily activities, can generally obtain more and better results such as better operational efficiency, increased profits, improve their market position and increase their level of increase (Qureshil et al., 2009). Further, Qiang et al. (2006) concluded that SMEs that use e-mail to communicate with customers increased their sales by 3.4%, compared to those companies that did not own the e-mail. Likewise, Raymond et al. (2005) concluded that the use and adoption of ICTs, especially web pages, e-mail and the use of the telephone to communicate with their customers, allowed this type of companies to achieve a 4% increase in sales and 5% in sales exports.

On the other hand, Wolcott et al. (2007) considered that SMEs that used ICTs efficiently achieved better results in just six months after adopting ICTs in the organization. Also, Qiang et al. (2006) concluded that only 27% of SMEs use e-mail and 22% have a web page to interact with their customers and suppliers, which has a positive effect on the level of productivity of this type of business, but it also

has benefits such as those obtained by companies that used ICT. Finally, Bharati and Chaudhury (2006) concluded that SMEs in the Boston metropolitan area that adopted and used ICTs, such as e-mail and traditional software that have computer systems, obtained better results and a higher level of growth than those small firms they did not use this type of technological tools. Therefore, considering the information presented above it is necessary to consider the following research hypothesis:

**H1: The higher level of use ICTs, greater level of business growth.**

Due to the elements analyzed in this paper, such as ICTs and growth, and given that they are two of the most important factors in SMEs not only in Mexico, but in any country in the world, it was initially carried out a Business Panel with managers of SMEs, representatives of government agencies that are closely linked to SMEs and representatives of financial institutions, in which a series of indicators were discussed that would allow for more detailed knowledge on ICTs and growth.

## **2.1 Sample Design**

In order to obtain the information that allowed to respond to the hypothesis raised in this empirical study, the 2017 Business Directory of the Mexican Business Information System (SIEM) of the State of Aguascalientes (Mexico), was considered as a reference framework, with 8,661 companies until June of the same year. Likewise, only those companies that have between 5 and 250 employees were considered, leaving the population of this segment in 1,342 companies. The initial sample design for this study was 500 companies to obtain a margin of error of  $\pm 4\%$  at a 95% confidence level. The fieldwork was carried out through a personal survey addressed to the SMEs manager in a period between September and December 2017. Finally, 400 surveys were obtained obtaining an 80% response rate and a margin of error of  $\pm 4.5\%$  with a confidence level of 95%.

## **2.2 Variables**

**Dependent Variable:** On the other hand, growth was measured through the sales made by SMEs in 2017 (Autio & Lumme, 1998; Ballou et al., 2004; Salojärvi et al., 2005; Linder, 2006; Carneiro, 2007; Kruger & Johnson, 2009). Likewise, to estimate the growth potential that SMEs can have, it is generally considered a qualitative evaluation of managers, with sales being the main indicator for their measurement (Autio & Lumme, 1998).

**Independent Variable and Control Variable:** To measure the degree of use of ICTs, the managers of the SMEs surveyed were asked to indicate whether they in had their company the variables exposed ahead (1 = Yes y 0 = No):

1. Do you use new technologies for the organizational management of the company?

2. Is it considered WELL informed about the possibilities and advantages of ICT in the company?
3. Do you consider it necessary to encourage training on ICT application in the company?
4. Does your company have an Internet connection?
5. Do you have a WEB page?
6. Do you have email?
7. Do you make electronic purchases using the Internet?
8. Does your company do telecommuting?
9. Do you make electronic sales using the Internet?
10. Do you do marketing using the Internet?

Based on the answers, the ICT variable was constructed through the sum of the affirmative questions, therefore having a nominal variable with a value of 0 to 10. This way of configuring the variable can be seen in García (2007) and García, Martínez, Maldonado et al. (2009). Likewise, two control variables (size and age of the companies) were used, since it is considered in the current literature that these variables can also have significant positive effects. These variables were organized as follows:

Size: This variable was measured through the average number of employees in 2017 (micro, small and medium-sized enterprises)

Antiquity: Measured through the number of years elapsed since the constitution or start of activity (young companies and mature companies).

### **3. Main Results**

To verify the hypothesis raised in this research paper and verify, in this way, the level of influence of information and communication technologies in the growth of SMEs, a linear regression analysis was carried out by means of the minimum ordinary squares (MCO), using the following model approach:

$$\text{Growth}_i = b_0 + b_1 \cdot \text{ICT}_{si} + b_2 \text{ Size} + b_3 \text{ Age} + \varepsilon_i$$

Where,  $\text{Growth}_i$  represent the sales achieved by the companies that participated in the research,  $\text{ICT}_{si}$  corresponds to the adoption and implementation of information and communication technologies by SMEs in México. Size, average number of employees, and Age, years of existence of the company. We estimate the model to know the results (see Table 1) and it is possible to observe that the independent variables have an inflation factor of variance (VIF) close to 1, so we discard the presence of multicollinearity.

