Impact of information and communication technologies on organizational learning

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Abstract. The use of information and communication technologies a strategic tool has become one of the greatest benefits that has given a total shift to the different tactics that could be implemented to improve processes within organizations. The purpose of the research was to determine the relationship between information and communication technologies and organizational learning in the “micro, pequeñas y medianas empresas” of the city of Ocaña, Colombia. The focus of the research was quantitative correlation type; with non-experimental transactional field design given that the impact of the information and communication technologies variable on organizational learning was analyzed at a moment of time and without manipulating the variables. In order to collect the information, a Likert instrument with a Cronbach's Alpha coefficient of 89.70% was validated. The results through the analysis of variance could show that information and communication technologies have a positive and significant impact on the organizational learning variable. The calculated correlation coefficient was 72.30%, showing that there is a high and positive correlation between the two variables. The information and communication technologies tools that managed to improve the competitiveness of companies are intranet, email, video conferences, social networks, search engines, document management, electronic commerce, databases and support applications for each type of organization.

1. Introduction
The changes present in work environments added to globalization and increase in employment and use of information and communication technologies (ICT), have led companies to enhance learning and thus improve their innovation [1]. On the other hand, organizational learning is the company's ability to acquire, develop and socialize knowledge in order to improve its competitiveness and respond to a changing environment [2].

According to the “Departamento Nacional de Estadística (DANE)”, “micro, pequeñas y medianas empresas (MIPYMES)” represent more than 90% of the national productive sector and are generating 80% of employment in Colombia, however, there are factors such as the scarce innovation involved in the low level of competitiveness [3].

In this sense, the city of Ocaña, Colombia, in recent years has seen a marked increase in the creation of MIPYMES, approximately 99% of the establishments belong to this segment. Its economy
is driven mainly by companies in the commerce sector and the service sector [4]. Therefore, it is necessary to analyze the way in which this sector manages the learning and support that ICTs give to this process.

ICT have become allied tools of micro-enterprises, serving as a communication medium to disseminate management, strengthen the corporate image and strengthen links with external agents, by streamlining the search processes, facilitating the exchange of information, yielding concrete results, promoting the formation of collaborative teams, storing data in processable formats and in the cloud.

For the foregoing, the research is focused on knowing the management of organizational learning and its relationship with ICT in MIPYMES in the city of Ocaña, Colombia. It is expected that the results make a significant contribution to entrepreneurs and academics by having a theoretical and empirical reference for organizational learning activities and ICT employment within organizations, translating this into a key element for the achievement of business vision in those organizations.

2. Methodology
The research assumed an epistemological position based on the quantitative positivist paradigm, since this paradigm gives rise to the collection of information with the objective of testing hypotheses, making statistics, establishing patterns of behavior or testing theories [5]. A non-experimental correlation research is addressed, since it was carried out without deliberately manipulating the variables and with the aim of determining the degree of relationship between organizational learning and ICT. Table 1 shows the variables and indicators in the research.

| Variable                              | Description                                                                 | Indicator                  |
|---------------------------------------|----------------------------------------------------------------------------|----------------------------|
| Organizational learning               | Organizational learning can be defined operationally as the process of transforming knowledge into a resource of the institution, where human capital is essential to carry out this process [6] | Communication, Consensus, Knowledge evaluation, Learning environment |
| Information and communication technologies | The implementation of ICT in learning management is bringing about transformations in all organizations. At the same time, these technologies support new formative channels that involve new forms of knowledge transmission [7] | Emails, Internet, Videoconferences, Intranet, Social networks, Mobile technologies |

The city of Ocaña, Colombia, has a total of 3358 productive units that are mainly made up of two economic sectors: commercial and services [4]. The calculation of the sample is made taking into account a confidence level of 95% and 120 companies to be surveyed.

The instrument for the collection of information was a questionnaire with a Likert scale that was subjected to validity and reliability tests. The judgment of three experts was carried out and the Alfa Cronbach index was calculated with a value of 89.70%, which averages good reliability and validity of the results.

The empirical data that were obtained after applying the questionnaire were tabulated to later analyze them. Likewise, the information obtained through the instrument was processed using the software IBM SPSS statistics version 25 with authorization code e95e445a496245219a06.

3. Results and discussion
There are elements that must be taken into account to encourage authentic organizational learning, starting with the stimulation of open communication and consensus; where organizational hierarchies can be put aside and the contribution of each individual is taken into account by the organization [8]. In addition, it is necessary to consider the competencies of the human resource, where the knowledge and skills of the personnel that make up the company is given value, to make it more and more competitive. The learning environment occurs when it is possible to work as a team using all the
available tools and technologies, with the aim of improving the learning process through collaborative mechanics [9].

Figure 1 shows the results of the comparison between indicators of the organizational learning variable, obtained from the calculation of arithmetic averages, one of them corresponding to the indicator "learning environment" that obtained the lowest score of 3.44, while the "communication" indicator has the highest score.

![Figure 1. Organizational learning variable.](image)

It is necessary that the leaders of the companies in the city of Ocaña, develop an adequate learning environment, for being a key element in the cognitive and social transformation of the people; these environments are based on the exchange of experiences and knowledge among individuals who are part of the organization, whether in physical or virtual environments, as Robbins and Coulter say, an intelligent organization must have an adequate learning environment as well as a rapid adaptation to change that allows them to achieve competitive advantages [10] Regarding the assessment of knowledge, it is important to implement a work environment that presents development opportunities to its employees so that they have knowledge, skills, and experiences that allow companies to focus on incorporating new strategies to be competitive [11].

