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Transformación e Innovación en las Organizaciones (TIO): El uso de las Tecnologías de la Información y Comunicación en las PYME, como herramienta para crear ventajas competitivas.

Transformation and Innovation in Organizations (TIO): Usage of Information and Communication Technologies as tools to create competitive advantages in SME´s

Transformação e Inovação em Organizações (TIO): O uso das Tecnologias de Informação e Comunicação nas PME, como ferramenta para criar vantagens competitivas.

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Resumen

En los últimos años, México ha tenido un crecimiento muy grande de las pequeñas y medianas empresas (también conocidas como pymes), y de la misma manera se espera que estas sean competitivas. En este sentido, se podría suponer que la introducción y el uso de las Tecnologías de la Información y Comunicación (TIC) en las pymes como herramientas para el desarrollo y crecimiento de las empresas ha generado un alto impacto en sus procesos. Este artículo presenta un estudio cuantitativo, no exploratorio, transversal. Su objetivo es caracterizar la apreciación y la relación que tienen los usuarios de las TIC en las pymes que se encuentran en el sector de servicios del municipio de Mérida, en el estado de Yucatán, con la finalidad de poder determinar áreas de oportunidad que puedan contribuir a mejorar los resultados en las empresas y apoyar al incremento de su competitividad. Los resultados muestran que las pymes cuentan con un alto porcentaje de dispositivos y recursos de TIC, pero los beneficios por el uso de estas tecnologías no están siendo considerados de alto impacto.

Palabras claves: competitividad, innovación, pymes, tecnologías de información y comunicación.

Abstract

In recent years, Mexico has had a very large growth of Small and Medium Enterprises (SMEs), and in the same way they are expected to be competitive. In this sense, it could be considered that the introduction and use of Information Technology and Communication (ICT) in SMEs as tools for the development and growth of companies, they provide a high impact on their processes. This article presents a quantitative, non-exploratory, cross-sectional study and its objective is to characterize the appreciation and relationship that users have of ICT in SMEs in the case of companies in the services group in the municipality of Mérida, in the state of Yucatan, and thus be able to determine areas of opportunity that can contribute to improve the results in the companies and with this support the increase of its competitiveness. The results show that SMEs have a high percentage of ICT devices and

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resources, but the benefits of using these technologies are not being considered with a high impact.

Keywords: competitiveness, innovation, SMEs, information technology and communication.

Resumo

Nos últimos anos, o México teve um crescimento muito grande das pequenas e médias empresas (também conhecidas como PME) e, da mesma forma, espera-se que sejam competitivos. Nesse sentido, pode-se supor que a introdução e o uso das Tecnologias de Informação e Comunicação (TIC) nas PME como ferramentas para o desenvolvimento e o crescimento das empresas tenha gerado um alto impacto nos seus processos. Este artigo apresenta um estudo quantitativo, não exploratório, transversal. Seu objetivo é caracterizar a apreciação e relacionamento que os usuários de TIC têm em PMEs que estão no setor de serviços do município de Mérida, no estado de Yucatán, para determinar áreas de oportunidade que possam contribuir para melhorar os resultados nas empresas e apoiar o aumento da sua competitividade. Os resultados mostram que as PMEs têm uma alta porcentagem de dispositivos e recursos de TIC, mas os benefícios do uso dessas tecnologias não estão sendo considerados de alto impacto.

Palavras-chave: competitividade, inovação, PME, tecnologias de informação e comunicação.

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1. Introduction

Currently, knowledge management is an element that has become a determining factor for any kind of organization and more in small and medium enterprises (referred to hereinafter as SMEs). In this sense, it is considered that Information and Communication Technologies (ICT) are a key factor for the success and improvement of companies at a competitive level, since they are a facilitator of conditions that allow a favorable environment for generation and accumulation of knowledge of all areas of the organization.

We know that SMEs are faced with excelling in a changing market that is increasingly competitive and globalized. That is why, in order for organizations to remain competitive, they must not only be efficient and productive, but they must also be innovative; they should also consider that ICTs not only cover physical goods such as machines and equipment, but also information and intellectual or operational knowledge. Therefore, its use as support tools can contribute significantly to the generation of relevant information.

