

Print ISSN: 0120-4645 / E-ISSN: 2256-5078 / Short name: cuad.adm. / Pages: 3-14
Faculty of Administration Sciences / Universidad del Valle / Cali - Colombia

Critical Success Factors in Implementing IT in MSMEs

Factores Críticos de Éxito en la implementación de TI en la MIPYME

Facteurs critiques de succès dans la mise en oeuvre des TI dans les PME - PMI

Néstor Alberto Zapata Márquez¹

Student, Master's degree in Business Management, Universidad Autónoma de Tamaulipas, México
ORCID ID: <https://orcid.org/0000-0002-0749-7844>. e-mail: azm.nestor@gmail.com

José Melchor Medina Quintero²

Professor and researcher, Victoria Faculty of Commerce and Administration, Universidad Autónoma de Tamaulipas, México. ORCID ID: <https://orcid.org/0000-0003-3466-7113>. e-mail: jmedinaq@docentes.uat.edu.mx

Francisco Isaí Morales Sáenz³

Student, Master's degree in Business Management, Universidad Autónoma de Tamaulipas, México
ORCID ID: <https://orcid.org/0000-0001-9740-149X>. e-mail: fmsaenz@uat.edu.mx

Demian Abrego Almazán⁴

Professor and researcher, Victoria Faculty of Commerce and Administration, Universidad Autónoma de Tamaulipas, México. ORCID ID: <https://orcid.org/0000-0003-0147-8834>. e-mail: dabrego@docentes.uat.edu.mx

Article of Scientific and Technological Research,
PUBLINDEX-COLCIENCIAS classification

Submitted: 03/09/2018

Reviewed: 24/09/2018

Accepted: 14/12/2018

Core topic: Administration and Organizations

JEL classification: M15

DOI: <https://doi.org/10.25100/cdea.v35i63.6874>

Abstract

Technological innovation grows by leaps and bounds, becoming a key element in the development of any activity in society today. At the business level, the proper use of technological tools provides a clear competitive advantage over establishments that do not have them, or, failing that, over small businesses that are unable to optimize their use. From the above, the objective of this research is to determine the critical success factors that influence the level of implementation of information technologies within micro and small enterprises in the northeastern region of Mexico. For this reason, a questionnaire was applied to 128 owners and managers, using factor analysis with SPSS version 24 as a statistical analysis tool. The results show that there are seven factors that influence the implementation of technology, among them: i) favorable internal relations, ii) adoption, iii) decision making and iv) cost.

Keywords: Information technology, Internal relations, IT adoption, Decision making, IT cost.

¹ Engineer in Computational Systems, Instituto Tecnológico de Ciudad Victoria, México.

² BA in Administrative Computing, Universidad Autónoma de Tamaulipas, México. Doctor in Enterprise Information Systems, Universidad Politécnica de Madrid, Spain.

³ BA in Administration, Universidad Autónoma de Tamaulipas, México.

⁴ BA in Administrative Computing, Universidad Autónoma de Tamaulipas, México. Doctor of Administration Sciences, Universidad Autónoma de Tamaulipas, México.

Resumen

La innovación tecnológica crece a pasos agigantados, convirtiéndose en un elemento básico en el desarrollo de cualquier actividad de la sociedad actual. En el ámbito empresarial, el uso adecuado de herramientas tecnológicas proporciona una clara ventaja competitiva sobre establecimientos que no cuentan con ellas, o en su defecto, sobre pequeñas empresas que son incapaces de optimizar su uso. A partir de lo anterior, el objetivo de la presente investigación es determinar los factores críticos de éxito que influyen en el nivel de implementación de las tecnologías de la información dentro de la micro y pequeña empresa en la región noreste de México. Por tal motivo, se aplicó un cuestionario a 128 dueños y gerentes, haciendo uso del análisis factorial con SPSS versión 24 como herramienta estadística de análisis. Los resultados muestran que son siete los factores que influyen en la implementación de la tecnología, entre los cuales destacan: i) Las relaciones internas favorables, ii) Adopción, iii) La toma de decisiones y iv) El costo.

Palabras clave: Tecnologías de la información, Relaciones internas, Adopción de la TI, Toma de decisiones, Costo de la TI.

Résumé

L'innovation technologique se développe à pas de géant et devient un élément fondamental dans le développement de toute activité de la société actuelle. Dans le milieu des affaires, le bon usage des outils technologiques procure un avantage concurrentiel évident sur les établissements qui ne les possèdent pas ou, à défaut, sur les petites entreprises qui ne sont pas en mesure d'optimiser leur utilisation. Sur la base de ce qui précède, l'objectif de cette recherche est de déterminer les facteurs critiques de succès qui influencent le niveau d'implantation des technologies de l'information dans les micro et petites entreprises de la région nord-est du Mexique. Pour cette raison, un questionnaire a été appliqué à 128 propriétaires et gestionnaires, utilisant l'analyse factorielle avec SPSS version 24 comme outil d'analyse statistique. Les résultats montrent qu'il y a sept facteurs qui influencent la mise en œuvre de la technologie, parmi lesquels : i) des relations internes favorables, ii) l'adoption, iii) la prise de décision et iv) le coût.

