Revista Iberoamericana para la Investigación y el Desarrollo Educativo
ISSN 2007 - 7467

https://doi.org/10.23913/ride.v15i30.2270

Artículos científicos

Desigualdad tecnológica en las Mipymes: un diagnóstico desde la ciudad de México

Technological Inequality in MSMEs: a diagnosis from Mexico City

Desigualdade tecnológica nas MPMEs: um diagnóstico da Cidade do México

Arturo González Torres
Tecnológico Nacional de México, México
cann.azteca13@gmail.com
https://orcid.org/0000-0002-3337-7600

María Luisa Pereira Hernández
Universidad Pedagógica del Estado de Sinaloa, México
pereirahdz@hotmail.com
https://orcid.org/0000-0002-4748-539

Claudia Carolina Lacruhy Enríquez
Tecnológico Nacional de México, México
claudiac.le@loscabos.tecnm.mx
https://orcid.org/0000-0003-4397-326X

Resumen

Este estudio se enfoca en evaluar el grado de adopción de las Tecnologías de la Información y Comunicación (TIC) en las micro, pequeñas y medianas empresas (Mipymes) de cuatro alcaldías de la Ciudad de México. A través de un enfoque mixto, que combina métodos cualitativos y cuantitativos, se identificó que la mayoría de las empresas analizadas se encuentran en etapas iniciales de digitalización, utilizando herramientas básicas como el correo electrónico y páginas web sencillas.

Sin embargo, se detectaron importantes barreras que limitan una mayor adopción de tecnologías digitales, entre las que destacan la falta de infraestructura adecuada, la escasez de capacitación en el uso de herramientas digitales y una cultura empresarial poco orientada hacia la innovación tecnológica.

Los hallazgos de esta investigación subrayan la necesidad de implementar políticas públicas y programas específicos para apoyar a las Mipymes en su proceso de transformación digital. Las recomendaciones incluyen desarrollar competencias digitales, facilitar el acceso a tecnologías y crear incentivos para la inversión en soluciones digitales.

Finalmente, este estudio facilita la comprensión de la situación actual de las Mipymes en términos de digitalización y proporciona información valiosa para diseñar estrategias que permitan reducir la brecha digital y fortalecer la competitividad de este sector empresarial en la Ciudad de México.

Palabras clave: TIC, Mipymes, diagnóstico, nivel de información, brecha digital.

Abstract

This study focuses on evaluating the degree of adoption of Information and Communication Technologies (ICT) in micro, small and medium-sized enterprises (MSMEs) in four boroughs of Mexico City. Through a mixed approach, combining qualitative and quantitative methods, it was identified that most of the companies analyzed are in the initial stages of digitization, using basic tools such as e-mail and simple web pages.

However, important barriers that limit a greater adoption of digital technologies were detected, among which stand out the lack of adequate infrastructure, the scarcity of training in the use of digital tools and a business culture poorly oriented towards technological innovation.

This research demonstrates a compelling need for public policies and tailored programs to support MSMEs in their digital transformation process. Recommendations include promoting digital literacy, facilitating access to technologies, and creating incentives for companies to invest in digital solutions.

Finally, this study facilitates the understanding of the current situation of MSMEs in terms of digitalization and provides valuable information to design strategies to reduce the digital divide and strengthen the competitiveness of this business sector in Mexico City.

Keywords: ICT, MSMEs, diagnosis, level of information, digital divide.

Revista Iberoamericana para la Investigación y el Desarrollo Educativo
ISSN 2007 - 7467

Resumo

Este estudo centra-se na avaliação do grau de adoção das Tecnologias de Informação e Comunicação (TIC) nas micro, pequenas e médias empresas (MPME) de quatro municípios da Cidade do México. Através de uma abordagem mista, combinando métodos qualitativos e quantitativos, identificou-se que a maioria das empresas analisadas se encontra nas fases iniciais da digitalização, utilizando ferramentas básicas como o correio eletrónico e páginas web simples.

No entanto, foram identificados obstáculos significativos a uma adoção mais ampla das tecnologias digitais, incluindo a falta de infra-estruturas adequadas, a escassez de formação na utilização de ferramentas digitais e uma cultura empresarial pouco orientada para a inovação tecnológica.

Os resultados desta investigação sublinham a necessidade de implementar políticas públicas e programas específicos para apoiar as MPME no seu processo de transformação digital. Entre as recomendações estão a promoção da literacia digital, a facilitação do acesso às tecnologias e a criação de incentivos para que as empresas invistam em soluções digitais.

Por último, este estudo facilita a compreensão da situação atual das MPME em termos de digitalização e fornece informações valiosas para a conceção de estratégias destinadas a reduzir a lacuna digital e a reforçar a competitividade deste sector empresarial na Cidade do México

Palavras-chave: TIC, MPME, diagnóstico, nível de informação, lacuna digital.

Date of Reception: September 2024 **Acceptance Date:** January 2025

Introduction

Companies produce goods or services and maintain commercial relations with various clients. Therefore, they must constantly improve their logistics to adapt to global technological changes.

The emergence of Information and Communication Technologies (ICT) has triggered a profound transformation in the business world. These tools, ranging from computers to intricate digital networks, have redefined the way organizations manage, process and distribute information. Beyond simple instruments, ICTs have become catalysts for change, driving innovation and shaping new business models.