With the aim of analyzing the level of use of ICT in SMEs, a study was carried out that tries to characterize the appreciation that users of these technologies have in this type of companies, and thus be able to determine areas of opportunity that can contribute to improve their performance and thereby support the increase of their competitiveness. The results show that SMEs have a high percentage of devices and resources related to ICT, but the benefits of using these technologies are not being considered high impact.

The route this work takes is as follows. In the first place, the topics of ICT in SMEs are analyzed, namely, innovation and competitiveness and how they contribute to the growth of organizations; Secondly, the design and procedure of the study is described; Subsequently, the analysis of results is presented, to finish with the conclusions and future lines of research.

2. Development of the theme

2.1. Information and Communication Technologies in SMEs

SMEs are all those companies that register between 50 and 250 employees, according to the Organization for Economic Co-operation and Development [OECD] (2013, p.21). Under these parameters, 99% of Mexican companies are SMEs and they generate 72.3% of jobs throughout the country. They are undoubtedly a vital part of the economy in Mexico.

In the current 21st century, where technology is fundamental for the survival of SMEs, the use of ICT is an aspect that becomes a necessity. The authors Bocanegra and Vázquez (2010), as well as Riascos and Aguilera (2011), state that the use of ICT allows gathering information, processing and analyzing it to facilitate decision-making, primarily for the management and management In turn, Slusarczyky Pozo (2015), Aquino, Vicuña and Moreira (2016) and Manzo and Alfaro (2016) agree that it is of great importance that companies use technological tools, as it improves the response to customer requirements, competitiveness, the increase of sales and the quality of the products, as well as the performance of the collaborating personnel and offer greater flexibility in the production and management processes. For all the above, ICT is a key element to reach smart growth, which every company needs, from multinationals to SMEs.

The rise of ICT has been accompanied by a great advance in the management of information and knowledge. So much so that this era has been called as the age of knowledge, as mentioned by Llanusa, Rojo, Caraballoso, Capote and Pérez (2017). This new management is being ratified, as there is increasing awareness among SMEs of the importance of ICT as tools for achieving economic, social and financial development goals.

The use of ICT is especially important for administration and sales, for the search and communication with suppliers and customers and for the continuous learning of the entrepreneur and the personnel of the companies. The administration of SMEs can improve

the efficiency of different business processes (production, sales and administration), as well as reduce costs and increase their competitiveness through the use of ICT.

Therefore, the management of the information resource in the 21st century is a very important activity of information science. "It is a revolution based on information, because current technological advances allow processing, storage, retrieval and communication of information in any of its forms (voice, texts, images) regardless of distance, time or volume" (Cloths , 2015).

For Lester and Thuhang (2008), there are at least four factors that motivate SMEs to invest in ICT: 1) savings in costs and generation of perceived benefits; 2) the external pressure of competitors, customers or suppliers; 3) the organizational disposition, and 4) the ease of use. These same authors indicate that not every investment in ICT will have an impact on the growth of the company and its business. In general, it is essential that technology be considered not so much as a functional instrument, but rather as a strategic capability of the company that can be translated into a competitive advantage.

While it is true that ICTs are essential for effective knowledge management, it is not possible to achieve success based solely on them.

It is important that SMEs consider that ICTs are tools that need to be incorporated into their activities and that, once incorporated, the basic objective of the administration is to support information management, which involves organizing and putting resources into use. information of the organization (both external and internal) to allow it to operate, learn and adapt to changes in the environment. The main actors in information management are the information professionals of each area, in close union with their users. The main processes of information management are the identification of information needs, the acquisition of information sources, their organization and storage, the development of products and services and their distribution and use, which are also the basis for the creation of information.

knowledge during the productive existence of the organization and, therefore, foundation of the initial phase of knowledge management (Méndez and Moreno, 1999).