Mots-clés: Technologie de l'information, Relations internes, Adoption des TI, Prise de décisions, Coût des TI.

1. Introduction

There are situations that occur in the environment throughout the life of a company, many of which are beyond the control of their owners, managers or directors, and some others related to the effort and interaction of the staff that carry out the activities day by day; therefore, adaptation to changes has an impact inside and outside of organizations,

forcing them to adapt to various issues in order to mitigate risks through strategies that provide the opportunity to retain their advantage and competitive position (Soto-Acosta, and Meroño-Cerdan, 2008). In this sense, the use of technologies within activities such as industry or administrative work took an important role that directly and indirectly influences the business success of small enterprises (Brockhaus and Horwitz, 1986). Even the growth of new companies depends to a large extent on the right organization and how it prepares to confront its environment, as well as the implementation of tools that facilitate its work. This is the case of information technologies (IT) and how it is that small businesses foresee the process of adaptability and the effectiveness of its use within organizational and production processes (Alzougoool and Kurnia, 2008).

On the other hand, the skills available to the human capital of the organizations are a factor that is unfavorably involved if they are not trained in the use of these tools. To that end, it is necessary to take into account the element of training as a pedagogical tool to strengthen optimal results when using information technologies (Wang and Wang, 2015).

The presence of new IT is relevant, as it marks a significant effect that increases the level of competitiveness among companies in the market (Alonso-Almeida and Llach, 2013). An adequate level of competitiveness is crucial for the proper development of small businesses, since, without this advantage, it will be immersed in a situation that prevents small entrepreneurs from being able to intervene appropriately in decision-making and growth risks, increasing loss of control and significantly affecting the implementation of technologies (Mitev and March, 1998). Entrepreneurs should take into account the success factors that enable the growth of small businesses, as well as the activities in which information technology can optimally influence activities and processes (DeLone, 1988). A situation outlined by Delmar (2006), who mentions that the persistent relationship between the adoption of information technologies and decision-making by the entrepreneur acts in connection to the performance of the institution.

Investing in technology affects its operational performance, as described by França of Aragão Gomes, Machado, and Russo (2014), and it is at that time when the skills of the human capital to use those technologies become critical within the organization's processes, and subsequently intervene in the satisfaction of the user, which becomes part of the key factors of success. Additionally, interest and satisfaction with the use of computer tools encourages them to remain constant and have up-to-date technologies, aside from demonstrating an interest in improving their information systems and investing in services that allow small entrepreneurs to obtain results, increase their profit margin and competence (Abrego, Sánchez, and Medina, 2017). Nguyen, Newby, and Macaulay (2015) argue that perceived satisfaction of both workers and customers reflects end-user comfort, and it is the latter that ultimately encourage small businesses to adopt technologies.

Nevertheless, it is not enough to only have an interest, as there are doubts and fears about spending on the acquisition or renewal of infrastructure and technology by those managing the small business, especially in the Hispanic community (Middleton and Byus, 2011). On the other hand, Díaz (2017) indicates that the purchasing capacity of small businesses and its relationship with economic development should consider aspects that enhance the use of information technologies and the impact they reflect on the cost-benefit ratio. Likewise, the development of research on computer-based information systems with a business approach opens up an opportunity to stimulate the growth of small businesses with the implementation of IT (Xiong and Qureshi, 2015); in this way, technological innovation is part of the key points involved in the success of small businesses (Ríos and Marroquín, 2013).

Considering the importance of IT and the harmonious development of a small business, the objective of this research is to determine the critical success factors involved in IT implementation. To achieve the goal, a review of the literature was carried out, which allowed developing a questionnaire in order to identify the factors that may influence the adoption of IT, so as to perform

a statistical analysis in order to clarify the main contributions to knowledge.

2. Literature Review

2.1. User Resources

Talking about IT means thinking about the performance and effectiveness that the end user aspires to. Gálvez Albarracín, Riascos Erazo, and Contreras Palacios (2014) explain that in order to implement them adequately, it is necessary to properly lay out the structure to which they will be applied, based on the association of the new tool with the other technologies with which they will be implemented. In addition, Wonglimpiyarat and Yuberk (2005) mention the relationship present between information processes, activity development and management in general with the quality of technology perceived at the time of use, the innovation it provides, as well as the contribution to the development and implementation of these tools in organizational processes, because the quality of technology is related to its ease of use (Davis, 1989).

Similarly, it is important to point out the relevance of the compatibility level between the old tools used and the incorporation of new technologies, because the affinity between the two influences the quality of IT in the form of the information systems to which companies adapt, which in turn impacts on the perception of usefulness and user satisfaction, thus contributing to the performance of each individual by bringing about greater use of information systems and generating a better result at the organizational level (Abrego *et al.*, 2017).

