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Impact of Digital Transformation on Financial Management in SMES in Boyacá: An Approach to Competitiveness

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SUMMARY

This study analyzes the impact of digital transformation on small and medium-sized enterprises (SMEs) in Boyacá, Colombia, focusing on their competitiveness and sustainability, the research is supported by a non-experimental and descriptive design, 89 companies were surveyed in the cities of Tunja, Duitama and Sogamoso, evaluating key indicators such as technological infrastructure, use of ICT in internal processes, training in digital skills and technological innovation, among the findings show that, although more than 60% of companies have basic access to digital technologies, less than 25% use advanced tools such as e-commerce or management software; Investment in training and adoption of emerging technologies is limited, while external factors, such as high costs and lack of regional infrastructure, aggravate the situation. This study concludes that inclusive public policies, accessible training programs, and a strengthened digital ecosystem are essential to close the digital divide and improve the competitiveness of SMEs in the region.

Keywords: Digital transformation, competitiveness, sustainability, financial management, SMEs.

Introduction

In the Colombian economic context, small and medium-sized enterprises (SMEs) represent 99% of registered companies, generating 80% of formal employment and

contributing 35% to the Gross Domestic Product (Confecámaras, 2023); the importance of SMEs lies not only in their economic impact, but also in the advantages they present over large companies, such as the ease of creating jobs, their tendency to innovate and their ability to adapt products and services to the needs and demands of consumers (Rothwell, Sulivan and McLean, 2005). Ramos Vecino (2023) highlights that the perception of the usefulness of ICT plays a determining role in the decision of SMEs to adopt these technologies, directly influencing their organizational performance and the optimization of their internal processes.

Colombia has defined the regulatory framework for SMEs, promoting their development. However, recent studies indicate that, although 68% of these companies have adopted some form of digital technology, only 20% use advanced tools such as e-commerce platforms or business management software (MinTIC, 2023). These figures reflect a significant gap in technological adoption, particularly in regions such as Boyacá, where SMEs constitute the core of the business fabric.

This sector, however, faces significant challenges, particularly in a globalized environment marked by accelerated digital transformation. Factors such as a shortage of financing, insufficient technological infrastructure, and resistance to organizational change limit its ability to compete effectively against large corporations (ECLAC, 2022; IDB, 2023). The COVID-19 pandemic also underscored the urgent need for digitalization, showing that companies with greater technological capabilities were able to adapt better to the crisis.

The Boyacá region, characterized by a high concentration of microenterprises, is no stranger to this problem. According to data from the Ministry of Information and Communications Technologies (MinTIC, 2023), although 68% of SMEs in the country have adopted some basic digital technology, less than 25% use advanced tools such as e-commerce platforms or business management software. In Boyacá, this situation is aggravated by external factors such as insufficient technological infrastructure, high implementation costs, and limited access to government incentives. These challenges hinder not only the improvement in the productivity of companies, but also their capacity for innovation and sustainability.

In this scenario, this study seeks to analyze the impact of digital transformation on SMEs in Boyacá, focusing on their ability to compete and sustain themselves in a dynamic market. Key indicators such as technological infrastructure, ICT training and business innovation are considered, evaluated in 89 companies in the municipalities of Tunja, Duitama and Sogamoso, which concentrate 70% of the SMEs in the region. This analysis is part of a rigorous methodological approach, supported by studies by organizations such as ECLAC, the IDB and the MinTIC, and local regulations.

The document is structured in five main sections. First, the theoretical framework explores the conceptual foundations of SMEs and ICTs. The methodology then details the non-experimental design used in the research. Subsequently, the results present the main findings, followed by a discussion that connects these results with public policies and regional challenges. Finally, the conclusions summarize the practical implications and offer recommendations to close the digital divide and improve the competitiveness of SMEs in Boyacá.

This study is relevant both at the academic level, where it allows to expand knowledge on the factors that influence the digital transformation of SMEs in regions with structural limitations; From a practical perspective, it provides valuable information for entrepreneurs, public policymakers, and actors in the digital ecosystem, allowing the design of strategies that promote digitalization, close the technological gap, and strengthen regional competitiveness. In addition, the research responds to the priorities established in the National Development Plan (2022-2026), which seeks to promote connectivity and equitable access to ICTs.

Theoretical Framework

This chapter develops the conceptual bases on small and medium-sized enterprises (SMEs) and the adoption of information and communication technologies (ICT), analysing their evolution in the last decade (2013-2023) and their impact on business competitiveness.

Description of SMEs

SMEs represent an essential component of developing economies, being responsible for more than 99% of companies in Latin America and generating approximately 60% of formal employment (ECLAC, 2018). In Colombia, SMEs are regulated under Law 590 of 2000, amended by Law 905 of 2004 and Decree 957 of 2019, which establishes clear criteria for their classification according to income, number of employees and economic sector (Congress of Colombia, 2004). These companies have shown a remarkable capacity for adaptation, especially during periods of crisis such as the COVID-19 pandemic, which accelerated the digitalization of their processes (Confecámaras, 2023).

Although SMEs contribute significantly to formal employment, their share of total sales and their ability to compete with large companies remain limited. This imbalance is due to factors such as financial constraints, lack of adequate technological infrastructure, and shortcomings in digital skills, which reduces their competitiveness in globalized markets (IDB, 2021).

Historically, SMEs were considered marginal in economic development processes. However, their contribution has been revalued due to their ability to generate employment, promote social equity and adapt to consumer demands. According to Drucker (1993), the success of organizations lies in how they define their mission and vision, which allows them to take advantage of specific market niches and respond effectively to changes in the environment.

