STATE OF THE USE OF ICT IN MEDIUM-SIZED ENTERPRISES OF THE COMMERCIAL AREA OF QUITO

Estado del uso de las TIC en las medianas empresas del área comercial de Quito

Estado do uso de TIC em empresas de médio porte na área comercial de Quito

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ABSTRACT

INTRODUCTION. The application of technology in business management has become a determining factor for businesses to be effective, efficient, innovative and competitive. **OBJECTIVE.** This study demonstrates the use of Information and Communication Technologies (ICT) in medium-sized enterprises (MEs) in the commercial sector of Quito that belong to the classifier G according to the International Standard Industrial Classification (ISIC). **METHOD.** Research is a non-experimental, transversal and descriptive scope design. A survey of 60 Enterprises registered a population of 722 in 2016. To analyze the state of the use of ICT, the indicators proposed by the Economic Commission for Latin America and the Caribbean through the Observatory for the Information Society in Latin America and the Caribbean (OISLAC) have been taken as reference. **RESULTS.** The results show that all medium-sized companies have access to the Internet, 90% have a presence on the web and 59% use ICT in their production processes. **DISCUSSION AND CONCLUSIONS.** The MEs are making bold inroads into the use of ICTs to strengthen their business activities. In addition, these companies are expanding the local coverage of their businesses and their presence on the web will allow them to apply new alternatives of global interaction with customers and suppliers.

Keywords: ICT indicators, Medium enterprises, OISLAC, information and communication technologies.

RESUMEN

INTRODUCCIÓN. La aplicación de la tecnología en la gestión empresarial se ha convertido en un factor determinante para que las empresas sean eficaces, eficientes, innovadoras y competitivas. **OBJETIVO.** Este estudio evidencia el uso de las Tecnologías de Información y Comunicación (TIC) en las medianas empresas (Mes) del área comercial de Quito y que pertenecen al clasificador G según la Clasificación Internacional Industrial Uniforme (CIIU).

MÉTODO. La investigación tiene un diseño no experimental, transversal y con alcance descriptivo. Se realizó una encuesta a 60 empresas de una población de 722 registradas hasta el año 2016. Para analizar el estado del uso de las TIC, se ha tomado como referencia los indicadores propuestos por la Comisión Económica para América Latina y el Caribe a través del Observatorio para la Sociedad de la Información en Latinoamérica y Caribe (OSILAC). **RESULTADOS.** Los resultados muestran que todas las medianas empresas tienen acceso al Internet, 90% tiene presencia en la web y 59% utilizan las TIC en sus procesos productivos. **DISCUSIÓN Y CONCLUSIONES.** Las MEs están incursionando en forma decidida en el uso de las TIC para fortalecer sus actividades empresariales. Además, estas empresas están ampliando la cobertura local de sus negocios y su presencia en la web les permitirá aplicar alternativas nuevas de interacción global con clientes y proveedores.

Palabras clave: Indicadores TIC, medianas empresas, OSILAC, tecnologías de información y comunicación.

RESUMO

INTRODUÇÃO. A aplicação da tecnologia na gestão empresarial tornou-se um fator determinante para que as empresas sejam eficientes, inovadoras e competitivas. **OBJECTIVO.** Este estudo evidencia o uso de Tecnologias de Informação e Comunicação (TIC) em empresas de médio porte do setor comercial de Quito e classifica o classificador G de acordo com a Classificação Industrial Internacional Uniforme (CIIU). **MÉTODO.** A pesquisa tem um desenho não experimental, transversal, com um escopo descritivo. Foi realizado um levantamento em 60 empresas de uma população de 722 cadastradas até 2016. Para analisar o estado de uso das TIC, os indicadores propostos pela Comissão Econômica para a América Latina e o Caribe por meio do Observatório da Sociedade da Informação na América Latina e no Caribe (OSIALC). **RESULTADOS.** Os resultados mostram que todas as empresas têm acesso à Internet, 90% têm presença na web e 59% usam TIC em seus processos de produção. **DISCUSSÃO E CONCLUSÕES.** Os MEs estão fazendo incursões ousadas no uso das TIC para fortalecer suas atividades comerciais. Além disso, essas empresas estão expandindo a cobertura local de seus negócios e sua presença na Web permitirá que eles apliquem novas alternativas de interação global com clientes e fornecedores.

