

## Influence of information and communication technologies on the competitive advantage of micro-enterprises – Huancayo

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### ABSTRACT

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In a context where ICTs are indispensable elements for the development of business activities, it is necessary to know their influence on the internal improvement of processes. This research seeks to establish the influence of ICTs on the competitive advantage of micro-enterprises in Huancayo 2024. Research developed under a basic type study, has a quantitative approach with a correlational and cross-sectional level, the sample was made up of 59 entrepreneurs in the bakery sector in the province of Huancayo. Data analysis and processing was carried out using structural equations based on PLS. The study obtained the following results: a Spearman's Rho correlation coefficient of 0.821 with a significance level of ,000 which shows a high and positive degree of influence between ICTs and competitive advantage as well as its different dimensions Level of use, alignment of use and training; Likewise, the general hypothesis is accepted, which establishes that there is a significant relationship between Information and Communication Technology ( ICTs ) and the competitive advantage in SMEs in the pastry sector - Huancayo 2024.

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## 1. Introduction

Information and Communication Technologies (ICTs) are computer tools that generate new forms of communication, with the purpose of simplifying the emission, access, storage, retrieval and processing of information directly associated with the use of computers, databases, social networks and the Internet, but also includes other technologies such as television and telephones (Anggadini et al., 2021; Escorcía Guzman et al., 2022). The connection between ICTs and the business competitiveness of Small and Medium Enterprises (SMEs), measured through indicators such as sales, profits or productivity, is fundamental. It is necessary to incorporate new technologies and make adjustments to the internal processes of small businesses, as well as to their relationships with suppliers, customers and partners, so that they can develop and obtain a competitive advantage (Serrat, 2021). Undoubtedly, today, business management is deeply transformed by globalization and technological innovations (Fraser, 1994). We are immersed in the so-called information society, a reality accentuated by the Covid-19 health crisis, which has driven the need to carry out commercial transactions virtually and has increased the use of ICTs (Nguyen Chau et al., 2024). Likewise, companies have made adjustments to adapt and survive in an increasingly competitive global market (García de Velazco et al., 2024), where those that fail to adapt will find it difficult to face the new challenges that technology presents to them, and may collapse due to a lack of understanding and aversion to change.

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More and more companies are linked to ICTs, whether through software, telecommunications equipment, e-commerce or other forms (Dwi Handoyo et al., 2024). In the current technological era, the use of these tools has become imperative to systematize internal processes, organize staff and optimize resources. Only in this way can the sustainability of a company's competitive advantage be guaranteed (Nguyen Chau et al., 2024). Today, there are still Small and Medium Enterprises (SMEs) that do not consider this technological factor as a competitive advantage, due to lack of knowledge, fear of change or reluctance to invest in new management tools, such as technology and networks. (Fraser, 1994); At a global level, according to the report of the National Observatory of Telecommunications and the Information Society (ONTSI, 2019), indicators were provided on the use of Information and Communication Technologies (ICT) in Spain and the European Union (EU), where 75% of Small and Medium-sized Enterprises (SMEs) in Spain had an online presence through a website, surpassing France (71%) but falling below the EU average (77%), Germany (88%), and the United Kingdom (84%) (Nguyen Chau et al., 2024). Despite the abundance of information that small businesses have to deal with, their main challenge lies in accessing and efficiently managing this information (Kumar et al., 2024). SMEs often fail to properly implement ICTs for various reasons, one of which is the limited availability of information on the subject, resulting in a loss of competitiveness, an objective always sought by these companies (Kumar et al., 2024).

According to the report by the Development Bank of Latin America (2020), it is highlighted that, beyond the availability of the necessary technologies, the crucial disparity is found in the use of these technologies. In a study that covered 8 countries (Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru and Uruguay), it was observed that the adoption of the Internet by companies exceeded 90%, but the rate varies considerably when considering the use of electronic banking (from 34% in Peru to 95.4% in Colombia as extremes). As for the companies that have implemented digital sales channels, they do not exceed 40% in any of the countries, and in half of the sample, they do not even reach 10%. In Peru, according to the National Institute of Statistics and Informatics (2020), the annual economic survey reveals that the use of computers is widespread in all business segments, with rates of 98.9% in large companies, 99.3% in medium-sized companies and 93.4% in small companies; Internet access is widespread, registering figures of 98.6% in large companies, 97.7% in medium-sized companies and 91.8% in small companies. Despite these high rates of technological adoption, a decrease in the presence of business websites is observed in previous years. Only in 2017, both large and medium-sized companies experienced a recovery, reaching percentages of 64.8% and 46.1% respectively. However, the small business sector continued a downward trend, remaining at 26.2%. (INEI, 2024)

This scenario suggests that while most Peruvian companies have access to technologies such as computers and the Internet (Inga-ávila et al., 2023), not all are able to take full advantage of their benefits, either due to investment or training limitations. A clear example is the low use of intranets and extranets, with rates below 50% in large companies and below 20% in small companies. The purpose of this research is to analyze the connection between the use of information and communication technologies (ICT) and the competitive advantages that micro and small enterprises (MSEs) can develop to improve their results and last over time.