Nowadays, companies are faced with constant technological change, so it is important to create new strategies that help organizations to be more efficient with optimal processes. It should be noted that the correct application of ICT can generate a great competitive advantage for organizations and in this way, other resources such as electronic commerce can be used.

The digital transformation of companies is based on the progressive integration of ICT. These tools, which range from personal computers to intricate computer networks, have transcended their traditional role as simple work instruments to become catalysts for innovation and organizational efficiency. By facilitating the flow of information and connectivity, ICT has redefined internal processes and customer relationships, driving a new era of competitiveness.

This research focuses on analyzing the application of Information and Communication Technologies (ICT) in SMEs in Mexico City.

Problem statement

This study focuses on the technological inequality faced by Micro, Small and Medium Enterprises (MSMEs) in Mexico City with respect to the adoption and effective use of Information and Communication Technologies (ICTs). Although ICTs have become catalysts for change and innovation in the business field, many MSMEs face significant obstacles to their implementation. These challenges include the lack of economic resources to invest in technology, lack of awareness of the opportunities offered by ICTs, the shortage of qualified personnel to handle specialized technological tools, and the absence of national strategies that promote digitalization in this sector. In addition, there is a digital divide that limits access to and use of these technologies, which can result in a competitive disadvantage for MSMEs compared to larger or technologically advanced companies. This study aims to diagnose the technological barriers faced by the SME sector in Mexico City and, based on this diagnosis, generate strategies to boost its digital development.

Study Questions

1. What is the current level of adoption and use of Information and Communication Technologies (ICT) in Micro, Small and Medium Enterprises (MSMEs) in Mexico City?
2. What factors influence the digital and technological gap between SMEs of different sizes and sectors in Mexico City?

Importance of research

The significance of this research lies in its focus on the category of MSMEs , whose importance has recently increased at local, national and international levels, especially given the growing number of these companies and the challenges they face in terms of social interaction, communication and repetitive behaviors. The study gains relevance by addressing the technological gap in a crucial sector for the economy, offering a detailed diagnosis of the level of adoption and use of ICTs in MSMEs in Mexico City. This information is vital to design effective strategies that favor the innovation and expansion of these companies in the digital market. In addition, the research contributes to the existing literature on digital transformation in the business field, providing updated data specific to the Mexican context. The results can serve as a basis for the formulation of public policies and support programs that address the specific technological needs of MSMEs , thus promoting their development and sustainability in an increasingly digitalized environment. Ultimately, this study can have a significant impact on reducing technological inequality and strengthening the business fabric of Mexico City.

Limitations of the study

The limitations of the study focus mainly on its geographic and sample scope. The research was limited to four municipalities in Mexico City (Milpa Alta, Cuauhtémoc, Iztapalapa, and Xochimilco), which might not be fully representative of the situation throughout Mexico City. In addition, the final sample of 30 MSMEs , although diverse, is relatively small considering the total universe of companies in these categories. The study was based on a self-diagnosis, which could introduce biases in the responses due to the self-assessment of the participants.

Background

2.1 Definitions of ICT

The Organization for Economic Cooperation and Development (OECD) (2002) defines ICT as systems that capture and transmit automated information data and that help the development and economic growth of companies. Rosario (2005) calls ICT the group of technologies that allow the acquisition, production, processing, and presentation of information in the form of voice, images and data, where ICT includes electronics as a technology that supports the development of telecommunications, information technology and audiovisuals.

2.2 Characteristics of ICT and business ICT

Cabero (1996) raises characteristics of various authors who present the same to ICTs, which are: Immateriality. Interactivity. Interconnection. Instantaneousness. Gros (2008) manifests a characteristic of ICTs, which is the influence of processes on products, where it is seen that it affects the processes more than the products, allowing for greater development of the processes involved in obtaining said results.

Davenport et al. (2017) state that current studies and trends, both in theoretical and empirical models, have shown that excellent knowledge management in combination with new information and communication technologies (ICT), have allowed companies to obtain organizational, economic and financial benefits.

Kotelnikov (2007) mentions that companies that incorporate these technologies in their production processes achieve reductions in inventory management costs, production costs, and costs associated with quality, among others. In the particular case of companies, the works point to problems related to the lack of human resources with knowledge of specialized production tools, budgetary limitations for attracting and retaining qualified personnel, and a lack of implementation of changes in the organization and management of MSMEs (Tello, 2008; Cepal, 2013).

2.3 Characteristics of business ICT

According to Porter and Millar (1986), they deduce that information technologies can modify the structure of many sectors, promoting the need and the possibility of a change. Peirano and Suarez (2004) declare that the incorporation of ICT in the business field is a complex process since it involves activities that present different and unique forms of change. Pérez and Dressler (2007) describe that the development of ICT has allowed the appearance of computer tools with new modalities that help the training and development of individuals

in companies. Segovia et al. (2013) indicate that ICT is a tool that leads a company to be more innovative, which is willing to change, which makes it find new opportunities in the market and become competitive before other organizations.