Palavras-chave: Indicadores TIC, médias empresas, OSIALC, tecnologias de informação e comunicação.

INTRODUCTION

Since the late 80's, humanity driven by the development of the Internet, has had a set of social, cultural and economic changes, many of them largely determined by the development of Information and Communication Technologies (ICT), information society had arrived. ICT initiated the informational stage of globalization, understood as a way of social and especially economic development, which has been made possible through a profound technological innovation managed by ICT [1].

A form of disclosure of the extent of the state of information society in different areas has been the use of indicators, such as the Global Competitiveness Index (GCI).

This indicator measures the ability of a country to use its resources and institutions to be more productive. According to the GCI 2017-2018 report, Ecuador is in the position 97 of 147 economies around the world, below the average for Latin America and the Caribbean [2]. That is why strengthening regional and global competitiveness becomes a fundamental task from the perspective of the Ecuadorian industry. This requires boosting technological innovation processes, to transform today's businesses in smart business organizations [3], managing organizational knowledge by relying on one of the essential inputs for that changes: the ICT.

According to the Organization for Economic Cooperation and Development (OECD), ICT is the backbone of the digital economy and society. This source also states that these technologies have become a key driver of innovation, as they represent the majority (23%) of business expenditure on research and development in countries of the Organization [4], also states that 37% of all patent applications of its member countries are based on ICT. In 2015, ICT accounted for 4.5% of total value-added production in OECD countries, largely concentrated in services (80%). In late 2016, more than 70% of venture capital investments in the United States went to the ICT industry.

Referring to the subject matter of this investigation under Article 16 of the Regulations of the Organic Law of the national public procurement system, midsize enterprises (MEs) are the productive companies producing organizations with 50 to 159 workers, a sales value or annual gross income between one million one five million United States dollars (US $) and a volume of seven hundred thousand assets between one and four million dollars [5]. These parameters vary for the Superintendence of Companies, Securities and Insurances of Ecuador (SUPERCIAS for its acronym in Spanish for *Superintendencia de Compañias, Valores y Seguros*) as its reference for the MEs are between 50 to 199 have workers or income between US $ 1'000.001,00 and US $ 5'000.000,00 [6].

This study was executed to medium-sized companies in the commercial area of Quito. In addition, these companies belong to the economic sector G of the International Standard Industrial Classification (ISIC) and correspond to the activities of wholesale and retail trade; repair of motor vehicles and motorcycles [6].

Among the motivations to study the trade sector are those that reflect the importance of the Ecuadorian economy. So much so that, in the last survey on ICT conducted by the National Institute of Statistics and Census, 73.7% of Enterprises in the commercial sector invest in ICT, followed by industries such as mining, manufacturing and services. Additionally, in terms of amounts of investment, trade is the third sector that invests in ICT after others such as services and manufacturing [7].

To determine the status of use of ICT in MEs, in this research we worked with key indicators on ICT use in enterprises. These indicators have been proposed by the Observatory for the Information Society in Latin America and the Caribbean (OISLAC) [8]. The set of 12 evaluated indicators shown in table 1.

Table 1. ICT´s indicators for businesses

Indicator	Description
B1	Enterprises using computers.
B2	Employees who regularly use (once a week) computers.
B3	Enterprises that use Internet.
B4	Employees who use the Internet regularly.
B5	Enterprises with web presence.
B6	Enterprises with Intranet.
B7	Businesses receiving orders over the Internet.
B8	Enterprises placing orders over the Internet.
B9	Enterprises using the Internet by type of access. • Narrowband. • Broadband (greater than 256 kbps) fixed. • Mobile bandwidth.
B10	Enterprises with Local Area Network (LAN)
B11	Enterprises with extranet
B12	Enterprises using the Internet by type of activity. 1. Sending or receiving an email. 2. Using Internet phone calls and video conferences. 3. Using instant messaging or discussion spaces. 4. Information of goods and services. 5. Information from government organizations. 6. Interaction with government organizations. 7. Electronic banking. 8. Access to other financial services. 9. Providing services to clients. 10. Selling products online. 11. Internal or external recruitment. 12. Staff training.

Source:[8]

Key. Indicator: OISLAC indicator. Description: meaning of the indicator.