**Table 1. Relationship between ICTs and the level of Growth (n = 400)**

<b>Variables</b>	<b>Growth</b>
<b>ICTs</b>	0.368***
	(9.234)
<b>Size</b>	0.570***
	(14.111)
<b>Antiquity</b>	0.037
	(0.950)
Higher VIF	1.090
F Value	90.492***
R <sup>2</sup> Adjusted	0.402
Below each standardized coefficient, in brackets, t-student statistic value. *= p ≤ 0.1; **= p ≤ 0.05; ***= p ≤ 0.01	

Source: Self-Made

The results of Table 1 show that a greater use of ICTs in SMEs positively and very significantly influences their level of growth (standardized coefficient = 0.368 and  $p < 0.01$ ), which confirms the hypothesis of the investigation paper proposed. In addition, size has a greater degree of influence (standardized coefficient = 0.570 and  $p < 0.01$ ) in the growth of SMEs. However, age does not affect the level of SMEs growth, as it is not a statistically significant variable. The validity of the model is contrasted through the adjusted R<sup>2</sup> that resulted in 0.402 and an F value of 90.492 ( $p < 0.01$ ). The independent variables have an inflation factor of variance (VIF) close to 1, so we rule out the presence of multicollinearity.

#### 4. Conclusion

Considering the results obtained in this empirical study, it is possible to conclude in two fundamental aspects. On the one hand, the adoption and implementation of ICTs by SMEs allows this type of business to have a greater chance of achieving a higher level of growth. Therefore, if companies are interested in obtaining a significant increase in their level of growth, then in the first instance they will have to incorporate ICTs into their business activities, in addition to making more efficient and effective use of these technological tools., since it will depend on a high percentage that SMEs achieve a positive and significant increase in their level of growth, and to the extent that the use of ICTs in the organization increases so will the level of growth.

On the other hand, the size of the companies exerts a greater degree of influence on the level of growth of SMEs, so as the size of the SMEs increases; it will also have the possibility that its level of growth does. Likewise, if the use of technological tools is added to the size of the SMEs in all the activities and processes of the



organizations, then the SMEs will have a greater probability of positively or significantly increasing their level of growth. This will allow this important business sector to obtain the economic and financial resources necessary for the acquisition of more and better information technology, thereby also generating greater business performance.

In addition, it is also possible to conclude that the age of SMEs in the market in which they participate does not have significant positive effects on the level of growth of companies. Therefore, regardless of the age of the SMEs (young companies and mature companies), their level of growth will not be affected, that is, the SMEs that has just started its commercial operations in a certain market compared to that SMEs that it has more than 10 years of being based in the same market, they will have the same probability of obtaining a higher level of growth, since the age variable does not have a significant interference in the level of growth that SMEs can achieve.

Likewise, these results have a series of implications for both managers and the companies themselves. With regard to managers, if they want to achieve a higher level of growth in their companies, then they will have to adopt and implement ICTs in all the activities of the organization, always seeking that these technological tools are maximized and used efficiently and effectively. In addition, managers also have to create the necessary infrastructure for the adoption and use of ICTs in the organization, since the spaces that need technological tools are vital for ICTs to be able to provide all the advantages that they offer to companies, which can be translated not only in a higher level of SMEs growth but also in a better level of business performance.

In this sense, managers will also have to make use of the support offered by the different government programs of the three levels, not only for the acquisition of ICTs that the organization requires, but also to train employees who have the responsibility of management of technological tools, since a good training on the use and management of ICTs will allow employees to be able to take advantage of all the advantages they offer, in addition to efficient management of these technological tools, which will allow organizations are more likely to improve significantly, both their level of growth and their level of business performance, thereby achieving a better market positioning than their main competitors.

Additionally, these results reflect the importance of ICTs in SMEs and the strong influence that this type of technological tools exert on the level of growth of organizations, so that SMEs can significantly increase their level of growth, then in the first instance they must incorporate in all their business activities to the ICTs. Likewise, these results also suggest that by incorporating this type of technological tools in companies in their processes, the probability that SMEs will obtain a much greater growth than that achieved by their main competitors will be increased, which will facilitate these companies to also increase your market share.

Thus, if we consider that there is an increasing number of SMEs that are currently incorporating ICTs both in their processes and in their daily activities, then it is feasible to consider that there is an increasing level of growth and business

performance, that is, to the extent that organizations increase the use and management of this type of technological tools, the level of growth of SMEs will increase significantly. Therefore, the more ICTs are integrated into organizations and the more efficient and effective use and management by employees, SMEs can not only achieve a better level of growth than those companies that have not yet adopted and implemented to ICTs, but also greater competitive advantages and a better level of business performance.

Finally, the results obtained in this empirical study can be very useful, in the first instance, for the public administration of the three levels of government so that they can generate and develop the programs and activities that lead SMEs to incorporate into their activities ICTs, and those companies that already have them, can make more efficient and effective use of these technological tools. In the second instance, for business chambers so that they can design support programs on the use and effective management of ICTs for their various members; in the third instance for entrepreneurs so that they know the multiple advantages that ICTs offer to organizations, and in the fourth instance for professors and students of business areas to know the advantages that come with the adoption and use of technological tools and growth that SMEs have.

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