2.4 National and international studies

In international studies, Vera et al. (2011) mention that small and medium-sized companies with smaller budgets can use traditional traditional marketing instruments together with digital marketing tools as a medium and long-term advertising strategy. Thus, Fonseca (2013) reveals that only 29% of business owners know what ICT means, 60% have a website, 53% of employees are not trained in the use of ICT and only 19% of business owners know of programs focused on the incorporation of ICT, according to data obtained from a study conducted in 65 Colombian companies in the department of Boyacá. Saavedra and Tapia (2013) point out that Mexico occupies the 78th place in the network availability index, while, for example, China occupies the 37th place and Brazil 61st. This lag is reflected in the poor regulation of this sector and infrastructure, the low quality of education in mathematics and science and research (place 65), which, together with the high costs of access to ICT, translates into a lack of individual preparation levels (place 109).

For their part, Rodríguez et al. (2014) analyze the implementation of affiliate marketing in Spanish travel agencies, determining that this process is gradual due to the lack of technology, sufficient knowledge, business plans and adequate databases, with ICT being an important element to promote this type of marketing in the tourism sector. Tricoci , Corral, and Rosenthal (2016) state that 50% of companies have participation in social networks, this increases their competitiveness by 60%, they also indicate that 79% that invest in ICT are large companies, highlighting that investment and available economic resources are essential for the use, training and improvements of these technologies. Vargas (2021) mentions that the problem of incorporating technologies into the business models of MSMEs in Latin America can be observed especially in micro-enterprises, and is the lack of investable economic resources in the technological field.

At the national level, Guzmán (2008) states that ICT is a term currently used to refer to a wide range of services, applications, and technologies, which use various types of equipment and computer programs, and are often transmitted through telecommunications networks. Maldonado et al. (2010) analyzed the influence that ICT has on the performance of MSMEs in 400 companies in Aguascalientes, indicating that they have a positive and significant influence on the rational performance of efficiency and productivity, however,

with less impact on human relations, flexibility and development of human resources. According to Saavedra and Tapia (2013), in Mexico MSMEs give little importance to ICT mainly due to 6 factors: economic factors, the digital divide, motivation, lack of knowledge of opportunities, lack of national strategies and level of integration in production chains.

Montejano et al. (2018) investigate the effects of information technologies on innovation principles by applying a survey to 149 entrepreneurs in Aguascalientes. The results obtained reflect a strong relationship between ICT and innovation since 13.4% use ICT in all operations, 50% use IT to apply innovation principles and 96.4% have computers. According to Aguirre (2018), knowledge is a determining factor in the adoption, creation and improvement of technologies, according to the results obtained from a survey conducted electronically to 35 MSMEs. from the state of Sonora. For this reason, training and updating human resources is important; innovative culture influences the decision-making capacity and initiative to innovate.

According to Buenrostro and Hernández (2019), information on the use of ICT in Mexico is very scarce and is limited to indicators related to infrastructure and equipment, without considering more complex elements related to its incorporation into the management and production of the different economic sectors. This limits entrepreneurs from developing a good strategy to become a company with a large commercial market. From the point of view of Alarcón and Ruíz (2020), they infer that technological progress in multinational companies (MNCs) in northwestern Mexico is limited, since they hire middle and qualified personnel for abstract tasks, they have a pattern of behavior that reduces technological content, they insert personnel into manual activities, but they are not promoted to higher positions.

Methodology

Research design

The research is qualitative and quantitative based on Hernández and Mendoza (2018), with an exploratory, descriptive scope. Exploratory research according to Muñoz (2011) the smaller-scale study allows local understanding of the phenomenon under study. Descriptive research according to Díaz and Calzadilla, (2016) collects information independently or jointly on the research variables.

It is an intrinsic case study according to Creswell and Creswell (2018), reflecting the panorama of the inclusion of ICT in small and medium-sized companies in four municipalities of Mexico City.

Participants

The study area was delimited to Mexico City in the municipalities of Milpa Alta, Cuauhtémoc, and Xochimilco, the business landscape is divided into various sectors, with MSMEs constituting the majority and organized as follows (Table 1.

The sample was made up of experts, with the following selection criteria: 1. Companies located in the previously mentioned municipalities, 2. They are part of the Directory of Economic Units of the National Institute of Statistics and Geography (INEGI) (2024), 3. Interest in participating in the study. Derived from the above, the case study was integrated with 30 MSMEs .

Table 1. Distribution of the study population.

Town hall	Small (11 to 50 workers)	Medium (31 to 250 workers)	Total
High Milpa	220	30	250
Cuauhtémoc	5503	1235	6738
Iztapalapa	2567	741	3308
Xochimilco	619	129	748
Total	8909	2135	11044

Source: DENUE (2024).

Instrument

The questionnaire was designed with 40 questions composed of two sections, the first included the company profile with demographic data: company name, number of employees, line of business, size and municipality of origin.

The second section was a self-diagnosis adapted from the guide of the Society for the Promotion and Industrial Reconversion SA (2004).

Table 2. Structure of self-diagnosis.

Diagnostics	Number of reagents	Likert scale
ICT availability and infrastructure	12	Dichotomous
Degree of preparation for the use of these technologies	7	Dichotomous
to analyze how ICT is used in the relationships that the company maintains with its environment	40	1-4 points will be at the office automation level. 4-14 points belong to the information level, 15-25 points are in the interaction phase. 26-33 points belong to transaction. 34-40 are in digitalization

Source: Society for the Promotion and Industrial Reconversion SA (2004).