Considering the above, Ca 'Zorzi (2011) highlights some aspects of the incorporation of ICT in organizations, such as strategic management, business intelligence, financial management, production, supply chain management, management of clients, promotion in the company, sales channels, distribution, foreign trade and human resources; aspects that are not unique to large companies, since SMEs can have some of these processes and each day, according to the requirements of growth and obtaining information, incorporate one of these in their administration.

It is important to highlight that in environments as complex as those that SMEs must face today, only those that use all the means available to timely, adequate information, and incorporate and use ICT in their daily activities, and learn to take advantage of Market opportunities always visualizing threats, can achieve the goal of being successful.

2.2. Innovation

At present, there is greater recognition of innovation processes, with the understanding that they can transform any part of the value chain and that products and services represent only the tip of the innovation iceberg (Birkinshaw, Bouquet and Barsoux). , 2011).

Some studies claim that innovating today implies not only the designation of internal resources, but also the involvement of suppliers, technology centers, universities, specialized companies, start-ups or spin-offs, among others (Sales and García, 2008).

Molero (2015) considers that technological innovation is the great driving force of competitiveness and economic growth.

Taking into account the above, companies should consider that when innovating the gains of competitiveness must come from three fundamental vectors: investment in research and technological development (R & D), the potential of qualified human capital and the existence of a business sector able to absorb the knowledge and technology generated in their environment to develop new products and services that can be useful to the community (Fundación Cotec, 2014).

Some companies are considering analyzing and using the concept of "open innovation", whose commonly accepted definition refers to the use by organizations of the inputs and outputs of knowledge in order to accelerate internal innovation and expand the market for external use Of the same. In other words, it is the paradigm that assumes that companies can and should make use of both external and internal knowledge, and must use the different means of market access if they hope to develop their technology. (Chesbrough, 2006 [citado por González y García, 2011]).

Rodríguez, Theran y Bucci (2011) highlight as fundamental elements for the incorporation of open innovation management commitment of the industrial sector, improvement in communication channels with the environment, the consolidation of a culture of innovation enhancing teamwork, motivation and training of resources human beings, considering both internal and external sources.

2.3. Competitiveness

Puente (2017), in its analysis of the development of a competitive business model, mentions that the new business environment is characterized, in the first place, by the globalization of the economy, which exacerbates the pressures on competitiveness, causing the need for changes drastic in the strategic orientation of companies. In these circumstances, only those companies that manage to be highly efficient will be able to survive. Secondly, in the business environment, technological changes are taking place, which, while not something new, have

acquired a new dimension and much more pronounced features, such as the use of ICT in business.

At the same time, companies should consider competitiveness as the fundamental basis of performance over the average of companies in a long-term sector, as Porter (1988) points out. It lies in the capacity of the organization to develop competitive advantages, which are born fundamentally of the value it is able to create for its buyers, that is, the performance of the profits.

On the other hand, Mitchelmore and Rowley (2013) state that business competitiveness is considered important for business growth and success, where the development of conceptual competencies and relationships in management, associated with the creation of business strategies, is a key factor. .

The concept of business competitiveness is defined by Aragón and Rubio (2006) as the ability of a company to achieve a favorable competitive position that allows it to obtain a performance superior to that of its competitors.

Muñiz (2010) mentions that competitive analysis helps identify the strengths and weaknesses of the company, as well as the opportunities and threats that affect it within its target market.

From the previous perspectives, Longenecker, Moore, Petty, and Palich (2009) consider that SMEs in Mexico suffer from managerial competencies in their business management that provide them with better behavior and more effective skills to make changes in strategies, programs, structures, among other; and that allows the organization to adapt, and thus be able to anticipate changes that may affect it.

Based on all the previous premises, it is intended to obtain information through a study that identifies the use of ICT in SMEs, and to determine degrees of importance in the perception of the usefulness of their use.

3. Study design and procedure

Con el objeto de obtener información que sirva de base para analizar la utilización de las TIC, se realizó un estudio de las pymes del sector de servicios de Mérida, Yucatán, basándose en datos primarios recabados en los meses de octubre y noviembre de 2016.