## **2. Literature review**

### *2.1. Structural equation models*

Structural equation models are considered multivariate statistical models that allow establishing the relationship or effect between two or more variables (Cepeda & Roldán, 2004). It is also considered a statistical analysis technique used to study complex patterns, which facilitates the validation of theoretical and empirical models, in addition to incorporating constructs that are not directly observable (latent and unobserved variables) into its analysis (Ruiz et al., 2010). Structural Equation Models (SEM) statistically analyze various dependency relationships in a cross-sectional manner, highlighting aspects that are not observable in the process of establishing these relationships. They facilitate the analysis of each group of variables, allowing the evaluation and observation of each of the latent or unobservable variables. This strengthens the correlations used and enables more accurate estimates of the structural coefficients (Escobedo et al., 2016).

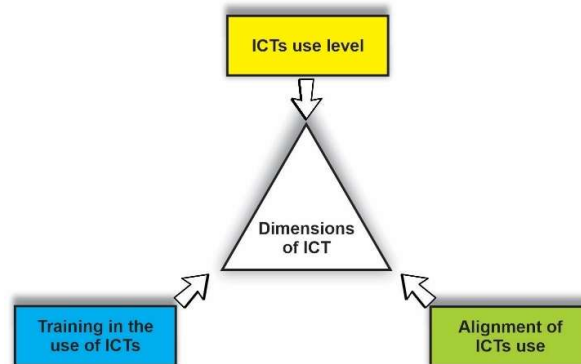
### *2.2. Information and Communication Technologies*

According to (Ayala & Gonzales, 2015), ICTs have transformed the way we live, work and communicate. Technologies allow us to create, process and distribute information in the form of text, images, sound and video, creating new content (Pacheco & Rodríguez, 2019). For the Ministry of Production (2016), (MEF, 2016), ICTs are the use of computers and telecommunications equipment to manage information, mainly in the business field, this has transformed the industrial and business sector, allowing the development of automated information systems shared by two or more companies (Ayala & Gonzales, 2015), which provide valuable information for decision making, allowing companies to adapt quickly to market changes making it possible to compete with new products and markets (Scarabino & Colonnello, 2009; Pacheco & Rodríguez, 2019). It is defined as the combination of different types of communication tools, both real-time and delayed, to improve communication, allowing organizations to carry out their business operations through a variety of devices and software, regardless of their geographic location. This facilitates communication and collaboration between people, which improves efficiency and productivity (Churampi-Cangalaya et al., 2023).

According to (Cervantes et al., 2014), ICTs in the business environment are a set of technologies and resources that are used to process, store and distribute information. These technologies include computers, networks, software, telecommunications and digital media. ICTs are used in a variety of contexts, including business, education, government and entertainment. ICTs are enabling industrial sectors to operate more efficiently and flexibly, and are creating new business opportunities through the Internet, high-speed data transmission networks, databases, e-commerce and other new technologies (Fonseca, 2013). According to (Slusarczyk, 2019), ICTs have transformed the economy by facilitating communication and the exchange of information at a global level, which has led to an increase in the internationalization of companies and commercial relations. The Internet has promoted communication between different countries in the world, uniting markets, societies and cultures, which has led to a series of social, economic and political changes at a global level.

New technologies are no longer a luxury for companies, but a necessity to survive and prosper in today's market. In the business world, continuous product improvement is essential to remain competitive. ICT contributes to this improvement by providing tools and resources that allow companies to be more efficient and effective. They are also important because:

- Technology has made it easier to access a wealth of information about competitors and customers. This allows companies to better understand their competitors and customers, giving them a competitive advantage.
- Labor flexibility is created.
- The company uses technology to automate repetitive and manual tasks, freeing up employees to perform more strategic and creative tasks.
- ICT facilitates communication between companies and their customers, employees and suppliers.
- ICTs enable companies to expand their business into new markets and develop new business relationships.



**Fig. 1.** Dimensions of ICTs (Roncha & Echevarría, 2017)

#### a. Level of use of ICT

The adoption of ICT is a necessity for all companies, as it impacts every aspect of their operation. However, not all business sectors have considered investing in the implementation of these technologies. A company's ICT infrastructure includes the technological equipment and systems used to run the company. This equipment can help simplify and/or systematize tasks, which can improve the company's efficiency and productivity (Roncha & Echevarría, 2017). Management systems are tools that help companies automate and optimize their processes. They can be simple, such as systems based on office automation tools, or complex, such as ERP or CRM systems. Management systems can help companies improve their efficiency, productivity, and competitiveness (Pacheco & Rodríguez, 2019). They can be used to automate tasks, collect and analyze data, and make better business decisions.