On the other hand, Dillon (2001) emphasizes that both work experience and constant training are factors directly involved in the level of technology adoption and in the way in which it will be implemented into work activities. On the contrary, one of the main barriers faced by small entrepreneurs is economic capacity, defined by León and Valenzuela (2014) as a determining factor when innovating or acquiring information technologies, so it is essential to incorporate strategies that favor economic growth and

technology in the adaptation process (López, Maldonado, Pinzón, and García, 2016). In this sense, innovation is supported by banking and government criteria, seeking to reduce the impact of economic capacity as a difficulty to be faced by small entrepreneurs when adopting technologies that promote their growth, through various means of aid or credit that assess the importance of investing in technology development (Biachi and Guijarro, 2010).

The absence of information technology, coupled with the lack of infrastructure, significantly limits the perception of technologies, the development of small businesses and their commercial level, leading to a decrease in their level of competitiveness with respect to the competence in the market (Alzougoor and Kurnia, 2008). However, Shiels, McIvor, and O'Reilly (2003) propose that the characteristics present in industrial companies drive the success of factors that influence the adaptability of information technologies and their use. Micro enterprises engaged in activities in the industrial sector have greater availability and intention to implement IT; just as those engaged in tax activities assimilate information systems more easily (Estébanez, Grande, and Colomina, 2010).

Another aspect that influences the adoption of technology is skills and knowledge since the correct training of the user increases its possibilities of acceptance and user satisfaction. Likewise, the knowledge of the entrepreneur on this type of tools allows user to lead the organization with greater certainty, increasing the probability of success of implemented technology and information systems (DeLone, 1988). In this way, the subject of training and learning becomes a constant element in the objective of incorporating technologies in small businesses in order to make the best use and harnessing of these tools (Patiño, 2012).

According to studies conducted by Lucchetti and Sterlacchini (2004), one of the factors that influence the possibilities of adopting technology in micro enterprises is the education available to workers. Ballina (2015), refers to the capabilities and knowledge that each element possesses about information technology as a factor

that affects performance and productivity in the growth of small business, thus making it possible to obtain greater effectiveness in the performance of the organization by incorporating new technology. In this sense, the relationships present between the appropriate adoption of new technologies, the proper use and labor productivity of human resources are positively tied to their computational skills (Díaz, 2017).

Thusly, human capital is the most relevant resource within an organization; however, the lack of stability regarding motivation and satisfaction of staff may not lead to the success of the company, because the level of collaboration in activities will consequently increase the level of adaptability and growth to which small businesses can access (López *et al.*, 2016). The importance of human resources and how this element can conceptualize technological tools is defined by Xiong and Qureshi (2015) as a component that infers in organizational performance and growth; providing micro and small businesses the opportunity to position themselves ahead of the competition in the productive sector in which they operate (Ríos and Marroquín, 2013).

Based on the above, it is possible to corroborate what Olivos, Carrasco, Flores, Moreno, and Nava (2015) argue by stating that the difficulties present within the micro, small and medium-sized enterprises have an impact on competitiveness, the level of production, in addition to negatively influencing the attraction of investors, and the ability to retain talented elements, customers and investors, limiting the company's share in the market. Similarly, Afolayan, Plant, White, Jones, and Beynon-Davies (2015) point to the implementation of information technologies as the reason for a strong boost in the economy, as long as the human resource has the necessary skills and knowledge. Therefore, implementing IT plays a significant role in promoting the development of capable human resource and economic growth; consequently, it is possible to generate a clear vision of the progress of activities that intervene favorably in the economic performance of micro, small and medium-sized enterprises (Alonso-Almeida and Llach, 2013).

2.2. User Benefits

Caniëls, Lenaerts, and Gelderman (2015) argue that organizational changes are affected by the implementation of information technologies, as small businesses are forced to make use of such tools based on generational changes and market orientation. Similarly, human capital and changes within the organization are factors that complement the functioning of IT, the quality they reflect, and the competitiveness they provide to small business about the environment in which it develops (Alonso-Almeida and Llach, 2013). It is for this reason that the technological element in companies influences the comfort and ease of use perceived by the end user as a predominant element because the usefulness perceived by the user at the time of making use of information technologies has a considerable impact on its usefulness (Davis, 1989). This relationship leads to the use and usefulness determined by the quality present in the various computer tools used; in other words, the greater the amount of qualities present, the higher the level of satisfaction and as a consequence, the user will be more eager to adopt them (Abrego *et al.*, 2017).

As Mitev and March (1998) state, employee satisfaction is affected by IT use, especially in the use of software, which includes a lower risk of adaptability when incorporating hardware tools. Davis (1989) sustains that the work of the user is enhanced in relation to the degree of usefulness of the information generated by the technology; however, the adoption of new computer tools demonstrates the commitment of the owner of the company to its success, as it promotes the effectiveness of organizational procedures and staff, thus allowing the organization greater stability over time (Nguyen *et al.*, 2015). Therefore, investing in information technologies has a significant impact on the competitiveness and expansion of micro, small and medium-sized enterprises, thereby allowing them to be easily recognized at the local level, which influences the opinion of the surrounding society more quickly (Gálvez Albarracín *et al.*, 2014).

