

The impact of Information Technologies on the competitiveness of SMEs

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Abstract

Currently, markets have evolved along with globalization impacting the design of strategies and the development of business capabilities to meet their needs, an aspect that can not be ignored in this evolution of the economy and globalized markets are information technologies, this research analyzes its impact on the competitiveness of Mexican SMEs, the results show a direct and positive impact, the analyzes were made through the structural equations modeling, this impacts on the decision making in the strategic activity of organizations providing information to managers of essential aspects in the development of internal capacities such as the use of information technologies and thus allocate their resources strategically.

Key Words: Markets, globalization, information technologies and competitiveness.

1. Introduction

In a world of globalized economies, with the trade opening and free market, competitiveness among countries has become a macroeconomic indicator of considerable importance, since this maintains a relationship with the productivity of companies, therefore, governments they must develop economic policies that promote the obtaining of resources and the development of capacities that attend to increase the business competitiveness where strategies are developed that allow to take better advantage of their factors of production including among them, the human capital.

The aim of this research is proving evidence on the possible relationships that could be given between different constructs: information technologies, and competitiveness. The authors conducted the study in small medium enterprises in Aguascalientes, México.

Currently, the concept of competitiveness has been approached from different contexts, and although there are diverse and even contradictory definitions to determine it, it has not been possible to establish it with precision since it is considered a multidimensional term. Therefore, several authors have tried to assimilate it, establishing factors or indicators for competitiveness.

For Mayorga and Martínez (2008), the competitiveness in the countries does not refer simply to the availability of the basic elements of production, but also to the changes and implementations that drive international economies to be truly competitive.

For the Mexican Institute of Competitiveness (IMCO, 2006) competitiveness is seen as: "The ability of a country to attract or retain investment", while for Aaroz (1998) competitiveness is perceived as the union of different economic elements, geographic, social and political, they are grouped together and contribute to the development of the nation, in this sense more classical authors such as Chenais, (1981) states that competitiveness is the ability of a country to compete with other nations.

Marulanda, López and Mejía (2013) note that currently at a global-level, due to globalization in the markets, companies that have desired to generate and strengthen sustainable competitive advantages have achieved it through different approaches, such as information technologies or also with the continuous improvement.

Despite the current situation in Mexico, Aguascalientes was the second city in 2016 with the highest growth in its competitiveness index with 5.5% in the last five years, and 4.9% in the last ten years, being surpassed only by the state of Querétaro, this provides guidelines to propose business strategies that allow continuing on the path of growth in competitiveness and improve this index to position the city of Aguascalientes as the first reference in increase of this index.

At present, Mexico has promoted public policies to improve competitiveness, productivity and employment in an ambitious manner, which is why studies that provide the government with information to reform these policies will be necessary in the country. Likewise, the lack of mature and well-established national competition has inhibited competition and has also increasingly marked the difference in income in the Mexican economy, which is why studies such as the one presented will contribute to the development of the country's economy.

The economic results that a country obtains regarding the use and investment in information technologies (IT) is quite considerable, which means that the more a country's investment to develop the use of (IT), better results will have. For example, in countries where (IT) use in the economy represents less than 10%, each increase of 10% will represent a GDP growth of 1.6%, and in countries where its use depicts more than 10%, an increase of 10% represents a GDP growth of 3.6%, which highlights the importance of having studies in Mexico that analyze the current situation and the possible effect of an increase in the use of IT in the business environment and so they can propose improvements in the business sectors and to be able to have a better GDP, which would undoubtedly have a positive impact on the Mexican economy (OECD, 2010).

The latter indicates the importance of studies that analyze the level and impact of the development and use of IT to be implemented in the company to increase their competitiveness; IT will help the information to be generated more easily and in the same way it can be accessed and distributed. Therefore, the present investigation allows us to analyze the effect that a primordial capacity has on organizations in the current world, such as the use of information technologies in one of the aspects of vital importance in a firm and in any economy in the world.

In this paper, the reader will be able to find a description of the current problems that this research addresses, followed by a review of the state of the art of the involved builders, after which the analyzes carried out through structural modeling as well as their results and results can be found, and in the last section are the conclusions of the authors and the recommendations of future research lines.