2.3. Methodology

The study is quantitative, non-exploratory, transversal and its objective is to characterize the appreciation and relationship that ICT users have in SMEs, specifically in the case of those belonging to the group formed by the subsectors that, in accordance with the Economic Censuses of the National Institute of Statistics and Geography [Inegi] (2014) and the North American Industrial Classification System [SCIAN] (2013), includes the following services: a) Information in mass media (subsector 51); b) Financial and insurance (subsector 52); c) Professionals, scientists and technicians (subsector 54); d) Corporate (sub-sector 55), and d) Business support and waste management and remediation services (subsector 56), in the municipality of Mérida, Yucatán.

2.4. Sample

The sample size required to carry out the study was obtained to estimate the percentage of companies in the group described. This size is determined by the expression:

$$n = \frac{Z^2 NP(1-P)}{E^2(N-1) + Z^2 P(1-P)}$$

Where:

N It is the total of companies object of study, according to the final results of the Inegi Economic Censuses (2014) (*N* = 2,861,356);

Z It is the value of the Z statistic for a certain level of significance (in this case, 0.10), corresponding to a certain confidence percentage (in this case, 90%). This value is, in this case, 1.64;

P It is the expected value of the proportion that you want to estimate. In this case, 0.5 was considered to obtain the sample size that allows obtaining said estimate,

E It is the error of estimation or margin of error with which we want to obtain the estimate, in this case, said value is in its decimal expression 0.1 (10% in its percentage expression).

From the previous data, the sample size turns out to be 66 companies. However, it was only possible to access the information of 58 companies, so that they represent the effective sample for the realization of the study.

2.4. Validation of the Instrument

To revise the construct validity and reliability of this section, the Exploratory Factorial Analysis (AFE) and the Confirmatory Factorial Analysis (AFC) and the Cronbach's Alpha coefficient were obtained, respectively. The detail of these results is described below.

a) Validity

According to the results of the AFE, the sample adequacy coefficient KMO turns out to be 0.647 and the p value of Bartlett's sphericity test of 0.000, with an explained variability of 83.2%, considering the first two components. So the result can be considered satisfactory.

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b) Reliability

As for the reliability of the instrument, it was verified by the Cronbach's Alpha coefficient. The value obtained turns out to be 0.737, which is considered satisfactory, so the questionnaire, although it is perfectible, is reliable.

Given that the validity of content, construction and reliability of the instrument is fulfilled, it is concluded that the instrument, although perfectible, is valid and reliable.

4. Results

In this descriptive study we can highlight that with respect to the economic activities of the companies in the study group, 74.2% corresponds to companies in subsectors 56 and 54. The remaining 25.8% to the rest of the group's subsectors (51, 52 and 55), as shown in table 1.

Tabla 1. Actividad económica.

		Frecuencia	Porcentaje	Porcentaje válido	Porcentaje acumulado
Válido	51	6	10.3	10.3	10.3
	52	8	13.8	13.8	24.1
	54	15	25.9	**25.9**	50.0
	55	1	1.7	1.7	51.7
	56	28	48.3	**48.3**	100.0
	Total	58	100.0	100.0	

Fuente: Elaboración propia

62.1% of companies are up to 10 years old (Table 2) and the remaining 37.9% more than 10 years.

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Tabla 2. Años de funcionamiento de la empresa.

		Frecuencia	Porcentaje	Porcentaje válido	Porcentaje acumulado
Válido	1 - 5 años	16	27.6	27.6	27.6
	6 - 10 años	20	34.5	34.5	**62.1**
	11 - 20 años	13	22.4	**22.4**	84.5
	21 o más	9	15.5	**15.5**	100.0
	Total	58	100.0	100.0	

Fuente: Elaboración propia

As shown in Table 3, in terms of the devices and resources available to the company, most of them have a computer (96.6%), Internet (96.6%) and fixed telephony. (91.4%).

Tabla 3. Dispositivos y recursos con los que se cuenta en la empresa.