METHOD

Scope of research and participants

This study focuses on medium-sized companies in the commercial area in Quito - Ecuador and the ones belonging to classifier G of the ISIC. This classifier is related to the companies dedicated to the trade of products. These companies are registered by

the SUPERCIAS [9]. As of May 2016, 722 MEs of classifier G were registered; this information was used to define the study population.

Design of the investigation

This research is quantitative, non-experimental and transversal. A survey is used as a data collection technique. This survey was applied to the active medium-sized companies belonging to the classifier G of the ISIC that have their residence in Quito and have at least five years of operation.

Population and Sample

The sample size is the portion of the population that is chosen, on which the necessary data is acquired for the development of research [10]. To calculate the sample size proportional to a finite population sampling was used, because it existed as likely as medium-sized enterprises comply or not with the characteristics to be investigated. The sample size was determined with equation 1 [11].

$$n = \frac{Z^2 N p q}{E^2(N-1) + Z^2 p q}$$
Eq. 1

Where:

n = sample size

N = population size

E = sampling error

Z = confidence level

p = probability of success

q = probability of failure

The parameters for the calculation of the sample are N = 722, E = 10.2%, Z = 1.65, p = 0.5 y q = 0.5. The calculation of sample size for medium-sized Enterprises in the commercial sector of Quito city is detailed below.

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

$$n = \frac{(1,65)^2 * (722) * (0,5) * (0,5)}{(0,102)^2 * (722-1) + (1,65)^2 * (0,5) * (0,5)}$$

$$n = 60$$

Consequently, for a population of 722 medium enterprises in the commercial sector of Quito, with a confidence level of 90% and 10.2% error it is necessary to survey 60 medium-sized enterprises, all belonging to the classifier code G.

Ethical standards of investigation

This research required the participation of directors or managers of technology enterprises of the medium-sized companies, who were informed about the objectives of this research and agreed to participate in the survey.

Instruments and Techniques for Data Collection

The tool chosen for the collection of data was a survey addressed to directors or managers of technology companies, which was carried out digitally through the platform surveys of the National Polytechnic School (NPS) or by personally visiting the respondents in their work places.

The survey consisted of a questionnaire; the objective was to obtain information to calculate the indicators of ICT use proposed by OISLAC. The questionnaire had a set of 32 questions with dichotomous options or multiple answers.

In order to guarantee that the questionnaire meets the criteria of validity and reliability required for its application, the validation of the content was carried out according to expert judgment through the method of individual aggregates [12], [13]. This process involved expert teachers of the Faculty of Administrative Sciences NPS.

Data analysis techniques

Quantitative analysis of data collected from the survey was made using descriptive statistics through the NPS computing platform, which uses computer application processing software LimeSurvey as open source survey [14].

Procedure

The survey complied with the ethical research standards: informed consent, voluntary participation, confidentiality and no exposure to participants of the companies studied to physical or psychological risks. The questionnaires were sent by email through the Directorate of Information Management and Processes NPS, from 6 January 2017 until 17 March of the same year. Monitoring via telephone and face was conducted. Table 2 shows the distribution of the questionnaire application shown.

Table 2. Application forms of questionnaires

Method of applying the questionnaire	Number of questionnaires
Email	38
Visit to each company	22

Key. Method of applying the questionnaire: type of data collection. Number of questionnaires: total of surveys.

RESULTS

For displaying, the results have ICT indicators divided into four categories, as this facilitates analyze together some indicators. These are computers, access and connectivity forms of Internet access and Internet applications in business. The results of access and use of computers shown in table 3.

Table 3. Indicators of access and use of computers

Indicator	Description of indicator	Value
B1	MEs using computers	100%
B2	Employees who regularly use computers	83%

Key. Indicator: OISLAC indicator. Description of indicator: meaning of the indicator.