Procedure

The research procedure was carried out in six stages:

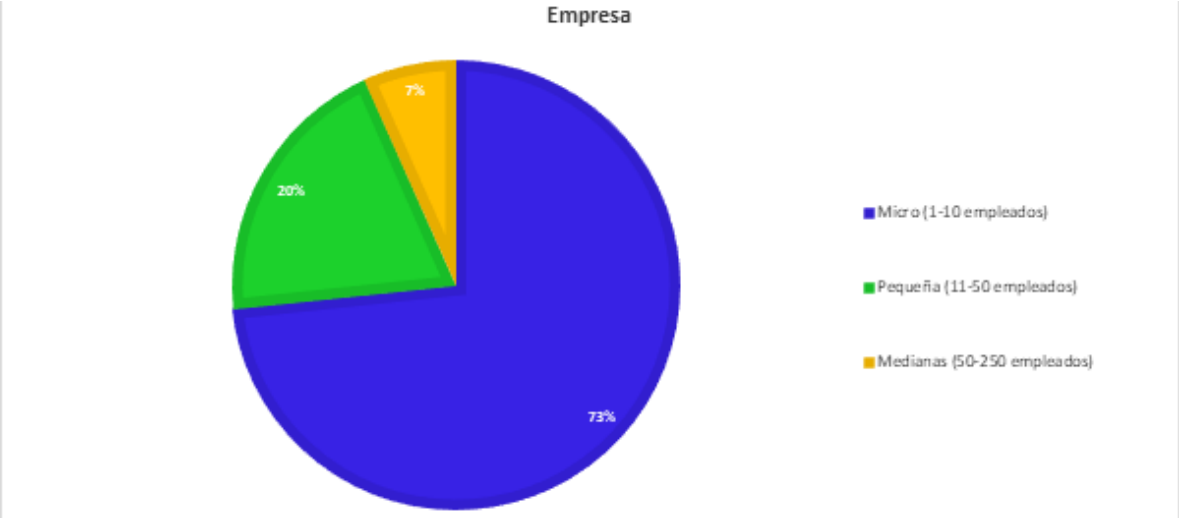
- The problem statement and the research objective have been established based on the phenomenon study variable.
- Second, an exhaustive analysis of the scientific literature available in open access repositories from 2002 to 2024 was carried out, to understand the context of the object of study.
- Third, the collection instrument was designed, indicating the data of the profile of the object of study, subsequently, the guide of the Society for the Promotion and Industrial Reconversion, SA (2004), was selected for the adaptation of self-diagnosis.
- Fourth, the population and sample of the case study were determined for the application of the questionnaire in Google Forms.
- Fifth, the data were analyzed with SPSS Version 25, with descriptive statistics, for the discussion of the results.

- In the sixth stage the authors reflected on the conclusions, limitations and future lines of research.

Results

This research is merely descriptive since the author of the data collection instrument discloses the category of the results in which he states that depending on the score obtained, it can be known how much the companies know about business ICT, therefore, according to the information obtained with our data collection instrument, the qualitative results can be interpreted as follows, considering that our 100% consists of 30 companies.

Figure 1. Company size.



Source: Own elaboration (2024).

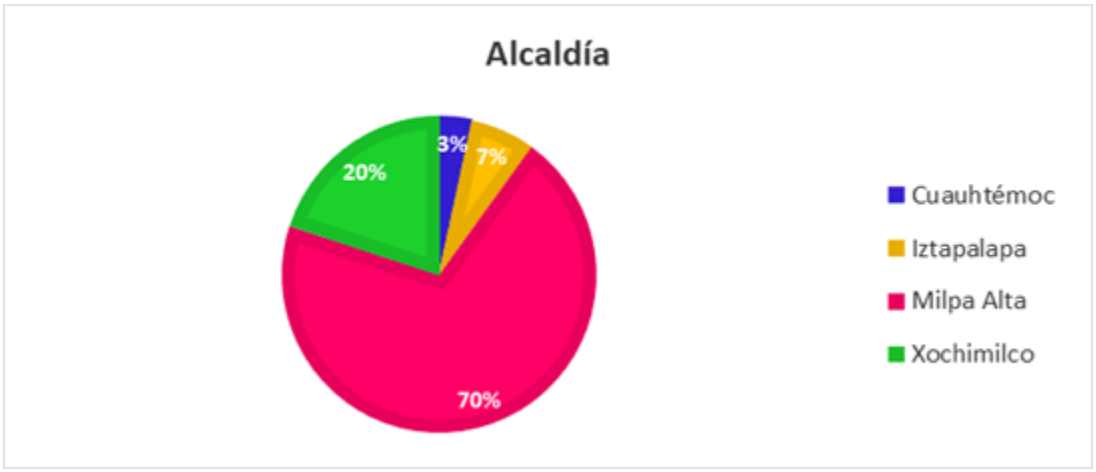
According to the figure, it can be seen that 73% of the surveyed companies claim to be micro-enterprises, while 20% claim to be small companies, and finally, 7% belong to medium-sized companies.