		Recuento	% del N de columna
Dispositivos y recursos con los que se cuenta en la empresa	**Computadora**	56	**96.6%**
	Internet	56	**96.6%**
	Telefonía fija	53	**91.4%**
	Tabletas electrónicas	18	31.0%
	Telefonía móvil	45	77.6%
	Correo electrónico	46	79.3%

Fuente: Elaboración propia

Regarding the information regarding the use of ICT, it can be seen in table 4 that 43.1% of companies have up to 4 computers, while 32.8% have 10 or more. In 75.9% of companies, 34% or more of the staff uses computers in their work routine (Table 5).

Tabla 4. Número de computadoras en la empresa.

		Frecuencia	Porcentaje	Porcentaje válido	Porcentaje acumulado
Válido	0 - 4	25	43.1	**43.1**	43.1
	5 - 9	14	24.1	24.1	67.2
	10 o más	19	32.8	**32.8**	100.0
	Total	58	100.0	100.0	

Fuente: Elaboración propia

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Tabla 5. Porcentaje de empleados que utiliza computadora en su rutina.

		Frecuencia	Porcentaje	Porcentaje válido	Porcentaje acumulado
Válido	0 - 33%	14	24.1	24.1	24.1
	34 - 66%	21	36.2	36.2	60.3
	67 - 100%	23	39.7	39.7	100.0
	Total	58	100.0	100.0	

Fuente: Elaboración propia

To complete this study, from the sum of the responses to the reagents on an additive Likert scale, the areas of the company were identified that, to a greater extent, are considered to be benefited by the use of ICT. The maximum possible total is 58 x 5 points, that is, 290 points. Table 6 describes for each of the five areas of the company the points reached and the percentage they represent with respect to the maximum possible total.

Tabla 6. Beneficios por el uso de las TIC en las áreas.

Área	Puntos	Porcentaje	Lugar
Contabilidad	200	69	Primero
Mercadotecnia	170	58.6	Segundo
Recursos humanos	168	57.9	Tercero
Finanzas	167	57.6	Cuarto
Producción	164	56.6	Quinto

Fuente: Elaboración propia

The detail of the results by area is presented below, as can be seen in Figure 1. The SMEs consider that they are greatly benefited by the use of ICT in the area of Accounting only by 22%; while 31% consider that they can benefit on average.

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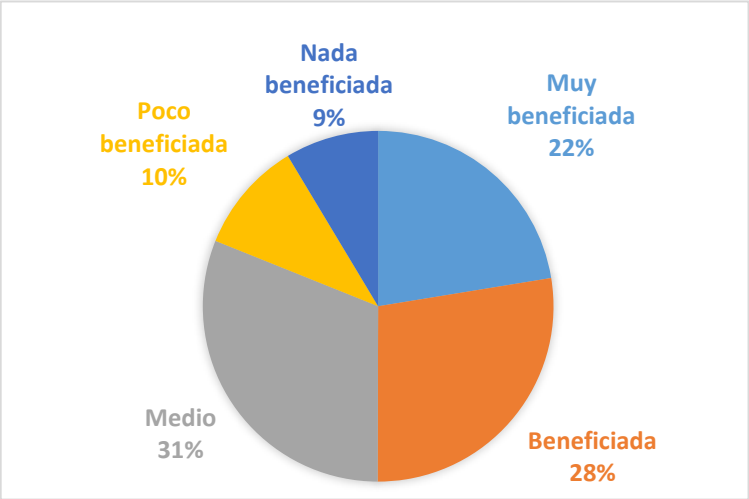
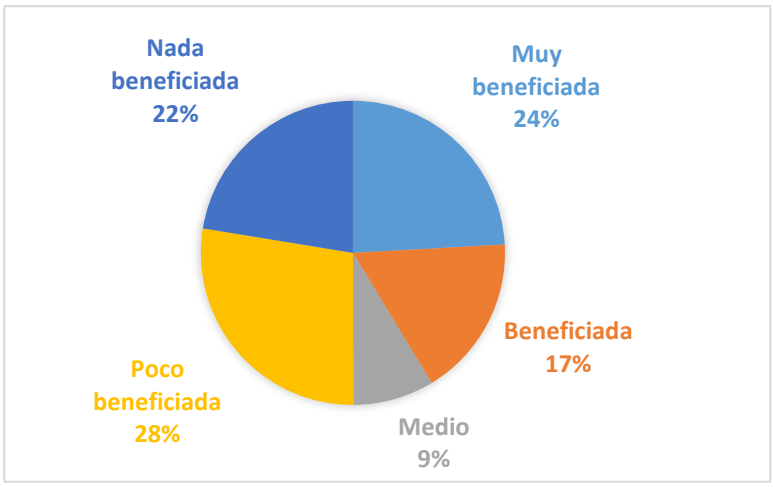
Figura 1. Beneficio del uso de las TIC en el área de contabilidad.