Making use of new technologies in the business environment means promoting performance in administrative and operational processes, since the adaptability

to this type of tools greatly improves the functioning of any organization, unlike those who do not dare or do not have the necessary capacity to use them suitably (Middleton and Byus, 2011). Therefore, the adoption of information technologies requires a great deal of effort for small organizations because it is necessary to implement changes, modify or incorporate new procedures and improve the staff's knowledge to achieve the expected results (Mitev and March, 1998). Making decisions that benefit strategic orientation through a change in information management and administration is also of great importance, as well as adopting IT tools plays a decisive role in the growth and expansion of micro and small businesses (Wang and Wang, 2015).

Based on experience and results, owners or managers can identify elements involved in the IT adoption process, such as innovation, intent and organizational capabilities of micro, small and medium-sized enterprises (Ghobakhloo, Hong, Sabouri, and Zulkifli, 2012). Similarly, Milosz (2011) asserts that collaboration, communication and participation among small businesses can benefit growth and the opportunity to adapt to internal and external changes, such as the use of technologies and computer tools.

On the other hand, as a result of the promulgation of government policies that are focused on the technological axis and that contribute significantly to the performance of small businesses, Ríos and Marroquín (2013) make a special reference to the government's participation as a significant element in technological adoption and innovation. In addition to this, and in order to remain in a competitive environment, small and medium-sized enterprises have the obligation to adapt to the changing social, political and technological environment by relying on the implementation of the IT that falls within reach and exploit to the maximum the benefits it offers, thus guaranteeing its survival (Child *et al.*, 2017).

From the above, it is possible to identify in the literature that the proper implementation of technology does not require exclusively the intention and the economic resource to achieve this objective. Additionally, it is necessary that a staff with the appropriate profile, whose skills, favors

the organization and knowledge enable rapid adoption and maximum utilization of IT, as well as the optimization of operational and administrative processes that drive stability, and subsequently the economic and productive growth of small businesses.

3. Methodology

Currently, IT implementation is an essential factor in the growth of companies, because it is present in internal processes and communication with other institutions. The objective of this study is to determine the elements involved in the implementation of information technology, particularly in micro and small businesses.

In order to achieve the objective set forth, the literature review was undertaken with the intention of identifying elements that intervene when implementing technologies, as well as defining the items that would make up the instrument to apply. Based on the above, a questionnaire was prepared, which was evaluated by academics (2) and by a group of people engaged in business in micro and small businesses (5), and thus obtain feedback and thereafter make the corresponding adjustments in accordance with the observations made.

In this way, it was possible to perform a pilot study with 20 micro and small entrepreneurs that caused the modification of 4 items whose wording was not adequate and caused confusion or doubt during this first application. This last modification was made in order to obtain greater certainty and generate a valid instrument. The final questionnaire consisted of two sections, the first requesting demographic data consisting of gender, marital status, age range, educational level, economic activity and the number of employees. The second section consisted of 40 questions that were evaluated on a 5-point Likert-type scale (1 Strongly Disagree, 2 Disagree, 3 Neutral, 4 Agreed and 5 Strongly Agree).

The empirical work was carried out in Ciudad Victoria, Mexico. Once the questionnaire was validated, it was applied to a non-probabilistic sample, this process lasted approximately one month, in which 128 valid questionnaires were attained. The

target population was identified as the owners and managers of micro and small businesses use information technologies within their administrative or operational processes, the sample was chosen at convenience in such a way that it covered commercial, industrial and service activities. The analysis of the data was carried out with the information generated based on the descriptive statistics in tables and frequencies, then a factorial analysis was performed using the SPSS software version 24, which allowed to draw the corresponding conclusions taking into account the results obtained.

4. Results

To interpret the behavior of elements that are difficult to measure directly, the exploratory factor analysis is an appropriate tool whose purpose is to define the scale and identify the factors corresponding to a wide set of data, allowing the reduction of the evaluated indicators in a defined number of conceptual variables (Blalock, 1966; Pérez and Medrano, 2010).

It is necessary to ensure that the matrix generated with the data has the necessary correlation in order to obtain greater suitability for factor analysis. To achieve this characteristic it is necessary to identify all factor loads that exceed 0.500, since they are defined as significant for this type of analysis (Hair, Anderson, Tatham, and Black 1998) with the sample used here; therefore, every item with value equal to or greater than 0.500 was considered valid in the present study.

Likewise, it is necessary to determine the statistical probability in order to analyze the existence of significant correlations between the variables addressed using Bartlett's sphericity. For this case, the results obtained when performing this analysis were significant at $p < 0.001$ levels, because they must present at least $p < 0.05$ to be adequate in a factorial analysis. Additionally, the suitability of the data was measured using the Kaiser-Meyer-Olkin test (KMO), in order to quantify the degree of intercorrelation between the variables addressed, this data reached a value of 0.879, which is reliable for the purposes of a factorial analysis (Field, 2013).