The MEs access to diverse types of networks for communication and exchange of information, access and connectivity indicators are shown in figure 1.
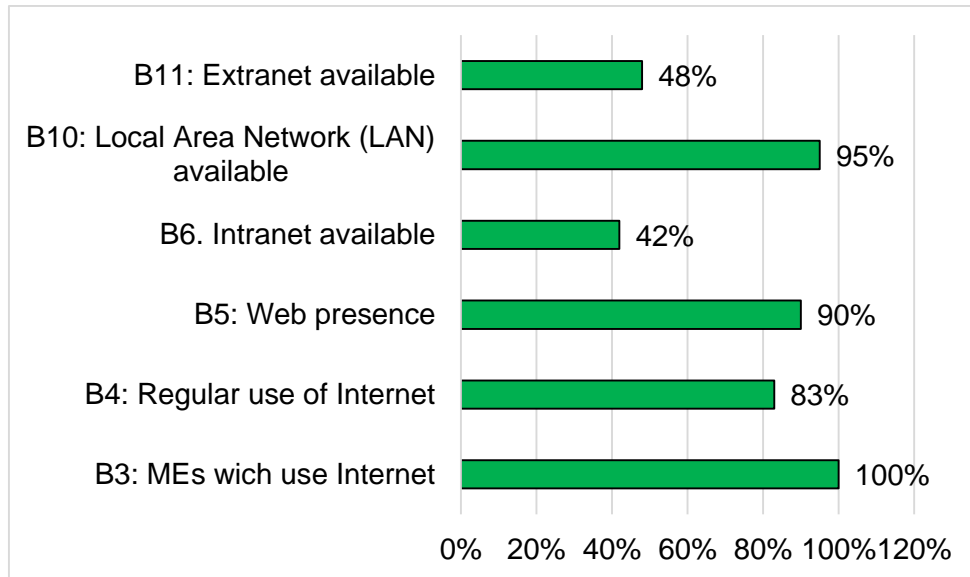
Figure 1. Access and connectivity indicators

Table 4 shows the results of the indicators in ways that have the MEs to access the Internet is shown.

Table 4. Indicators forms of Internet access

Indicator	Description of indicator	Value
B9.1	Internet access with narrowband	3%
B9.2	Fixed access broadband internet	85%
B9.3	Internet Access Mobile Broadband	23%

Key. Indicator: OISLAC indicator. Description of indicator: meaning of the indicator. Value: percentage of the indicator.

The results of the indicators measuring the use of internet activity (B7, B8 and B12) are shown in figure 2.
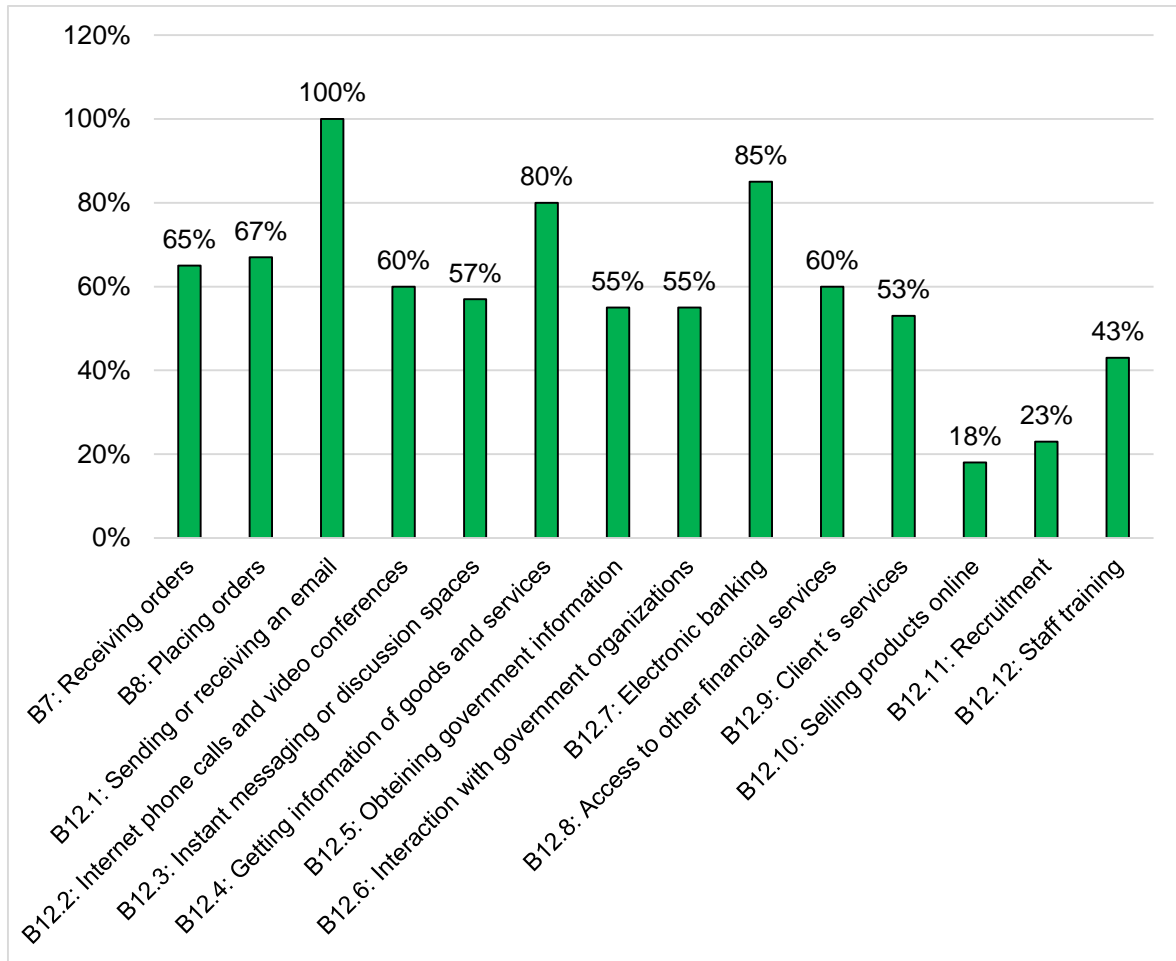
Figure 2. Internet usage indicators by activity