#### b. Training in the use of ICT

The use of technological and communication tools in a company requires the training of all employees, from the manager to the operators. This is because the effective use of these tools requires basic knowledge of their application (Coronel & Aquino, 2022). Without proper training, employees will not be able to use the tools efficiently and the company's objectives will not be achieved. Implementing technological tools in a company is useless if employees are not trained to use them (Inga-ávila et al., 2022). Training must be provided to all employees, from the manager to the operators (Friné et al., 2009). In order for SMEs to take advantage of the benefits of ICT, they must invest in training for their staff. Training must be focused on the functions that employees will perform, and must also provide knowledge on the use of basic IT tools, such as office programs, the Internet, applications, virtual platforms, social media advertising tools, accounting systems and banking platforms.

ICT training is essential for SMEs to achieve their goals. Training should be tailored to each role and cover a wide range of topics.

The impact of ICT on workers can be positive or negative, depending on how they are used (Vasquez, 2021). It is important to train workers in the use of ICT, but it is also important to measure the results they have in their assigned functions. If workers are making good use of the tools, an improvement in their productivity and comfort in the work area should be seen. Using ICT in the workplace can have a positive impact on worker productivity and comfort. However, it is important to ensure that workers are trained in the use of ICT and that they are using the tools effectively (Inga-ávila et al., 2023).

### c. Alignment of ICT use

A company's objectives in implementing ICT tools determine how these tools are applied and the benefits expected to be obtained from them (INEI, 2024). Companies use ICT to improve their efficiency, competitiveness and customer satisfaction, the main reasons being the following:

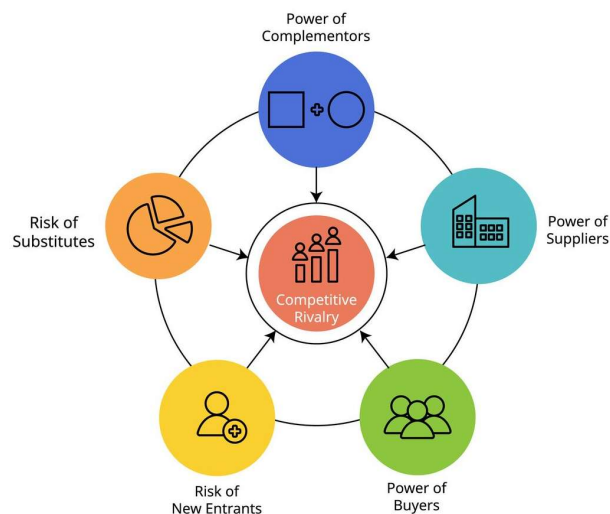
- Organizational arrangement.
- Ease of use of ICT.
- Pressure from suppliers, customers and competitors.
- Cost savings and increased profitability.

For this research, we will focus our analysis on three ICT objective areas that are of greatest importance to micro and small businesses.

- Production objectives: SMEs seek to reduce costs by improving their production processes. This can be achieved by using technological tools that automate tasks, collect data and enable effective communication.
- Marketing objectives: SMEs use technological tools for marketing, since they are cheaper than traditional strategies.
- Accounting and finance objectives: SMEs seek to reduce the time and resources needed to carry out their financial and accounting operations.

### 2.3. Competitive advantage

According to Porter (2007), competitive advantage is a key factor for a company's success in a competitive market. A company can have a competitive advantage if it can offer products or services at a lower price than its competitors, if it can offer products or services that are unique or superior to those of its competitors, or if it can focus on a specific market niche and offer a product or service that better meets the needs of that niche. For Hill and Jones (2009), competitive advantages are unique capabilities of companies that allow them to offer products or services of higher quality, at a lower price, or both, they have a competitive advantage. According to Keones (1997), competitive advantage is a unique or distinctive characteristic of a company, product or service that customers perceive as important and that differentiates it from the competition. A company, product or service has a competitive advantage if it offers something that customers value and that they cannot find in the competition. According to Porter (2015), the five forces model is an analytical tool that allows companies to understand the competitive environment of their industry. The model recognizes five forces that impact a company's profitability.



**Fig. 2.** Dimensions of competitive advantage (Porter, 2015)

#### a. Customer bargaining power

Customer bargaining power is the ability of customers to influence the prices and quality of products or services. The more organized customers are, the more bargaining power they have (Crowther, 2008). This is because organized customers can

more easily negotiate with companies and demand better prices, quality, or services.

b. Negotiating power with suppliers

It is higher when demand for raw materials is high and supply is low. In this case, suppliers can increase prices for final products because they have a strong position in the market. However, the bargaining power of suppliers can also be high in other cases, even when demand is low (Omsa, 2017). This may be because the exchange of raw materials is expensive, companies do not buy large volumes of products, or there are no substitute materials available.

c. Threat of entry of new competitors

The emergence of competitors in an industry can be due to the availability of raw materials (Publications, 2008). When raw materials are available in greater numbers, barriers to market entry are reduced, making it easier for new companies to enter the sector.

d. Threat of entry of substitute products

The threat of substitute products is the emergence of products or services that can replace ours. (Garzón & Landázuri, 2023). The appearance of these products may limit the price of ours, as customers may opt for substitute products if our prices are too high.

e. Rivalry between competitors

Rivalry among existing competitors increases when there are many companies in the sector, the companies are large, fixed costs are high, products are perishable (López et al., 2018), prices are under pressure or companies are in the process of absorption.