Table 1. Total variance explained

Component	Initial AutoValues			Sums of the squared saturations of the extraction			Sum of the rotation's squared Saturations		
	Total	% of variance	% Cumulative	Total	% of variance	% Cumulative	Total	% of variance	% Cumulative
1	12.819	37.702	37.702	12.819	37.702	37.702	5.078	14.936	14.936
2	2.428	7.141	44.844	2.428	7.141	44.844	3.995	11.751	26.687
3	1.909	5.614	50.458	1.909	5.614	50.458	3.349	9.850	36.538
4	1.771	5.209	55.667	1.771	5.209	55.667	3.160	9.295	45.832
5	1.531	4.502	60.169	1.531	4.502	60.169	2.558	7.523	53.355
6	1.399	4.114	64.284	1.399	4.114	64.284	2.492	7.329	60.685
7	1.150	3.381	67.665	1.150	3.381	67.665	1.807	5.315	65.999

Extraction Method: Primary Component Analysis.

Source: Authors' own elaboration based on the results obtained.

According to Nunnally (1978), Cronbach's alpha is a type of diagnostic measure used to obtain a reliability coefficient in order to assess the consistency level whole-type kind of scale. In the present analysis, the Cronbach alpha value obtained was 0.951, which is regarded as satisfactory, since, according to what was stated by Robinson, Shaver, and Wrightsman (1991), the value of that coefficient must meet a lower limit of 0.700.

Subsequently, the factor analysis of the main components was performed, which estimates the factors whose single variance has low proportions, considering, in turn, the total variance (Hair *et al.*, 1998). Then, the orthogonal rotation was executed by means of the Varimax method (Field, 2013), this process ended in an interaction for which 8 items were removed from the original instrument. The model covers 65.99% of the total variance with 7 elements obtained a result that can be seen in Table 1.

Similarly, in Table 2, it is possible to appreciate the final rotations, where it is possible to identify 7 elements involved in the implementation of information technologies in micro and small businesses, which have been defined as favorable internal relations (Cronbach's Alpha = 0.912), Adoption ($\alpha = 0.886$), Decision making ($\alpha = 0.865$), Cost ($\alpha = 0.822$), Cost Reduction ($\alpha = 0.718$), IT use Knowledge ($\alpha = 0.775$), and IT use Training ($\alpha = 0.692$).

Element 1, called *Favorable Internal Relations*, is conceptualized as the existing

welfare relationship between employees working in micro and small businesses. Element 2, *Adoption*, seeks to demonstrate the level of implementation and adaptability to new information technologies within processes. As for element 3, which has been called *Decision Making*, the intention is to evaluate the influence that information technologies exert at the time that the owner or manager must make crucial decisions within micro and small businesses.

Element 4 has been named *Cost*. In this regard, the role played by the cost of information technologies in their implementation by micro and small businesses is analyzed. Element 5 is *Cost Reduction*, which refers to the savings or decrease of costs absorbed by micro and small businesses by implementing information technologies within their processes. *IT use Knowledge* is as element 6 has been defined and refers to the skills, experience or knowledge available to workers who make use of tools and information technologies within these type of organizations; and finally, the name of *IT use Training* is proposed for the 7th element, because it indicates the relevance of the training provided to staff regarding these technological tools.

4.1. Lessons

In factor 1, it is possible to observe that the existing collaboration, communication and participation among workers intervene positively in the adaptability to new tools, as well as the environment in which they

Table 2. Matrix of rotated components (a)

Element	Item	A
1	18. I feel good when I learn to use new information technologies.	0.635
	19. My information is safe when I use the various technologies in my business.	0.682
	20. I consider that using information technology (computer, printer, Internet) improves the teamwork of my employees.	0.675
	21. My employees work better with the use of information technologies.	0.622
	22. I believe that constant learning courses for my workers in the use of information technologies improve teamwork.	0.621
	23. I believe that renewing information technologies in my business improves the working environment among my employees.	0.679
	24. I believe that teamwork by my employees helps them use new information technologies in my business.	0.743
	25. I believe that teamwork by my employees helps to better use information technologies in my business.	0.651
	28. The use of information technologies improves communication with my employees when a decision is made.	0.520
2	1. I consider it necessary to use information technologies (computer, printer, Internet) in my business.	0.537
	34. I have information technologies (computer, printer, Internet) in my business.	0.749
	36. I use IT every day in my business.	0.822
	37. I believe that I make good use of the information technologies used in my business.	0.770
	38. I can improve my use of information technologies in my business.	0.524
3	15. I believe that the use of information technologies (computer, printer, Internet) helps me do my job better.	0.594
	16. I believe that the use of information technologies in my business gives me an advantage over other similar businesses.	0.682
	26. Using information technologies (computer, printer, Internet) helps me make decisions to grow my business.	0.661
	27. I think it is easier for me and for my employees to make decisions with the use of information technologies.	0.695
	31. I believe that using information technologies in my business helps me increase the profits (selling more, making more products) of my business.	0.557
4	5. It is easy for me to buy information technologies (computer, printer, Internet).	0.669
	6. It is easy for me to spend on buying new information technologies.	0.783
	7. It is easy for me to renew the information technologies that my business uses.	0.753
	8. It is easy for me to find someone to repair the information technologies I use in my business.	0.566
	9. It is easy for me to spend on repairing the information technologies I use in my business.	0.801