2. Literature review

As mentioned above, it is undoubted that companies need to promote processes and actions that generate competitive advantages. The desire to excel has led companies to give increasing importance to information technologies and their inclusion in business strategies; this is demonstrated by the increase in the acquisition of different types of software ERP (Enterprise Resource Planning) which allow a better and easier management in companies (Quispe, Padilla, Telot and Noriega, 2017)

Undoubtedly, information technologies are an essential element in organizations since they are part of their strategies and allow to increase their performance and are effective if well implemented, for which organizations must know the specific capacities and acquire technological resources that lead them to improve the different company's divisions of their organizations (Maldonado, Martínez y Pérez 2011).

Quispe, *et al.* (2017) explain how the globalization of markets has been surrounded by new technological developments and how companies need to improve their information technologies to improve control in the organization, and also for centralize information, which is one of the main objectives of information technologies (improve the management of company information) to achieve process optimization.

Another example of what has been explained above is that, Fiol (1996) points out that information technologies play a key role in counteracting and surviving a highly competitive market, as well as to ensure that organizations have strategies that allow organizations acquire simulators to obtain forecasts about their growth and performance (Maldonado *et al.* 2011).

For Barney (1991), information technologies are considered as resources, if they are used correctly within the organization, thus achieving a more competitive company; this occurs through the resources of the organization, which improves the results of the same. In addition, it is very important to have correct management of the technology of the company's production processes. (Pedroza, 2001).

The definition of information technologies for Nazari and Reza (2013) includes different forms of technologies, including technologies based on information technology, mathematics, statistics, electronics, telecommunications and medical sciences for production, assembly, preservation recovery, transmission, distribution, unit conservation, debugging, processing, explanation and visualization of hidden data or information. It can be noted in this conceptualization, that information technologies greatly support the organization, management and above all better knowledge provision.

Ramarapu and Lado (1995) understand information technologies as data processing systems that receive data from the divisions of the organization and transfer them to others, this conceptualization is consistent with the one of Nazari and Reza (2013), since the author understand information technologies as a tool that facilitates knowledge management in the organization.

Lately, globalization has led to competition in world markets, which allows a greater possibility of opportunities for companies to market their products or services with the main objective of winning the preference of customers (Gradzol, Gradzol and Rippey, 2005). Competition in organizations, depends largely on the environment and the support they have for their growth (Montejano, Guzmán and López 2014); in this sense, there are companies with similarities and if they want increasing their competitiveness must develop certain mechanisms to reduce their costs, this does not mean diminishing their quality, but if it allows them to be more efficient in relation to their competitors in the sale or distribution of the product, and although costs are not the only variable of competitiveness, it is considered a key piece.

Grover and Malhotra (1999) define the Information Technology construct as the use of technologies for the acquisition of information, as well as its transmission within the company that will allow them to make correct decisions. According to Duncombe & Heeks (2003), Southwood (2004) and Matthews, (2007) the implementation of ICT will benefit companies in reducing costs and increasing organizational benefits. To analyze this construct, a scale adapted and used from Kent and Mentzer (2003), Sanders and Premus, (2005) has been also used by Maldonado (2015) in the same business context where this research is carried out, in which the information technology construct is a one-dimensional variable. The scale is shown below.

A recommendation by Guzmán, Montejano and López (2014) after conducting a quantitative research on the productive processes and their impact on competitiveness, establishes that within the variables of the construct of productive processes, there are some that have less attention from the employer: information technologies and application of new technologies incorporated into the area of production, therefore this situation leads to greater attention to these items to obtain a greater impact on competitiveness.

In a study by Maldonado, López, Martínez and Montejano (2015) the influence of information technologies on competitiveness was analyzed, with a sample of 400 SMEs from the State of Aguascalientes, the results demonstrated a positive influence on the competitiveness construct as in its dimensions with information technologies.

Other authors who measured the relationship between the use of IT and competitiveness were Irlayici and Elcin (2012) who carried out a study to measure the effect that the use of information technologies has on companies in Turkey, after conducting their study, they observed that most of the companies that composed the sample, only applied information technologies operationally and therefore do not receive an increase in competitive advantages, so they suggested to companies; to implement the use of IT with a strategic vision to achieve its competitiveness.

A study that measures this relationship in manufacturing companies is the one of Aguilera, Cuevas and González (2015), the authors explain the important role that IT has in the development of strategies within of the organizations since they allow the increase of the competitiveness in the changing and globalized markets, their results show a direct and positive relation of IT in the competitiveness of the manufacturing companies of Aguascalientes, Mexico.

Parody, Jiménez and Montero (2016) indicate that competitiveness in an organization comes from a competitive advantage in the methods of production and organization (price and quality) in relation to competitors. The above is given as a differentiation that will help the company stand out among the others, achieving this when the customer has a level of satisfaction with the product or service.