### 3. Methodology

The research is carried out with the aim of improving the conditions of the MSMEs studied, identifying and proposing solutions to the problems they face. Ñaupas et al. (2018) conceptualizes this type of research as derived from the findings of basic or fundamental research and is directed towards solving social problems in a community, region or country (Nieto, 2018). Problems and working hypotheses are raised with the aim of addressing these issues (Hernández-Sampieri y Mendoza, 2019). Likewise, the hypothetical deductive method was used, which is a common approach in scientific and market research because it allows testing the validity of a hypothesis in different contexts (Ñaupas et al, 2018). The research has a deductive method since, based on the reasoning process that starts from general principles, specific conclusions can be reached (Ocampo, 2017). This approach is useful in scientific and market research because it allows testing the validity of a hypothesis in different scenarios (Gallardo-Echenique, 2017). The study was carried out using a non-experimental design because the variables were not deliberately manipulated. Instead, the phenomena were observed and analyzed as they occur in the context of SMEs. The research is cross-sectional because data is collected at a single point in time, without following its evolution over time. In the present study, the population will be composed of 59 entrepreneurs in the bakery sector in the province of Huancayo. Since the population is small because only companies in the bakery and pastry sector in the city of Huancayo are considered, the entire population will be taken as a sample, considering for this case a census sample.

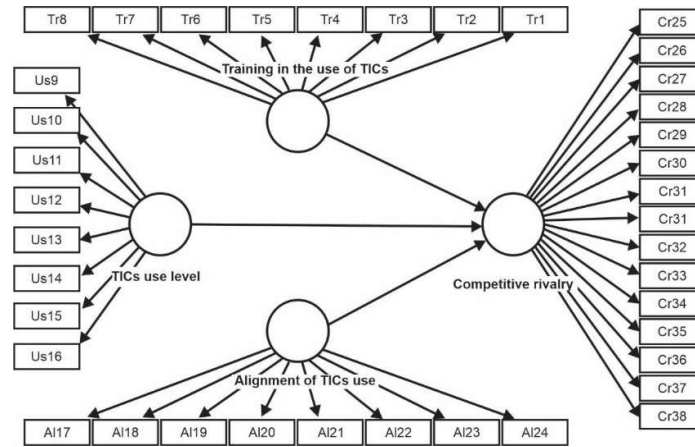
**Table 1**

Population of micro-enterprises in the bakery sector of the city of Huancayo (ASPAN 2024)

Micro enterprises	Population	%
Industrial bakeries	18	30.51%
Classic bakeries	25	42.37%
Artisanal bakeries	16	27.12%
Total	59	100%

#### 3.2 Research model

The model for the present research is presented in Fig. 3, which shows the relationship between the dimensions of information and communication technologies such as the level of use of ICT, alignment of the use of ICT and training in the use of ICT (Buenrostro & Hernández, 2019; Friné et al., 2009).



**Fig. 3.** Proposal for a research model

Based on the described model, the following specific hypotheses were raised:

**General Hypothesis (HG):** *There is a significant relationship between Information and Communication Technology (ICT) and the competitive advantage in SMEs in the pastry sector – Huancayo 2024.*

**Specific hypothesis 1 (H1):** *There is a significant relationship between the level of use of ICTs and the competitive advantage in SMEs in the pastry sector – Huancayo 2024.*

**Specific hypothesis 2 (H2):** *There is a significant relationship between training in the use of ICTs and competitive advantage in SMEs in the pastry sector – Huancayo 2024.*

**Specific hypothesis 3 (H3):** *There is a significant relationship between the alignment of the use of ICTs with the company's objectives and the competitive advantage in SMEs in the pastry sector - Huancayo 2024.*

### 3.3 Data collection and processing process

Data collection was carried out using the survey technique, which facilitated the development and use of two specific instruments called: Information and Communication Technologies Implementation Questionnaire, which consisted of 24 questions, and the Competitive Advantage Questionnaire, which consisted of 15 questions.

The instruments described in the preceding paragraph were applied using the Google Form and Microsoft Form platforms ; these questionnaires were sent to the sample members, who were able to answer the questions. Informed consent was guaranteed, as well as the confidentiality of the data and the anonymity of the participants who completed the questionnaires. Once the information was collected, a data matrix was created, which was processed using the Microsoft Excel 2023 and SPSS version 27.0 programs for descriptive analysis, as well as the SmartPLS 4.0 software.