Figure 2. Results of the companies' turnover.

Source: Own elaboration (2024).

90% of the companies surveyed are commercial, 7% claim to be a service company, while the other 3% are industrial.

Figure 3. Distribution of companies by municipality.



Source: Own elaboration (2024).

It is shown that the municipality with the highest prevalence was Milpa Alta with 70% and Xochimilco with 20% while Iztapalapa covers 7% and, finally, the Cuauhtémoc municipality obtained 3%.

To assess the reliability of the responses, the Cronbach's alpha parameter was used, as indicated by Kerlinger and Lee (2000). The result coincides with that recommended by researchers Hoyt et al. (2006), who indicate that if the value is greater than 0.7, this can be interpreted as an acceptable value.

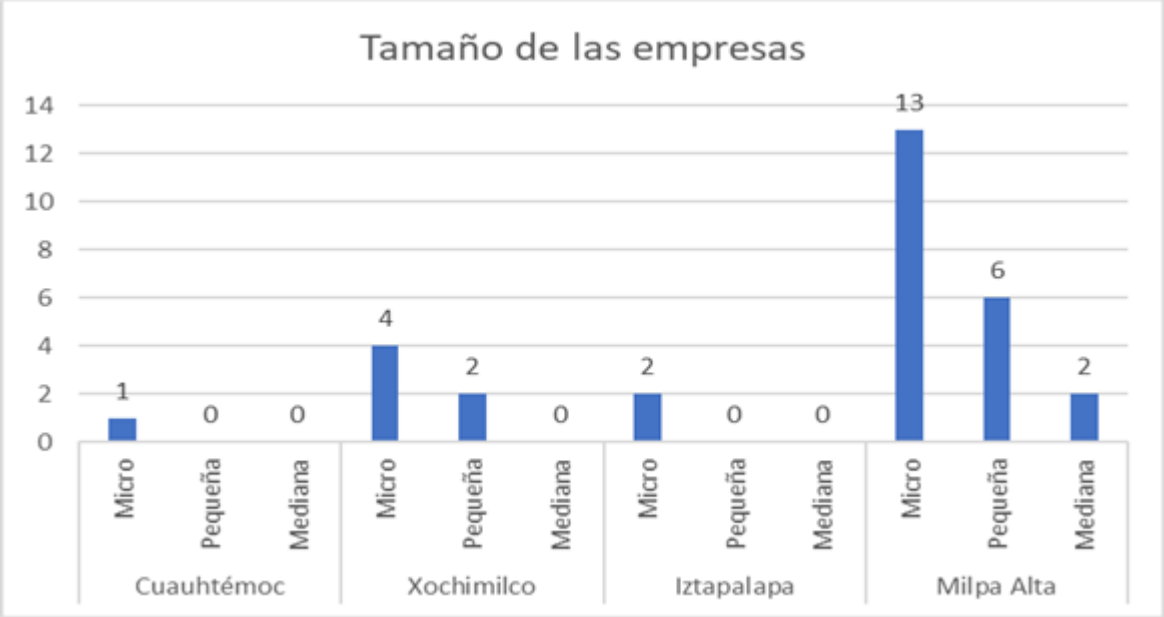
Table 3 . Reliability statistics .

Cronbach's alpha	N of elements
.764	40

Source: Own elaboration (2024).

Figure 4 represents the distribution of company size for the different mayorships that were used for the applicability of this study.

Figure 4. Firm size by location.

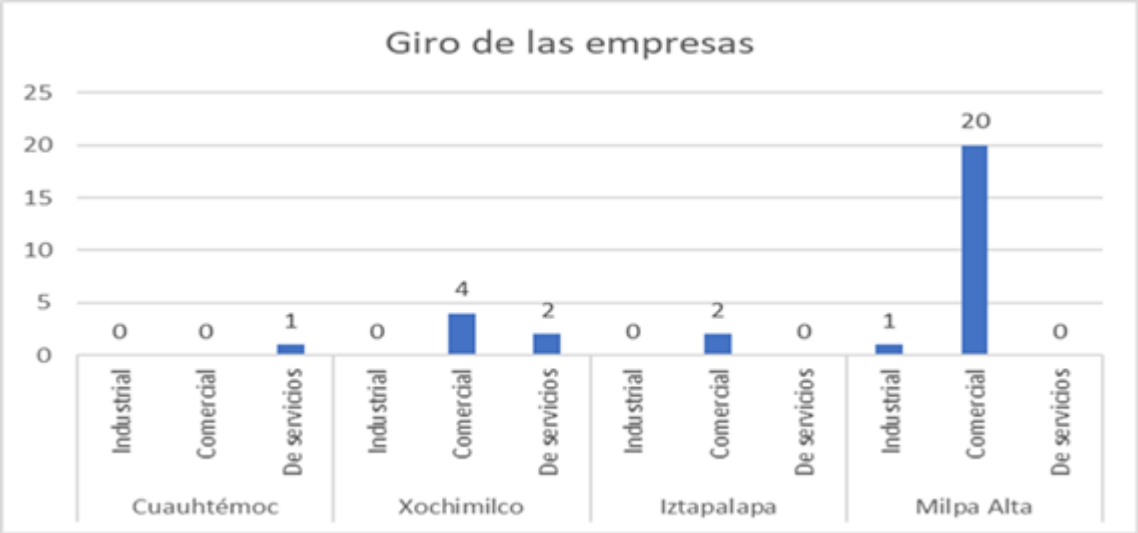


Source: Own elaboration (2024).