Often the term competitiveness is considered as a universal concept to describe the economic growth of a country and as a necessary factor to gain participation in international markets Flores, (2008). That is, it can be seen as a macroeconomic factor that has indicators that surpass those of other countries.

In terms of business, competitiveness is seen as a phenomenon whereby companies capable of competing, mix factors such as price and quality of the good or service, so that in case the quality is the same in the market, the companies can remain competitive if their prices are equal to or lower than the competition. Parody et al. (2016)

Competitiveness can be defined as "an access capacity of a company or territory in the domestic or export market. If the unit of analysis increases its participation in the domestic market or in international trade, then its competitiveness will have improved" (Márquez, 1994: 101).

On the other hand, the authors (Romo and Abdel, 2005, Dussel, 2001, Markusen, 1992, Bhardwaj and Momaya, 2007) who glimpse competitiveness as a competition or a rivalry, whether between nations or at a company level, and this is achieved through some differentiation of the product or service, it can be in relation to production, and organization. In addition, to establishing that competitiveness is possible in different scenarios, it can be individual or organizational, by sector if it is industry, commerce or service, or by segment.

It can be concluded that competitiveness is determined by a position that an organization has in the market in relation to its competitors achieved through a capacity in terms of quantitative or qualitative resources that intervene in its determination, in order to generate changes that allow develop advantages or some increase in business results.

After analyzing the studies mentioned above, we can state that there is empirical evidence to be able to propose the following hypothesis:

H1: Information Technologies have a direct and positive impact on the competitiveness of the company

3. Methodology

To address the proposed hypothesis, an empirical study was conducted in SMEs in Aguascalientes, México, the Statistical Directory of Economic Units (DENUE) of the National Institute of Statistics and Geography (INEGI) was taken as frame of reference, of 3,441 SMEs. The sample was selected by simple random sampling, leaving a total of 346 companies with a maximum error of $\pm 5\%$ and a confidence level of 95. The

survey was applied to managers or owners of SMEs through a personal interview among the 347 selected companies

In order to analyze the Information Technology construct, a scale adapted from Mentzer Kent and Mentzer (2003) and Sanders and Premus, (2005) was used, in which the information technology construct is seen as one-dimensional variable.

To measure competitiveness, an adaptation of the scale of Buckley et al. (1988) was used and previously also used by Aguilera *et al.* (2016) and Maldonado *et al.* (2012). In contexts similar to this work, the scale is measured through three dimensions: financial performance, cost reduction and technology use. For the measurement of the constructs of this research, the measuring instrument was formed by 5-point Likert questions (where 1 was not important and 5 was very important).

Table 1. Research design

Universe	3441 SMEs
Scope of study	Aguascalientes city, México
Sample unit	SMEs of Aguascalientes
Method of data collection	Questionnaire
Sample size	346 SMEs of Aguascalientes
Sample error	5%
Confidence level	95%

Source: Authors.

In the case of this research, we aim to follow three types of reliability analysis that Cuevas (2016) indicates are the most used in the use of structural modeling, Cronbach's alpha, composite reliability index (IFC) and extracted variance index (IVE). The following table lists the acceptable values for different authors for the measurement of reliability (Vila et al., 2000).

4. Analysis

The first step to use a Structural Equation Model (SEM) is assess the reliability and validity of scales a confirmatory factor analysis (CFA), it was performed using the maximum verisimilitude method with the use of the software EQS 6.3 (Bentler, 2005; Brown, 2006; Byrne, 2006). For measuring scale reliability Cronbach's alpha coefficients and reliability index (IFC) (Bagozzi & Yi, 1988) were used. Additionally, pursuant Chou, Bentler and Satorra (1991), Hu and Bentler and Kano (1992) recommend that in order to be able to statistically correct the theoretical model and to grant a better statistical fit of data.

The results of the AFC are shown in table two and show that the scales used to measure the model have acceptable adjustment indices ($S-BX2 = 268.73$, $df = 90$, $p = .000$, $NFI = 0.906$, $NNFI = 0.908$, $CFI = 0.932$, and $RMSEA = 0.079$), in the table we can also observe that all the factorial loads are higher than 0.60 what according to (Bagozzi & Yi, 1988) indicates that they are significant and also indicate a high consistency of the constructs. Another measure of the reliability of the constructs is the value of Alpha de Cronbach whose value in all dimensions exceeds the 0.70 recommended by Hair et al. (1995). Likewise, the extracted

variance index (IVE) was calculated showing that all values exceed the 0.6 recommended by Fornell and Lacker (1981).