DISCUSSION AND CONCLUSIONS

As evaluation findings to MEs for ISIC G, which is taken as reference indicators of access and use of ICT by MEs determined by OISLAC, we can make some clarifications.

As for access and use of computers, it is evident that all MEs use computers to production processes, which are commonly used by 83% of its employees.

On the other hand, in terms of access to communication networks or connectivity, all consulted MEs has access to the Internet, 95% have local area network, 42% have intranet and 48% have extranet. Further notes that 90% of MEs have a presence on the web, similar situation occurred in 2016 in the MEs of OECD countries [4]. This situation shows that the MEs are dabbling in digital communications to expand the physical coverage of their business, so, through its web presence are finding new ways to interact with customers and suppliers.

As for the form of access to the Internet. While all MEs use the Internet, 85% access through fixed broadband network, which shows that Enterprises are migrating to networks of more than 256 Kbit/s speed for their business; another important group (23%) is already moving into mobile communications. This situation is not far from countries with technological development, as compared with the average MEs of OECD countries, 95% have a broadband connection [4].

Regarding the use of the Internet in business activities, 59% of the MEs uses this resource daily. Activities are most commonly used email management (100%) and make banking transactions (85%). Whereas, the activities that are less used in recruitment (23%) and delivery of digital goods online (18%). These results show that the MEs use the Internet in most productive activities, although they have low confidence for use in the incorporation of workers and e-commerce.

It should be noted that among the most important limitations of the study were, on the one hand, develop a questionnaire whose answers faithfully reproduces the perception and objectivity of respondents, since computer terminology often used from multiple theoretical references. This situation was solved by asking questions accompanied by the definition of concepts. On the other hand, it was difficult to involve all respondents by email, which was solved with visits to Enterprises.

Once this work has been studied at MEs classifier G, the challenge in the future will continue to investigate the other classifiers MEs ISIC [15]. That way you can have a complete picture of the state of ICT in the MEs.

Finally, it is important to reflect on the role of ICT as a support for emerging technologies such as artificial intelligence, robotics, the Internet of Things, big data, 3D printing, synthetic biology, biosecurity, among others, involve several risks and uncertainties. These advances in science and technology would not only exacerbate inequalities in the production of goods and services worldwide, widening the technology gap, but also important ethical dilemmas that interfere with human dignity.

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DECLARATION OF CONFLICT OF INTEREST

The authors declare the absence of conflicts of interest.

CONTRIBUTION IN THE LINE ITEM RESEARCH

This research is focused to provide and strengthen the line of research of the Doctoral Program of Technological Management of the National Polytechnic School,

related to the organization and technological change that proposes to articulate a vision inter and transdisciplinary fields of management and technology [16].

STATEMENT OF EACH AUTHOR'S CONTRIBUTION

This research was a combined work of the authors from the research proposal until publication of the article.

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BIOGRAPHICAL NOTE

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