## 4. Results

### 4.1 Presentation of collected and processed results

**Table 2**

Dimensions of Information and Communication Technologies in micro-enterprises in the bakery sector in the city of Huancayo

		Groups					
		Level of use of ICT		Alignment of ICT use		Training in the use of ICT	
		F	%	F	%	F	%
Information and Communication Technologies	Deficient	16	28%	24	41%	18	31%
	Regular	28	47%	20	34%	22	37%
	Well	15	25%	15	25%	19	32%
Total		59	100%	59	100%	59	100%

Source: *Questionnaire on the implementation of information and communication technologies in pastry companies in Huancayo.*

Table 2 shows the dimensions of information and communication technologies based on the levels of implementation; for this reason, it is observed within the previously processed data that 47% of the businesswomen in the bakery sector consider the level of use of ICTs to be good , in relation to the alignment of the use of ICTs , 41% of the businessmen in the sector consider it deficient and in relation to the training of personnel in the use of ICTs , 37% of the businesswomen consider that this dimension is regular.

**Table 3**  
Dimensions of competitive advantage in pastry companies in Huancayo

Competitive advantage		Customer bargaining power		Negotiating power with suppliers		Threat of entry of new competitors		Threat of entry of substitute products		Rivalry between competitors	
		F	%	F	%	F	%	F	%	F	%
		Deficient	18	31%	5	9%	18	31%	22	38%	20
Regular	32	54%	32	54%	22	37%	24	41%	28	47%	
Well	9	15%	22	37%	19	32%	13	22%	11	19%	
Total		59	101%	59	100%	59	100%	59	100%	59	100%

Source: Competitive advantage questionnaire in micro-enterprises in the pastry sector in the city of Huancayo.

Table 3 presents the levels of perception of the competitive advantage based on its dimensions, of which we can highlight the following percentage values: of the total number of respondents, 54% of businessmen consider regulating the power of negotiation with clients and power of negotiation with suppliers, 37% consider regulating the threat of entry of new competitors in the sector and 47% consider regulating rivalry between competitors.

4.2 Model confirmation

**Table 4**  
Confirmatory model

	Reliability		variance extracted		Discriminating validity		
	Cronbach Alpha	Composite reliability	Average (AVE)	variance extracted	Tr	Us	AI
Training in the use of ICTs	0.959	0.974	0.882		0.842		
ICTs use level	0.985	0.932	0.801		0.783	0.875	
Alignment of ICTs use	0.920	0.984	0.734		0.632	0.700	0.425
Reference values	>0.7	>0.7	>0.5				

Table 4 presents the confirmatory model, where the values obtained by both the composite reliability and the Cronbach alpha established the reliability of the model. From the data processing and in relation to that presented by Nunnally (1978), the internal consistency is pertinent since the value obtained in the Cronbach is higher than 0.9 in all cases. Likewise, the values obtained in the composite reliability coefficients are higher than 0.9, so the composite reliability is considered satisfactory. On the other hand, the discriminant validity and convergent validity allow the value of the construct to be analyzed (Cepeda & Roldan, 2004). The value of the average variance extracted (AVE) creates a value of the variance between a construct and the corresponding indicators; said value must be above 0.50 (Hair, Hult, Ringle, & Sarstedt, 2017). The research shows values higher than 0.57, which shows adequate convergent validity (Fornell & Larcker, 2001). On the other hand, discriminant validity was calculated from the square roots of the AVE and allows comparisons with the correlations between latent variables (Fornell & Larcker, 2001). In this context, we can conclude that the model used to measure the present study is shown in Table 4, where the items are detailed.

4.3 Analysis of structural equation models

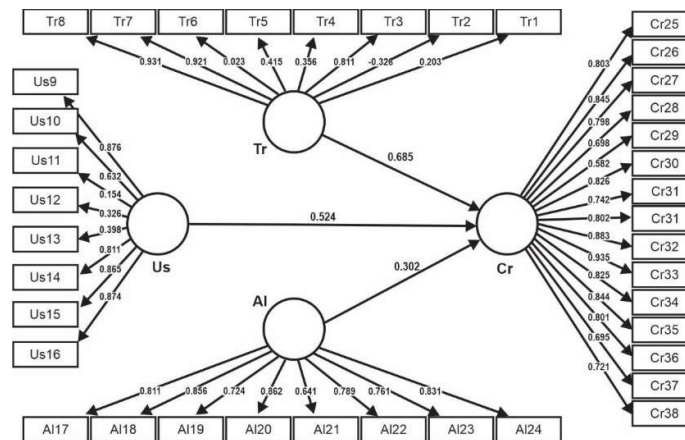


Fig. 4. Confirmatory structural model

According to the results obtained in Fig. 4, the rejection or acceptance of the specific hypotheses formulated was established. According to the data collected and processed, we mention that hypotheses 1 and 2 are accepted, while hypothesis 3 is rejected. Regarding the accepted hypotheses, these show a significant relationship with the competitive advantage since they show the following values: Use of ICTs ( US ) path = 0.878, p = 0.000 and Training in the use of ICTs ( Tr ) β = 0.796, p = 0.009. On the other hand, the third specific hypothesis is rejected, which according to the data shows that there is no relationship between

the Alignment of ICTs with the competitive advantage since it has values such as (US)  $\beta = 0.185$  and  $p = 0.081$ . Likewise, the value of the SRMR (Standardized Value) could be calculated. Root Mean Square Residual) conceptualized as an absolute measurement value of adjustment between the previously formulated correlation and the observed one. For Hu & Bentler (1999) the Standardized Root Mean Square Residual has values in a range from 0 (perfect fit) to 0.08 (good fit), which is why the SRMR value calculated in the research is 0.061, considered as a good fit.