	30. I believe that using information technology (computer, printer, Internet) helps me reduce the expenses (energy, stationery, telephone) of my business.	0.638
5	32. Using information technologies improves the time in which some tasks (work of my employees) are done in my business.	0.716
	33. I think it is worth spending (renewing, repairing, buying) on information technologies because they improve my income over time.	0.561
6	3. I know the information technologies needed to start a business.	0.661
	10. I have the necessary knowledge to make good use of information technologies (computer, printer, Internet) in my business.	0.785
	11. I can make good use of information technologies in my business.	0.562
7	13. I intend to attend learning courses on some non-utilized information technology.	0.850
	14. It is good to spend on a course to learn how to use new technology.	0.832

Extraction method: Analysis of main components.

Rotation method: Varimax normalization with Kaiser.

a. The rotation has converged in 8 iterations.

Source: Authors' own elaboration based on the results obtained.

operate, and influences the performance of small businesses, a phenomenon noted by López *et al.* (2016); Xiong and Qureshi (2015); Alonso-Almeida and Llach (2013); and Milosz (2011).

On the other hand, and in relation to what Abrego, *et al.* (2017); Díaz (2017); Nguyen, *et al.* (2015); Wang and Wang (2015); Ghobakhloo *et al.* (2012); Delmar (2006); Mitev and March (1998); DeLone (1988), have put forward, it can be determined that factors 2 and 3 bear a direct relationship because the correct adoption of technological tools encourages and assists decision making by owners or managers of small businesses; thus promoting greater productivity and fostering a greater commitment from entrepreneurs to decision-making and strategically addressing the risks involved.

With regards to cost factors (4 and 5), they reflect that the acquisition or upgrading of this type of infrastructure is limited by the capital available to small businesses, thence their economic development becomes a determining factor when choosing the technology that is available to them, requiring the company to implement strategies that allow it to maximize and exploit these tools in order to obtain the best results in relation to cost-benefit; a fact that is consistent with what Child *et al.* (2017); Díaz (2017); López, *et al.* (2016); León and Valenzuela (2014);

Middleton and Byus (2011); Biachi and Guijarro (2010) have pointed out.

Finally, the relationship between factors 6 and 7 determines the ease with which IT adapts to the processes of small businesses. This is because the education, training, experience, and the skills of the human capital affects the performance and productivity of the organization, and its economic drive consequently, factors that are consistent with the statements made by Afolayan *et al.* (2015); Ballina (2015); Wang and Wang (2015); França, de Aragão Gomes, Machado, and Russo (2014); Patiño (2012); Lucchetti and Sterlacchini (2004); Dillon (2001).

However, it is important to note that the study is focused on micro and small businesses, so it should be analyzed deeply and from different perspectives, whether the factors identified herein are present in medium-sized and large enterprises.

5. Conclusions

The implementation of information technologies has become a crucial point in the growth and development of companies worldwide, regardless of the size or activity they are engaged in. Constant technological advances and the growing demand for better technological tools to facilitate daily work

are on the rise, especially in countries with emerging economies where there is the presence of accelerated growth as a result of the advances made by developed countries.

In order to address the above, the realization of this research work focuses on determining the elements involved when looking for the implementation of information technologies in micro and small businesses. The results obtained allow to identify key elements that influence the level of IT implementation to which micro and small businesses have access, these elements are: *i)* favorable internal relations, *ii)* Adoption, *iii)* Decision making, *iv)* Cost of IT, *v)* Cost reduction, *vi)* Knowledge in the use of IT, and *vii)* Training in the use of IT.

It is necessary to mention the familiarity workers have with the use of computers, the Internet and other electronic devices, due to their routine involvement with these tools through trade, education or entertainment. This particular aspect, paired with an adequate working climate, allows workers to interact more easily with tools and information technologies, and in turn becomes an element capable of positively influencing the implementation of technologies in micro and small businesses.

However, not in all cases, entrepreneurs seek to innovate, since constant changes in the tax regime and migration to e-government require them to adapt and implement or renew technological tools forcing them to invest intelligently due to the costs that such tools imply. On the contrary, it is also possible to identify that the proper maintenance and renewal of these devices allow to improve the processes and mainly the decision-making by the owner or manager, and in some cases, considerably optimize the quality of their performance.

The implementation of information technologies is a definitive step from the birth of a company that, not in all cases, is easy to take on. Human capital is fundamental for its proper use and despite familiarity with these electronic devices in daily life, it is necessary to consider that the knowledge and skills that a worker possesses must be strengthened through specific training in the area in which he or she performs. This element is crucial in achieving an optimal benefit; however, the

economic cost and time spent are constraints that determine the level of implementation of information technologies.