As can be seen in the figure above, the municipality that obtained the highest number of companies called Micro was Milpa Alta, for the medium size it was Xochimilco and for the small size it was Milpa Alta.

Figure 5 represents the business activity of the companies distributed in the municipalities participating in this research.

Figure 5. Location of companies in Mexico City.

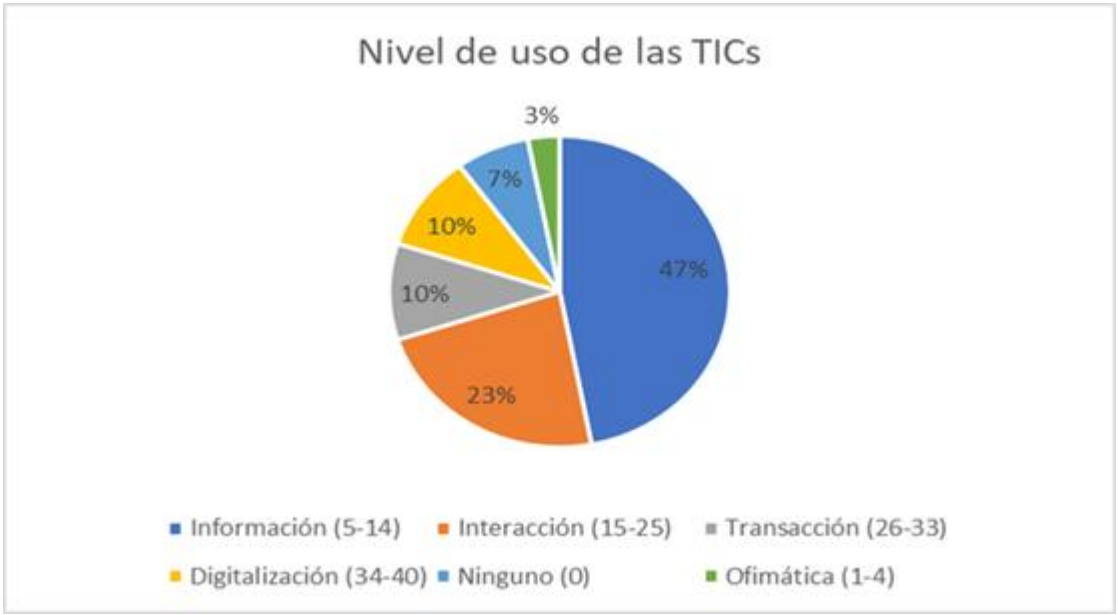


Source: Own elaboration (2024).

As can be seen in the figure above, the municipality that obtained the highest number of companies in the commercial sector was Milpa Alta, for the service sector it was Xochimilco and for the industrial sector it was Milpa Alta.

Figure 6 represents the level of use of ICT by companies distributed in the municipalities participating in this study.

Figure 6. Level of use of ICT.



Source: Own elaboration (2024).

In the figure above, it can be observed that the information level is the most prominent, followed by the interaction level, then the transaction and digitalization levels, then the office automation level and none.

Discussion

According to the research called: Evaluation of digital skills in SMEs , they are just beginning to know the advantages that new technologies bring and what these can contribute to their organization by facilitating the obtaining of information to make the company and its products known. It is worth mentioning that according to Gimeno (2010) ICTs have competitive advantages that make companies sustainable by helping to reduce their costs, increasing their advertising and therefore their sales, it must also be taken into account that investing in ICTs does not always have immediate repercussions on the competitiveness of the company, but it does result in important opportunities in the market. Therefore it is important that companies begin to have a deeper knowledge in the use of these new technologies.

According to Rocha and Echavarría (2017), excellent organizations are not those that have the most advanced or sophisticated technology, but those that know how to take advantage of their innovative practices , highlighting the implementation of new ways of doing things. The above can be verified with this study because, as already mentioned, companies are just beginning to have information about the advantages that ICT can bring and although knowledge is barely vast, the proper use of what is known can lead to great things.

Conclusions

The most frequent levels are information and interaction, with these two levels accounting for 70% of the companies surveyed. This means that companies use email to communicate and the Internet to make themselves known. However, the information systems have not yet been integrated with each other, so they process it manually to a certain extent.

The following points are highlighted according to the interpretation of the guide used:

The level of information reached 47%, which means that organizations are beginning to understand the advantages of ICT, incorporating email and the Internet as a channel to publicize their products, the company and obtain information.

The level of interaction was reached by 23% of the companies surveyed. Organizations use ICT and mainly the Internet to exchange information and establish a dialogue with customers, suppliers, etc.

The transaction level reached 10%, which is why companies are beginning to carry out economic transactions (purchase and sale) with customers and suppliers via the Internet.

The level of digitalization reached 10%, which organizations begin to integrate from all operations in the value chain (purchase-after-sales), the company is integrated and collaborates with external agents (customers-suppliers).