**Table 5**  
Contrast of hypotheses

Hypotheses	Mean sample	Standard deviation	Path beta value	Student's t statistic	p value	Decision
H1: Us →Cr	0.421	0.202	0.878	4.156	0.000	Accepted
H2: Tr →Cr	0.398	0.245	0.796	3.695	0.009	Accepted
H3: Al →Cr	0.449	0.398	0.185	2.001	0.081	Refused

$t > 1.96$ ;  $p < 0.05$

## 5. Discussion and Conclusion

### 5.1. Relationship between the use of ICTs and competitive advantage

The study allowed to establish the significant relationship between the use of ICTs with the competitive advantage, this statement is concluded from the value obtained according to the level of significance obtaining a value of 0.000 also the level of correlation obtained by the Spearman coefficient was 0.878 (Martínez et al., 2009), both values show the presence of a very high positive correlation between the study variables; This shows that the adoption of ICTs is essential for all companies, since they affect all aspects of their operations and that the infrastructure of a company includes the technological devices and systems that are necessary for its operation, this requires that its use can facilitate and / or organize tasks, which increases the efficiency and productivity of the company.

### 5.2. Relationship between training in the use of ICTs and competitive advantage

The study established a significant relationship between training in the use of ICTs and competitive advantage; this statement is concluded from the value obtained according to the level of significance, obtaining a value of 0.081. Likewise, the level of correlation obtained by the Spearman coefficient was 0.185 (Martínez et al., 2009). Both values show that there is no high correlation between the study variables; This implies that although a company's objectives are oriented towards the adoption of the use of ICT tools, they do not see their results in the benefits that are expected to be achieved with their use, since they do not relate it to their organizational structure; the use of ICTs is not easy for employees, the influence that should exist with suppliers, customers and competitors is not evident, and there is no reduction in costs or increase in profitability.

The use of technological and communication tools in a company requires that all employees, from management to operators, receive training. This is because to use them effectively it is necessary to have basic knowledge about how they work. Such training must focus on the tasks that employees will perform and offer them knowledge about the use of basic computer tools, such as office programs, the Internet, applications, virtual platforms, advertising tools on social networks, accounting systems and banking platforms.

### 5.3. Relationship to the alignment of the use of ICTs and competitive advantage

The study established a significant relationship between alignment in the use of ICTs and competitive advantage. This statement is concluded from the value obtained according to the level of significance, obtaining a value of 0.009. Likewise, the level of correlation obtained by the Spearman coefficient was 0.796 (Martínez et al., 2009). Both values show the presence of a very high positive correlation between the study variables. This implies that the use of technological and communication tools in a company requires that all employees, from management to operators, receive training. This is because in order to use them effectively, it is necessary to have basic knowledge about how they work. Such training should focus on the tasks that employees will perform and offer them knowledge about the use of basic computer tools, such as office programs, the Internet, applications, virtual platforms, advertising tools on social networks, accounting systems, and banking platforms.

## 6. Conclusion

The study has allowed to establish the relationship between the use of information and communication technologies with the competitive advantage in micro companies in the bakery sector in the city of Huancayo. This is concluded from observing an operational efficiency in the automation of processes allowing the reduction of time and operating costs from internal and external communication, which makes possible an improvement in collaboration between teams and with clients with quick and easy access to crucial information for decision making. Likewise, the adaptability based on the use of ICTs allows companies to adapt to changes in the market and to respond quickly to the needs of customers by promoting innovation in the development of new products and services, allowing them to remain competitive in an increasingly digital business environment.