In conclusion, the possibility of adapting to change and rapid development and technological innovation is a challenge to overcome, an entrepreneur must consider the current state and the growth of his company in the near future, identify its strengths and weaknesses in terms of adaptability to these tools, the processes that could be improved and even reduce costs as an incentive that will allow him to remain present in the market.

Finally, limitations are estimated: the geographical area in which the study has focused, as it may result in a variation of its validity in case of making a change at the time of applying the instrument in another region; as well as in the size of the sample, the level of education and even the specific sector in which the activities of each company.

7. References

- Abrego Almazán, D., Sánchez Tovar, Y., y Medina Quintero, J. M. (2017). Influencia de los sistemas de información en los resultados organizacionales. *Contaduría y Administración*, 62(2), 303-320. <https://doi.org/10.1016/j.cya.2016.07.005>
- Afolayan, A., Plant, E., White, G. R. T., Jones, P., & Beynon-Davies, P. (2015). Information Technology Usage in SMEs in a Developing Economy. *Strategic Change*, 24(5), 483-498. <https://doi.org/10.1002/jsc.2023>
- Alonso-Almeida, M. M., & Llach, J. (2013). Adoption and use of technology in small business environments. *Service Industries Journal*, 33(15-16), 1456-1472. <https://doi.org/10.1080/02642069.2011.634904>
- Alzouggool, B., & Kurnia, S. (2008). Electronic Commerce Technologies Adoption by SMEs: A Conceptual Study. *ACIS 2008 Proceedings*, 72.
- Ballina, F. (2015). Ventajas competitivas de la flexibilidad numérica en micro, pequeñas y medianas empresas del Distrito Federal. *Problemas del Desarrollo*, 46(183), 165-188. <https://doi.org/10.1016/j.rpd.2015.10.008>
- Biachi, G., & Guijarro, A. (2010). El apoyo a la innovación de la PyME en México. Un estudio exploratorio. *Investigación y Ciencia*, 18(47), 21-30.

- Blalock, H. M. (1966). *Estadística social*. México: Fondo de Cultura Económica.
- Brockhaus, R. H., Horwitz, P. S., Sexton, D. L., & Smilor, R. W. (1986). The art and science of entrepreneurship. *The psychology of the entrepreneur*, 2(11), 25-48.
- Caniëls, M. C. J., Lenaerts, H. K. L., & Gelderman, C. J. (2015). Explaining the internet usage of SMEs. *Internet Research*, 25(3), 358-377. <https://doi.org/10.1108/IntR-12-2013-0266>
- Child, J., Hsieh, L., Elbanna, S., Karmowska, J., Marinova, S., Puthuserry, P., ... Zhang, Y. (2017). SME international business models: The role of context and experience. *Journal of World Business*, 52(5), 664-679. <https://doi.org/10.1016/j.jwb.2017.05.004>
- Davis, F. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340. [https://doi.org/10.1016/S0305-0483\(98\)00028-0](https://doi.org/10.1016/S0305-0483(98)00028-0)
- Delmar, F. (2006). The psychology of the entrepreneur. In S. Carter, D. Jones Evans (Eds.), *Enterprise and small business: principles, practice and policy* (2nd ed., pp. 152-175). Lund, Sweden: Pearson Education.
- DeLone, W. H. (1988). Determinants of Success for Computer Usage in Small Business. *MIS Quarterly*, 12(1), 51-61. <https://doi.org/10.2307/248803>
- Díaz Rodríguez, H. E. (2017). Tecnologías de la información y comunicación y crecimiento económico. *Economía Informa*, 405, 30-45. <https://doi.org/10.1016/j.ecin.2017.07.002>
- Dillon, A. (2001). User Acceptance of Information Technology. In W. Karwowski (Ed.), *Encyclopedia of human factors and ergonomics*. London, UK: Taylor and Francis.
- Estébanez, R. P., Grande, E. U., & Colomina, C. M. (2010). Information technology implementation: evidence in Spanish SMEs. *International Journal of Accounting and Information Management*, 18(1), 39-57. <https://doi.org/10.1108/18347641011023270>
- Field, A. (2013). *Discovering statistics using IBM SPSS statistics*. London, UK: SAGE Publications Ltd.
- França, M. C. L., de Aragão Gomes, I. M., Machado, G. J. C., & Russo, S. L. (2014). Factors Conditioning Failure of Micro and Small Businesses of the Information Technology and Communication (ICT): Study of Multiple Cases, Aracaju (SE), Brazil. *Business Management Dynamics*, 3(8), 40-50.
- Gálvez Albarracín, E. J., Riascos Erazo, S. C., y Contreras Palacios, F. (2014). Influencia de las tecnologías de la información y comunicación en el rendimiento de las micro, pequeñas y medianas empresas colombianas. *Estudios Gerenciales*, 30(133), 355-364. <https://doi.org/10.1016/j.estger.2014.06.006>
- Ghobakhloo, M., Hong, T. S., Sabouri, M. S., & Zulkifli, N. (2012). Strategies for Successful Information Technology Adoption in Small and Medium-sized Enterprises. *Information*, 3(4), 36-67. <https://doi.org/10.3390/info3010036>
- Hair, J. F., Anderson, R. E., Tatham, R. I., & Black, W. C. (1998). *Multivariate Data Analysis*. Upper Saddle River, USA: Prentice Hall International.
- León, J. G. M., & Valenzuela, A. V. (2014). Aprendizaje, innovación y gestión tecnológica en la pequeña empresa: Un estudio de las industrias metalmecánica y de tecnologías de información en Sonora. *Contaduría y Administración*, 59(4), 253-284. [https://doi.org/10.1016/S0186-1042\(14\)70162-7](https://doi.org/10.1016/S0186-1042(14)70162-7)
- López-Torres, G. C., Maldonado Guzmán, G., Pinzón Castro, S. Y., & García Ramírez, R. (2016). Colaboración y actividades de innovación en Pymes. *Contaduría y Administración*, 61(3), 568-581. <https://doi.org/10.1016/j.cya.2015.05.016>
- Lucchetti, R., & Sterlacchini, A. (2004). The adoption of ICT among SMEs: Evidence from an Italian survey. *Small Business Economics*, 23(2), 151-168. <https://doi.org/10.1023/B:SBEJ.0000027667.55821.53>
- Middleton, K. L., & Byus, K. (2011). Information and communications technology adoption and use in small and medium businesses. *Management Research Review*, 34(1), 98-110. <https://doi.org/10.1108/01409171111096496>
- Milosz, M. (2011). Perception of global collaborative knowledge systems in Polish SMEs. *Studies & Proceedings*, 42, 126-136.
- Mitev, N., & March, A. (1998). Small businesses and information technology: risk, planning and change. *Journal of Small Business and Enterprise Development*, 5(3), 228-245. <https://doi.org/https://doi.org/10.1108/EUM0000000006784>
- Nguyen, T. H., Newby, M., & Macaulay, M. J. (2015). Information technology adoption in small business: Confirmation of a proposed framework. *Journal of Small Business Management*, 53(1), 207-227. <https://doi.org/10.1111/jsbm.12058>
- Nunnally, J. C. (1978). *Psychometric Theory*. New York, USA: McGraw Hill Editorial.
- Olivos, P. C., Carrasco, F. O., Flores, J. L. M.,