Fuente: Elaboración propia.

It can be seen in Figure 2, meanwhile, that SMEs consider that they are greatly benefited by the use of ICT in the area of Marketing only by 24%, while they consider that no benefit is obtained in this area in a 22%

Figura 2. Beneficio del uso de las TIC en el área de mercadotecnia.



Fuente: Elaboración propia.

With regard to the area of Human Resources, Figure 3 shows that SMEs in 14% feel very benefited by the use of ICT and in 23% consider that nothing supports them.

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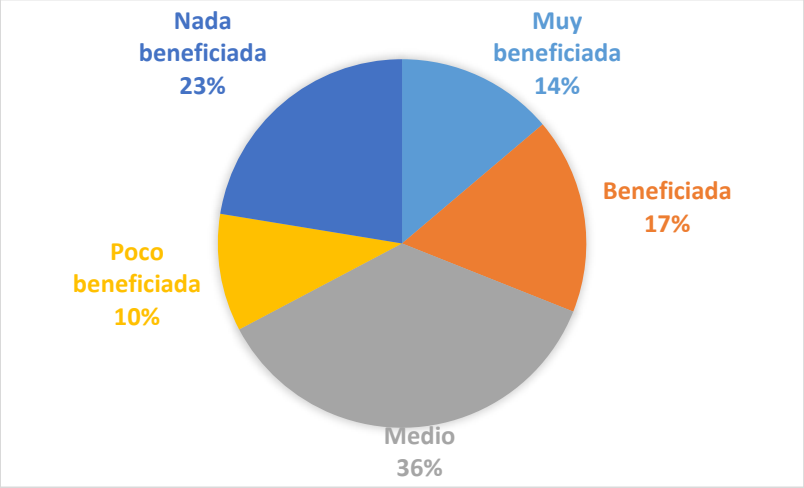
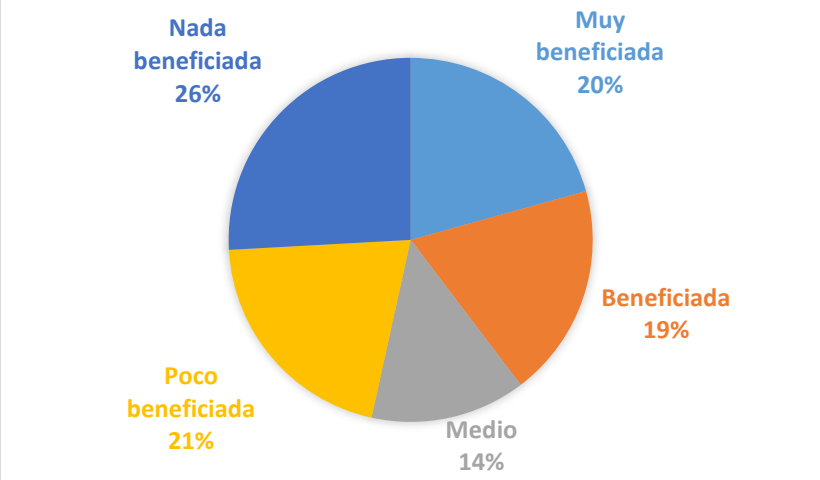
Figura 3. Beneficio del uso de las TIC en el área de recursos humanos.