## References

- Anggadini, S. D., Ula, M. H., Darmawan, H. Y., & Yulianti, L. (2021). Information Communication and Technology in the Industry. *IOP Conference Series: Materials Science and Engineering*, 1158(1), 012013. <https://doi.org/10.1088/1757-899x/1158/1/012013>
- ASPAN (2023). ASPAN PERÚ | Asociación Peruana de Empresarios de la Panadería y Pastelería. Retrieved October 12, 2024, from <https://aspanperu.com/>
- Ayala, E., & Gonzales, S. (2015). Tecnologías de Información y Comunicación (Fondo Editorial de la Universidad Inca Garcilaso de la Vega, Ed.). [www.uigv.edu.pe](http://www.uigv.edu.pe)
- Boyacá – Colombia. FAEDPYME International Review, 2(4), 49-59.
- Buenrostro, H. E., & Hernández, 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*, 27(50), 101–124. <https://doi.org/10.24275/ETYPYUAM/NE/502019/BUENROSTRO>
- Cepeda, G., & Roldán, J. (2004). Aplicando en la práctica la técnica PLS en la administración de empresas. Murcia, España: Congreso de la Asociación Científica de Economía y Dirección de la Empresa.
- Cervantes, K., González, L., & Ibarra, M. (2014). El aprovechamiento de las TIC en empresas pequeñas y medianas de Baja California, México o: el caso del sector manufacturero. *Revista Internacional de Economía y Gestión de las Organizaciones*, 3(1), 43-57.
- Coronel, N., & Aquino, P. A. (2022). Características de la integración de las TIC en la gestión administrativa de las medianas empresas comerciales de la ciudad de Pilar, año 2022. *Ciencia Latina Revista Científica Multidisciplinar*, 6(6), 1066–1083. [https://doi.org/10.37811/cl\\_rcm.v6i6.3603](https://doi.org/10.37811/cl_rcm.v6i6.3603)
- Churampi-Cangalaya, R. L., Inga-ávila, M. F., Huamán-Pérez, F., Peña-Rojas, A. C., Churampi-Cangalaya, J. J., & Ulloa-Ninahuan, J. (2023). Digital government, institutional development and public higher education. *International Journal of Data and Network Science*, 7(2), 865–872. <https://doi.org/10.5267/j.ijdns.2023.1.002>
- Dwi Handoyo, R., Hannafi Ibrahim, K., Bagus Rismawan, L., Haryanto, T., Erlando, A., Sarmidi, T., Vionita Djayadi, F., Azlan Shah Zaidi, M., Sethi, N., & Sylviana, W. (2024). Information communication technology and manufacturing industry exports based on technology intensity in OECD and non-OECD countries. *Research in Globalization*, 8, 100228. <https://doi.org/10.1016/J.RESGLO.2024.100228>
- Escorcia Guzman, J. H., Zuluaga-Ortiz, R. A., Barrios-Miranda, D. A., & Delahoz-Dominguez, E. J. (2022). Information and Communication Technologies (ICT) in the processes of distribution and use of knowledge in Higher Education Institutions (HEIs). *Procedia Computer Science*, 198, 644–649. <https://doi.org/10.1016/J.PROCS.2021.12.300>
- Fonseca, D. (2013). Desarrollo e Implementación de las TICS en las PYMES de.
- Fornell, C., & Larcker, D. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50. <https://doi.org/https://doi.org/10.2307/3151312>
- Fraser, J. M. (1994). Information and communication technology and business organization. *Telematics and Informatics*, 11(3), 217–223. [https://doi.org/10.1016/0736-5853\(94\)90007-8](https://doi.org/10.1016/0736-5853(94)90007-8)
- Friné, S., Marín, M., Lizbeth, D., & Rivera, A. (2009). Dimensiones del aprendizaje y el uso de las tic's. el caso de la universidad autónoma de campeche, méxico (dimensions of the learning and the use of the tic's. the case of campeche's autonomous university, Mexico). *RIED v. 12(1)*, 195–211.
- Gallardo-Echenique, E. E. (2017). Metodología de la Investigación. Huancayo: Univerdad Continental.
- García de Velazco, J. J. H., Jaimes, E. R. C., & Pertuz, A. A. Á. (2024). Digital Transformation: Participatory Actions Based on the Uses of Information and Communications Technologies (ICT). *Procedia Computer Science*, 231, 545–552. <https://doi.org/10.1016/J.PROCS.2023.12.248>
- Garzón, G., & Landázuri, B. (2023). Estudio de las fuerzas competitivas de porter en empresas industriales: una revisión de la literatura study of porter's competitive forces in industrial firms: a review of the literature. *Revista Electrónica Tambara*, 21(120), 1839–1857. <https://doi.org/https://tambara.org/wp-content/uploads/2023/08/5.Fuerzas-de-porter-Garz%C3%B3n-landazuri-FINAL.pdf>
- Hernández-Sampieri, R., & Mendoza. (2019). *Metodología de la investigación. Las rutas cuantitativa, cualitativa y mixta*. México: Editorial Mc Graw Hill Education.
- Hill, C., & Jones, G. (2009). Administración Estratégica (Octava ed. ed.). Mexico D. F.: McGRAW-HILL/INTERAMERICANA EDITORES, S.A. de C.V.
- INEI. (2024). Estadísticas de las Tecnologías de Información y Comunicación en los Hogares - Informe técnico. 1–50. <https://cdn.www.gob.pe/uploads/document/file/6543264/5702640-las-tecnologias-de-informacion-y-comunicacion-en-los-hogares-ene-feb-mar-2024.pdf>
- Inga-ávila, M., Churampi-Cangalaya, R., Inga-Aliaga, M., Rodríguez-Giraldez, W., & Vicente-Ramos, W. (2022). Influence of people, processes and technology on business strategy in small enterprise in a Covid 19 environment. *International Journal of Data and Network Science*, 6(3), 779–786. <https://doi.org/10.5267/j.ijdns.2022.3.003>
- Inga-ávila, M. F., Churampi-Cangalaya, R. L., Inga-Aliaga, M. A., Vicente-Ramos, W., & Rodríguez-Giráldez, W. (2023). Value generation and knowledge management in Peruvian microenterprises. *Uncertain Supply Chain Management*, 11(2), 743–754. <https://doi.org/10.5267/j.uscm.2023.1.006>
- Inga-ávila, M. F., Churampi-Cangalaya, R. L., Ulloa-Ninahuan, J., Inga-Ávila, J. L., Uribe-Hinostroza, M., Inga-Aliaga, M. Á., & Huamán-Pérez, F. (2023). Digital transformation and competitiveness in Peruvian small business. *International*