Table 2. Internal consistency and convergent validity of the theoretical model

Variable	Indicator	Load Factor	t robust	Cronbach's Alpha	IFC	IVE
Information Technologies	IT1	0.733	1.000	0.838	0.718	0.541
	IT4	0.612	16.30			
	IT5	0.732	13.68			
	IT6	0.832	19.69			
	IT7	0.753	16.06			
Finantial Performance	FP1	0.876	1.000	0.874	0.837	0.646
	FP2	0.828	25.87			
	FP3	0.808	24.23			
	FP4	0.693	18.60			
Purchase cost	PC1	0.944	1.000	0.822	0.907	0.729
	PC2	0.861	20.68			
	PC6	0.745	20.75			
Techonogy	TECH1	0.888	1.000	0.907	0.880	0.694
	TECH2	0.895	30.55			
	TECH3	0.842	26.53			
	TECH5	0.691	17.79			
$S-BX^2 = 268.73$; $df = 90$; $NFI=0.906$; $NNFI=0.908$; $CFI=0.932$; $RMSEA= 0.079$						

^a = Constrained parameter value in this identification process. ***= $p < 0.01$

In addition to the tests carried out to measure reliability, tests were carried out to measure the validity of the scales of the model through the confidence intervals in which Anderson & Gerbing, 1988) point out that among these values there cannot be a value of 1.0, Fornell & Larher (1981) explain that the values of IVE must be superior to the square of the variance extracted between each of the pairs of constructs, criteria that are met and shown in table 3. For this reason, we can affirm that the model has reliability and convergent and discriminant validity.

Table 3 Discriminant validity of the theoretical model

VARIABLES	Information Technologies	Fin. Perf	Purch.Cost	Tech.
Information Technologies	0.541	0.10	0.03	0.05
Fin. Perf	0.214-0.41	0.646	0.03	0.02
Purch.Cost	0.056-0.264	0.068-0.304	0.729	0.15
Tech.	0.107-0.343	0.014-0.246	0.219-0.551	0.694

The diagonal in the table, represents the index of variance extracted (IVE), below the diagonal represents the estimation of the correlation of the factors with the 95% confidence intervals.

5. Results

After analyzing the reliability and validity of the scales of the theoretical model, we proceeded to analyze the data through the structural modeling system using the EQS software in version 6.3 (Bentler, 2005, Byrne, 2006, Brown, 2006) in order to test the hypothesis.

Table 4. Results of structural modeling.

<i>Hypothesis</i>	Structural relationship	Standardized coefficient	Value t Robust
<i>H1: Information technologies directly and positively impact the competitiveness of Mexican SMEs</i>	IT → COMP	0.548***	10.190
S – BX² = 277.103; df = 95; NFI=0.911; NNFI=0.923; CFI=0.932; RMSEA= 0.079			

***=p< 0.01

According to the hypothesis of research (information technologies directly and positively impact the competitiveness of Mexican SMEs), the results shown in table 4 ($\beta = 0.548$, $p < 0.01$) allow us to accept the hypothesis, which means that one way in which SMEs can increase their competitiveness and gain a place in the market, will be through the use of technology in their management.

6. Conclusions and discussions.

The main objective of this research was to know the impact that information technologies has on the competitiveness of Mexican SMEs, the findings shown in table 4 indicate that the impact is direct and positive, these results indicate that the use of information technologies has become one of the main capacities to be developed by organizations to boost competitiveness.

As shown in the literature review, nowadays globalization has led companies to a competition that demands the development of better capabilities that allow them to perform correctly in highly diversified markets as they currently are, due to the easy access of products and services from practically the entire world. For developing countries such as Mexico, access to technologies and the capacity to use them means a competitive advantage.

The dimensions that form the competitiveness construct, can better describe the aspects that will be improved by using information technologies. The improvement of financial performance can be reflected in the monetary income of organizations, the second dimension positively impacted will be the purchase costs, these will be reduced, allowing organizations to diversify the use of their resources by developing impact strategies in other areas of the organization. Finally, the information technologies, in reference not only to the use but rather to the design and the acquisition by the organizations, understanding this dimension as the acquisition of technologies of all kinds that can impact in both management and production departments such as new machinery.

All this will also be reflected in the increase of performance, consequently, as future lines of research, It is recommended to analyze the effect that increasing the company competitiveness could have on their performance, since managers sometimes take aspects as the future performance of the organization for the allocation of resources in planned strategies and this will reduce the risk of investment in such strategies.

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