- Moreno, Y. M., & Nava, G. L. (2015). Modelo de gestión logística para pequeñas y medianas empresas en México. *Contaduría y Administración*, 60(1), 181-203. [https://doi.org/10.1016/S0186-1042\(15\)72151-0](https://doi.org/10.1016/S0186-1042(15)72151-0)
- Patiño, A. (2012). Uso y apropiación de las Tecnologías de la Información y las Comunicaciones en las pymes y su relación con la competitividad. *INGE CUC*, 8(1), 33-50.
- Pérez, E. R., y Medrano, L. A. (2010). Análisis factorial exploratorio: bases conceptuales y metodológicas. *Revista Argentina de Ciencias del Comportamiento*, 2(1), 58-66.
- Ríos Bolívar, H., & Marroquín Arreola, J. (2013). Innovación tecnológica como mecanismo para impulsar el crecimiento económico Evidencia regional para México. *Contaduría y Administración*, 58(3), 11-37. [https://doi.org/10.1016/S0186-1042\(13\)71220-8](https://doi.org/10.1016/S0186-1042(13)71220-8)
- Robinson, J. P., Shaver, P. R., & Wrightsman, L. S. (1991). Criteria for scale selection and evaluation. *Measures of personality and social psychological attitudes*, 1(3), 1-16.
- Shiels, H., McIvor, R., & O'Reilly, D. (2003). Understanding the implications of ICT adoption: insights from SMEs. *Logistics Information Management*, 16(5), 312-326. <https://doi.org/10.1108/09576050310499318>
- Soto-Acosta, P., Meroño-Cerdan, A. (2008). Analyzing e-Business value creation from a resource-based perspective. *International Journal of Information Management*, 28(1), 49-60.
- Wang, S., & Wang, H. (2015). Design and delivery of a new course of information technology for Small Business. *Journal of Information Systems Education*, 26(1), 37-46.
- Wonglimpiyarat, J., & Yuberk, N. (2005). In support of innovation management and Roger's Innovation Diffusion theory. *Government Information Quarterly*, 22(3), 411-422. <https://doi.org/10.1016/j.giq.2005.05.005>
- Xiong, J., & Qureshi, S. (2015). Information Technology for Development in Small and Medium-Sized Enterprises. *Information Systems and Quantitative Analysis Faculty Proceedings & Presentations*, 20. <http://digitalcommons.unomaha.edu/isqafacproc/20>

How to quote this article?

Zapata Márquez, N. A., Medina Quintero, J. M., Morales Sáenz, F. I., & Abrego Almazán, D. (2019). Critical Success Factors in Implementing IT in MSMEs. *Cuadernos de Administración*, 35(63), 3-14. DOI: <https://doi.org/10.25100/cdea.v35i63.6874>