The level of office automation covered 3%, which shows that companies use traditional ICT (telephone and fax) in communication with clients, suppliers, public administration, etc.

Contributions to future lines of research

It is suggested that specialized and accessible training programs be developed for MSMEs , with the objective of helping them understand the benefits of ICTs and acquire the necessary skills to use them effectively. Likewise, to encourage investment in technology, the implementation of public policies that include subsidies, tax benefits and the creation of collaborative platforms where MSMEs can share experiences and resources is proposed. Finally, it is recommended that technological solutions be adapted to the specific needs of Mexican MSMEs , promoting collaboration between universities and companies to develop local software and applications.

References

Aguirre Choix, R. (2018). La influencia de la adopción de tecnologías de información en la capacidad de innovación desde la perspectiva del recurso humano en las Mipymes de software en Sonora, México. *Investigación administrativa, 47*(122), 1-18. https://doi.org/10.35426/IAv47n122.03

Alarcón Osuna, M. A., y Ruiz Porras, A. (2020). Cambio Tecnológico en Corporaciones Multinacionales del Noroeste de México (2005-2017). *Nova scientia, 12*(24), 1-36. https://doi.org/10.21640/ns.v12i24.2045

Buenrostro Mercado, H. E., y Hernández Eguiarte, M. del C. (2019). La incorporación de las TIC en las empresas. Factores de la brecha digital en las Mipymes de Aguascalientes. *Economía: teoría y práctica*, (50), 101-124. https://doi.org/10.24275/etypuam/ne/502019/buenrostro

Cabero Almenara, J. (2006). Nuevas tecnologías, comunicación y educación. *Revista Electrónica De Tecnología Educativa (Edutec),* (1), 1-12. https://doi.org/10.21556/edutec.1996.1.576

Creswell, J. W., y Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications. https://spada.uns.ac.id/pluginfile.php/510378/mod_resource/content/1/creswell.pdf

Davenport, T. H., Thomas, R. J., y Cantrell, S. (2002). The mysterious art and Science of knowledge-worker performance. *MIT Sloan Management Review, 44*(1), 23-30. https://acortar.link/hNzE2J

Díaz-Narváez, V. P., y Calzadilla Núñez, A. (2016). Artículos científicos, tipos de investigación y productividad científica en las Ciencias de la Salud. *Revista Ciencias de la Salud*, 14(1), 115-121. https://www.redalyc.org/pdf/562/56243931011.pdf

Fonseca Pinto, D. E. (2013). Desarrollo e implementación de las TICS en las PYMES de Boyacá – Colombia. *Revista FAEDPYME International Review - FIR, 2*(4), 49–59. https://acortar.link/6aRadl

Gimeno, V. A. (2010). *La influencia de las nuevas tecnologías de la información y las comunicaciones y su repercusión en las estrategias empresariales: la banca online y su aplicación en las cooperativas de crédito* (Tesis doctoral, Universitat de València). Repositorio de la Universitat de València. https://acortar.link/KGPhZ5

Gros, B. (2008). *Aprendizajes, conexiones y artefactos*. Gedisa.

Guzmán Flores, T. (2008). *Las Tecnologías de la Información y la Comunicación en la Universidad Autónoma de Querétaro: Propuesta Estratégica para su integración* (Tesis doctoral, Universitat Rovira I Virgili). Repopsitorio de la Universitat Rovira I Virgili. https://www.tdx.cat/handle/10803/8937#page=1

Hernández-Sampieri, R., y Mendoza, C (2018). *Metodología de la investigación. Las rutas cuantitativa, cualitativa y mixta*, Ciudad de México, México: Editorial Mc Graw Hill Education, Año de edición: 2018, ISBN: 978-1-4562-6096-5, 714 p.

Hoyt, W. T., Warbasse, R. E., y Chu, E. Y. (2006). Construct Validation in Counseling Psychology Research. *The Counseling Psychologist, 34*(6), 769-805. https://doi.org/10.1177/0011000006287389

Instituto Nacional de Estadística y Geografía (INEGI) (2024). *Directorio de Unidades Económicas*. Instituto Nacional de Estadística y Geografía. https://www.inegi.org.mx/app/mapa/denue/default.aspx

Kerlinger, F. N., y Lee, H. B. (2000). *Investigación del comportamiento: Métodos de investigación en ciencias sociales* (4ª ed.). McGraw-Hill. https://padron.entretemas.com.ve/INICC2018-2/lecturas/u2/kerlinger-investigacion.pdf

Kotelnikov, V. (2007). *Small and Medium Enterprises and ICT*. United Nations Development Programme – Asia-Pacific Development Information Programme (UNDP-APDIP) and Asian and Pacific Training Centre for Information and Communication Technology for Development (APCICT). https://acortar.link/knA4P7

Maldonado Guzmán, G., Martínez Serna, M. del C., García Pérez de Lema, D., Aguilera Enríquez, L., y González Adame, M. (2012). La influencia de las TICs en el rendimiento de la PyME de Aguascalientes. *Investigación y Ciencia*, (55), 24-32. https://revistas.uaa.mx/index.php/investycien/article/view/4052

Montejano García, S., López Torres, G. C., Campos García, R. M., y Pérez Ramos, M. de J. (2018). Tecnologías de la información e influencia en la aplicación de los principios de innovación. *Mercados Y Negocios*, (37), 49–76. https://doi.org/10.32870/myn.v0i37.7120