- Journal of Data and Network Science*, 7(4), 1797–1804. <https://doi.org/10.5267/j.ijdns.2023.7.012>
- Keones, A. (1997). *La Ventaja Competitiva*. Madrid: Díaz de Santos.
- Kumar, S., Goel, U., Joshi, P., & Johri, A. (2024). Factors affecting Information & Communication Technology (ICT) adoption among MSMEs. *Journal of Open Innovation: Technology, Market, and Complexity*, 10(1), 100205. <https://doi.org/10.1016/J.JOITMC.2023.100205>
- López, Y., Arvizun, E., Asiain, A., Mayetto, Y., & Martínez, J. (2018). Análisis competitivo de la actividad productiva de la malanga: un enfoque basado en la teoría de Michael Porter. *RIDE. Revista Iberoamericana Para La Investigación y El Desarrollo Educativo*, 8(16), 729–763. <https://doi.org/10.23913/RIDE.V8I16.366>
- MEF. (2016). Manual de políticas de gestión de tecnologías de información. [https://www.mef.gob.pe/contenidos/acerc\\_mins/doc\\_gestion/RD478\\_2016EF4301.pdf](https://www.mef.gob.pe/contenidos/acerc_mins/doc_gestion/RD478_2016EF4301.pdf)
- Nguyen Chau, T., Vu Thi Hong, N., Pham Thi Thu, T., Ramsawak, R., & Nguyen Thien, N. (2024). Re-examining the effects of information and communication technology on economic growth. *Technology in Society*, 78, 102646. <https://doi.org/10.1016/J.TECHSOC.2024.102646>
- Nieto, N. (2018). Tipos de Investigación. Universidad Santo Domingo de Guzmán. [https://core.ac.uk/display/250080756?utm\\_source=pdf&utm\\_medium=banner&utm\\_campaign=pdf-decoration-v1](https://core.ac.uk/display/250080756?utm_source=pdf&utm_medium=banner&utm_campaign=pdf-decoration-v1)
- Nunnally, J. (1978). *Psychometric Theory*. McGraw Hill.
- Ñaupas, H., Valdivia, M., Palacios, J., & Romero, H. (2018). Metodología de la investigación cuantitativa – cualitativa y redacción de la tesis (5ª ed.). Bogotá - Colombia: Ediciones de la U.
- Ocampo, C. (2017). Métodos de Investigación Académica. Costa Rica: Sistema de Educación General.
- Omsa, S. (2017). Five Competitive Forces Model and the Implementation of Porter’s Generic Strategies to Gain Firm Performances. *Science Journal of Business and Management*, 5(1), 9. <https://doi.org/10.11648/j.sjbm.20170501.12>
- ONTSI, O. N. (2019). Informe sobre la sociedad de la información y las telecomunicaciones y el sector TIC y de los contenidos en España por comunidades autónomas. Obtenido de <https://www.ontsi.red.es/sites/ontsi/files/2019-0/Informe%20Espa%C3%B1a.pdf>
- Pacheco, D., & Rodríguez, R. (2019). Ict as a competitive strategy in business management. *Revista de Investigación En Ciencias de La Administración ENFOQUES*, 3, 286–298. <https://books.google.com.pe/books?id=2pqwKkqxxosC>
- Porter, M. (2015). *Ventaja competitiva: Creación y sostenimiento de un desempeño superior* (2ª ed.). Mexico: Grupo Editorial Patria.
- Publications. (2008). *The Five Competitive Forces That Shape Strategy - Article - Faculty & Research - Harvard Business School*. <https://www.hbs.edu/faculty/Pages/item.aspx?num=34522>
- Roncha, J., & Echevarría, S. (2017). *Importancia de la TICs en el ambiente empresarial*. Ciencia La Salle.
- Scarabino, J. C., & Colonnello, M. B. (2009). Innovación empresaria en Argentina. Difusión de TICs en las PyMEs. *Invenio*, 12(22), 93-107.
- Serrat, O. (2021). Information and Communication Technology in Organizations: Impacts and Implications. <https://www.researchgate.net/publication/350517727>
- Slusarczyk, M. (2019). TIC en las pymes. Obtenido de <http://cimogsys.esPOCH.edu.ec/direccion-publicaciones/public/docs/books/2020->
- Vasquez, E. F. (2021). Factores críticos para la adopción de las TIC en micro y pequeñas empresas industriales. *Industrial Data*, 24(2), 273–292. <https://doi.org/10.15381/IDATA.V24I2.20736>



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