Table 2 shows the arithmetic averages that resulted in the different indicators analyzed in the variable information and communication technologies. In this sense, it is appreciated that in MIPYMES the transmission of knowledge from videoconferencing or intranet is not enhanced, which makes it possible to contact customers and suppliers, reducing costs and resources.

| Types of web 2.0 technologies | Arithmetic average |
|-------------------------------|--------------------|
| Emails                        | 4.31               |
| Videoconferences              | 3.49               |
| Intranet                      | 3.60               |
| Social networks               | 3.99               |
| Internet                      | 4.23               |
| Web page                      | 3.85               |
Regarding the use of technological tools, there is evidence of the low use of video conferencing, which involves real-time communication between individuals or work groups from anywhere in the world without having to travel, saving time and money. Companies have used this technology to get in touch with customers, colleagues or suppliers more easily and even to transfer knowledge between experts and employees [12]. In addition, it is necessary to improve internal communication, through the use of the intranet that allows sharing resources among its employees and in this way all members of the organization can have updated information in the shortest time [13].

The business sector is a pioneer in the incorporation of emerging technologies thanks to significant advances in communication and internet networks. The transactions and services of the majority of companies of the world order are averaged by technologies allowing new business models to be born where cloud computing, virtual reality, artificial intelligence, big data, expert systems, machine learning and others are implemented [14].

3.1. Analysis of variance between the variables of the model
The analysis of variance of a factor raises the hypothesis that the population averages are equal. That is, the null hypothesis states that the groups do not have a significant difference in their averages and the alternative hypothesis states that the groups differ significantly from each other. Table 3 shows the difference in averages of the organizational learning variable according to the high or low employment of ICT.

| ICT                  | Organizational learning |
|----------------------|------------------------|
| High use of ICT      |                        |
| Average              | 4.28                   |
| N                    | 51.00                  |
| Desv. standard       | 0.22                   |
| Low use of ICT       |                        |
| Average              | 3.92                   |
| N                    | 69.00                  |
| Desv. standard       | 0.27                   |

In this case, the analysis of variance statistical technique was used to verify if those differences in the averages are statistically significant or are only due to chance, obtaining the results shown in Table 4.

| Sum of squares | Average quadratic | F    | Sig. |
|----------------|-------------------|------|------|
| Elements of organizational learning vs ICT | 3.77 | 58.90 | 0.00 |
| Between groups |                  |      |      |
| Inside groups  | 7.58              | 0.06 |      |
| Total          | 11.30             |      |      |

In the analysis of variance, a level of significance of 0.00 was obtained, a value less than 0.05 that was taken as a reference, therefore, it can be affirmed that there are statistically significant differences between the means; that is, the use of ICT has a positive and significant impact on the organizational learning variable; in this sense, the companies that use ICT the most have more organizational learning. Therefore, the null hypothesis that there is no difference between the means of the groups is rejected and the alternative hypothesis is accepted if there are statistically significant differences.

3.2. Correlation coefficient for the model variables
To determine the relationship between the two variables, it became necessary to calculate the correlation coefficient. Before calculating the correlation coefficient, the Kolmogorov-Smirnov test was performed to determine if the variables are normally distributed, giving the value of significance greater than 0.05 indicating the normality of the variables and therefore, parametric techniques can be used.
The Pearson correlation coefficient is calculated with the data obtained in the sample of the two analyzed variables, results that are presented in Table 5. This value indicates a high positive correlation of 72.3% among the variables, that is, as it increases the use of ICT also increases the elements of organizational learning within the MIPYMES. In addition, if we consider the coefficient of determination $R^2 = 0.52$ we can indicate that 52.10% of the variations that occur in the elements of organizational learning would be explained by the variations in the use of ICT within MIPYMES in the city of Ocaña, Colombia.

| Table 5. Correlation coefficient and determination in elements. |
|-----------------------|---------------------|---------------------|
| Model summary         |                     |
| R                     | R square            |
| 1                     | 0.72               |
|                       | 0.52               |
|                       | 0.21               |

These results are consistent with Merino's research, which states that the high impact of ICTs cannot be denied as promoters of productive improvements within the company [15] and with Nonaka and Teece that recognize a general and positive relationship between ICT and the processes that allow organizations to manage and acquire knowledge [16]. However, despite the relationship found between ICT and organizational learning, small companies are not committed to their employment due to an inadequate organizational culture, few economic resources and lack of human capital training [17].

It has been shown that ICT are support tools for proper knowledge management within companies. These ICT must be easy to access, safe and appropriate to the type of organization, in such a way that allows the organization an adequate decision making. ICTs are relevant thanks to their structural capacities, supporting activities of creation, distribution and memory of knowledge [18].

It is very important to have emerging technologies that will allow us to manage organizational learning in an appropriate way, such as the knowledge workspace application in which it is possible to share business information in real time and the conversational applications application that works as a chatbots that facilitates the communication with customers through mobile and social networks [14].

4. Conclusions
It was concluded that there is indeed a high and positive correlation between the elements of organizational learning management and ICT. The ICT tools suggested for MIPYMES to improve their competitiveness are: intranet, email, video conferences, social networks, search engines, document management, e-commerce, databases, virtual reality, artificial intelligence, mobile technologies and support applications for each type of organization.

The adoption of ICTs in MIPYMES should be reviewed from a different perspective to large companies, as the size, low qualification of workers and scarce economic resources, lead to this adoption has a rhythm and needs different chords to the missionary objectives of each of them. For ICT to be a support for organizational learning, they must enable the capture, storage and distribution of information in all organizational processes, thus supporting decision-making.

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