OCDE (Organisation for Economic Co-operation and Development) (2002). *Reviewing the ICT sector definition: Issues for discusión. Organisation for Economic Co-operation*

and Development. Organisation for Economic Co-operation and Development. http://www.oecd.org/dataoecd/3/8/20627293.pdf

Peirano, F., y Suarez, D. (2004). *Estrategias empresariales de uso y aprovechamiento de las TICs por parte de las PyMEs de Argentina en 2004*. Documento presentado en el 33 JAIIO. In Simposio sobre la Sociedad de la Información, Córdoba, Argentina [consultado 15 julio del 2024]. https://acortar.link/GpS4JV

Pérez, D., y Dressler, M. (2007). Tecnologías de la información para la gestión del conocimiento. *Intangible Capital, 3*(15). 31-59. https://acortar.link/4QqZ12

Porter, M. E., y Millar, V. E. (1986). Cómo obtener ventajas competitivas mediante la información. *Harvard-Deusto Business Review*, (25), 3-20. https://acortar.link/MQdjT4

Rocha Velandia, J. T., y Echavarría Suarez, S. (2017). *Importancia de las T.I.C.s en el ambiente empresarial. Administración de Empresas*, Universidad de La Salle. https://acortar.link/5YzQdx

Rodríguez Vázquez, C., Martínez Fernández, V. A., Juanatey Boga, O., y Rodríguez Fernández, M. (2014). El marketing de afiliación como herramienta de comunicación y gestión de las agencias de viaje en el mercado virtual. Estudio del caso español. *Estudios y Perspectivas en Turismo, 23*(1), 60-80. https://acortar.link/lwsiM5

Rosario, J. (2005). La Tecnología de la Información y la Comunicación (TIC). Su uso como herramienta para el fortalecimiento y el desarrollo de la educación virtual. Observatorio para la CiberSociedad. https://www.academia.edu/21575589/

Saavedra García, M. L., y Tapia Sánchez, B. (2013). El uso de las tecnologías de información y comunicación TIC en las micro, pequeñas y medianas empresas (MIPyME) industriales mexicanas. Enl@ce: *Revista Venezolana de Información, Tecnología y Conocimiento*, *10*(1), 85-104. https://produccioncientificaluz.org/index.php/enlace/article/view/13727

Segovia Hernández, J. G., Ortiz Hernández, R. M., y Uribe Ramírez, A. R. (2013). Innovación y conocimiento tecnológico en la sociedad del siglo XXI: La revolución de las TIC's. *Derecom: Revista Internacional de Derecho de la Comunicación y las Nuevas Tecnologías*, *(13)*, marzo-mayo. https://dialnet.unirioja.es/servlet/articulo?codigo=4330430

Sociedad para la Promoción y Reconversión Industrial, S.A. (2004). *Guía de Autodiagnóstico para Pymes en la utilización de las TIC*. Sociedad para la Promoción y Reconversión IndustriaL, S. A. de C.V. https://acortar.link/rv5Cuo

Tello Leal, E. (2007). Las tecnologías de la información y comunicaciones (TIC) y la brecha digital: su impacto en la sociedad de México. *Universities and Knowledge Society Journal (RUSC)*, *4*(2), 1-8. http://dx.doi.org/10.7238/rusc.v4i2.305

Vargas Sánchez, J. C. (2021). *La brecha y el desarrollo digital de las Pymes en Latinoamérica* [Trabajo académico, Universidad Militar Nueva Granada]. Repositorio de la Universidad Militar Nueva Granada. https://acortar.link/wgfysx

Vera-Colina, M. A., Rodríguez-Medina, G., y Melgarejo-Molina, Z. (2011). Financial planning and access to financing in small and medium-sized companies in the Venezuelan manufacturing sector. *Innovar*, *21*(42). https://revistas.unal.edu.co/index.php/innovar/article/view/35459

Contribution Role	Author(s)
Conceptualization	Arturo Gonzalez Torres
Methodology	Arturo Gonzalez Torres, Maria Luisa Pereira Hernandez
Software	Arturo Gonzalez Torres
Validation	Maria Luisa Pereira Hernandez, Arturo Gonzalez Torres
Formal Analysis	Claudia Carolina Lacruhy Enriquez, Arturo Gonzalez Torres
Investigation	Arturo Gonzalez Torres, Maria Luisa Pereira Hernandez
Resources	Arturo Gonzalez Torres, Claudia Carolina Lacruhy Enriquez
Data curation	Arturo Gonzalez Torres
Writing - Preparing the original draft	Arturo Gonzalez Torres, Maria Luisa Pereira Hernandez
Writing - Review and editing	Arturo Gonzalez Torres, Claudia Carolina Lacruhy Enriquez
Display	Maria Luisa Pereira Hernandez, Arturo Gonzalez Torres
Supervision	Arturo Gonzalez Torres, Maria Luisa Pereira Hernandez
Project Management	Claudia Carolina Lacruhy Enriquez, Arturo Gonzalez Torres
Acquisition of funds	Arturo Gonzalez Torres, Maria Luisa Pereira Hernandez