Fuente: Elaboración propia

Regarding the use of ICT in the area of Finance, Figure 4 shows that SMEs in 20% feel with many benefits and 26% with none.

Figura 4. Beneficio del uso de las TIC en el área de finanzas.



Fuente: Elaboración propia

And in the Production area, figure 5 shows that SMEs consider that the use of ICTs is very beneficial for them in 17% and 21% consider that their implementation does not support them at all.

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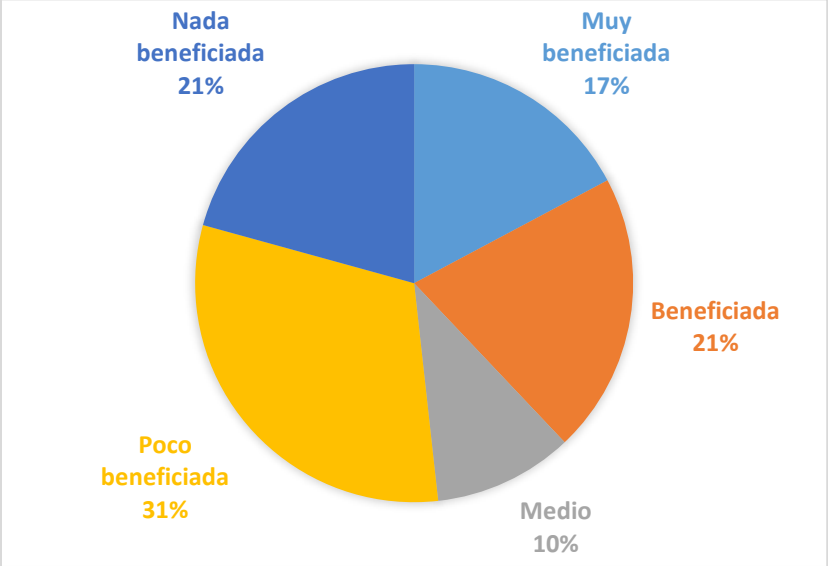
Figura 5. Beneficio del uso de las TIC en el área de producción.



Fuente: Elaboración propia

5. Conclusions

The investigation yielded important results in light of the instruments applied. A study was carried out that tries to characterize the appreciation that ICT users have in SMEs, and thus, as already mentioned, to be able to determine areas of opportunity that can contribute to improve the results in companies and support the increase of their competitiveness The results show that SMEs have a high percentage of ICT devices and resources, but the benefits of using these technologies are not being considered high impact.

SMEs in the services sector studied were 74% of business support activities and professionals, scientists and technicians; in 62.1% they are up to 10 years old, and the rest more than 10 years old. Because of this, they can be considered as mature companies in the sector where they work.

Between 91% and 96% have a computer, Internet and fixed telephony; 79% with email; 77% with mobile telephony and 31% with electronic tablets, which shows that they do have devices and resources.

Regarding the information regarding the use of ICT, it can be seen that 43.1% of companies have up to 4 computers, although, on the other hand, 32.8% have 10 or more. In 75.9% of companies, 34% or more of the staff uses computers in their work routine. All this points to the fact that, although they have computers, not all routine activities are carried out on them, so it is necessary to evaluate if daily activities could be expedited with the use of ICT.

In the analysis of the use of ICT and the benefits it provides in the main areas, it was observed that it is considered with greater importance and benefits in the area of Accounting, followed by Marketing, Human Resources, Finance and finally in the production area. No degrees of high or low importance are observed. Which leads to consider that the benefits in the use of ICTs are reflected between 56% and 69% of favorable appreciation by the users of SMEs.

It can be concluded that the adoption and use of new technologies in SMEs is beginning to be appreciated by users in companies. However, it should not be seen only as a commitment in the development of the company, but as a tool that improves their competitiveness.

The importance of the management of information and knowledge in SMEs, with the help of ICT, leads to carry out future research through a study that aims to determine and measure the causes that originate the one that is not being perceived and obtaining a greater benefit at the time of its implementation.

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