In the case of Colombia, SMEs play a crucial role in economic growth, especially in regions such as Boyacá, where they are the engine of the business fabric. However, structural gaps in terms of access to ICTs limit their ability to scale and compete in broader markets (ECLAC, 2022)

Importance of SMEs in Economic Development

For a long time, SMEs were seen as marginal in economic development processes. Ruiz (1995) pointed out that in the seventies they were considered secondary; however, in recent decades, their contribution has been revalued for their ability to generate employment, adapt to productive flexibility and contribute to social equity.

Drucker (1999**),** in his concept of "Business Theory", argues that the success of organizations depends on how they conceive their mission and business vision, an idea that is still valid in the context of SMEs that manage to identify and take advantage of market niches. According to UNESCO (2013), ICTs are essential for the democratization of access to knowledge, especially in small organizations with limited resources.

Impact of ICT on Competitiveness and Innovation

The strategic use of ICT has been identified as a key factor to boost the competitiveness of SMEs. According to ECLAC (2022), companies that invest in digital skills experience an average increase of 20% in their productivity. However, as MacGregor and Vrazalic (2006) point out, the adoption of advanced technologies remains slow in many SMEs due to financial and organizational constraints.

Porter (1980) highlights that business competitiveness is directly related to the capacity for innovation, understood as the ability to integrate emerging technologies and optimize internal processes. In the case of SMEs in Boyacá, this relationship is particularly relevant, since their sustainability depends on their ability to close digital gaps and take advantage of available resources.

Strategies and Policies to Support ICT Adoption

Over the past decade, strategies to encourage ICT adoption have evolved from optional to essential in companies' strategic planning. According to Aragón (2020), programs such as "Business Digital Transformation" have provided subsidies and training to SMEs, allowing more equitable access to digital technologies. However, it is essential that these policies not only focus on infrastructure, but also on the development of digital skills and the creation of collaborative ecosystems that foster innovation (ECLAC, 2022).

Financial Management in SMEs and the Role of ICT

Financial management is a fundamental pillar for the success and sustainability of small and medium-sized enterprises (SMEs). This process includes the planning, organization, management, and control of financial resources, allowing organizations to make informed decisions, optimize the use of capital, and ensure their long-term economic viability (Gitman & Zutter, 2020). In SMEs, financial management is of critical importance due to their limited access to financial resources, dependence on external financing, and vulnerability to economic fluctuations (Beck et al., 2005).

In this context, information and communication technologies (ICTs**)** have emerged as transformative tools to improve financial management in SMEs, where the incorporation of technological solutions, such as digital accounting systems, financial analysis software, and cloud-based platforms, allows companies to automate processes, reduce human errors, and make decisions based on real-time data (Deloitte, 2021). These tools are particularly valuable for SMEs, as they can facilitate cash flow management, income and expense tracking, budgeting, and strategic financial planning.

In addition, ICTs have revolutionized access to sources of financing. FinTech platforms, such as online lending and crowdfunding, have democratized access to

credit for SMEs, offering alternatives to traditional methods of bank financing (OECD, 2020). These platforms not only streamline the loan application and approval processes, but also use advanced algorithms to assess credit risk, reducing barriers to access to capital, it is also noteworthy that digital systems allow a more accurate and accessible record of the financial transactions of SMEs, which facilitates the preparation of tax reports and reduces the risk of penalties for regulatory non-compliance (Ernst & Young, 2020); likewise, the adoption of digital tools can contribute to financial sustainability by identifying unnecessary spending patterns and optimizing the use of resources.

ICT in SMEs: Transformation and Challenges

The advancement of ICT over the past 10 years has radically transformed the business environment, where ICT adoption involves more than an investment in equipment and software; it requires organizational restructuring to effectively integrate these technologies. According to MinTIC (2023), 68% of SMEs in Colombia have adopted some form of digital technology, but only 20% use advanced tools such as business management platforms and e-commerce.

The Inter-American Development Bank (IDB, 2021) highlights that SMEs in Latin America face significant barriers to ICT adoption, such as limited access to financing, lack of qualified personnel, and poor technological infrastructure; these factors limit the competitiveness and innovation capacity of SMEs, which are essential for their sustainable growth.

International organizations such as ECLAC (2022), IDB (2021), MinTIC (2023), OECD (2019) and the World Bank (2021), seek to offer a detailed and updated view of how companies have adopted and used ICT to boost their productivity, competitiveness and innovation in an ever-changing business environment, who through the compilation of indicators allows a better understanding of the areas of progress and challenges faced by SMEs in integration of new technologies in their processes, highlighting their impact on improving efficiency and expanding their operational capabilities. Table 1. presents a summary of the key indicators proposed to measure the use of information and communication technologies (ICT) in companies, especially over the last decade (2013-2023), a period in which digital transformations have redefined the way organizations operate and compete.

Table 1:Key Indicators for Measuring ICT Use in Business

Indicator	Description
B1	% of businesses using computers.
B2	% of employees who use computers on a regular basis.
B3	% of companies that use the Internet.
B4	% of employed people who use the Internet regularly.
B5	% of companies with a presence on the web and social networks. *(The use of social networks is included due to its relevance in the marketing and sales strategy).*
B6	% of companies using intranet and internal collaborative platforms.

B7	% of businesses that receive orders online and use online order management systems.
B8	% of companies that place orders and purchases online through e-commerce platforms.
B9	% of companies using the Internet, broken down by type of access (narrowband, fixed broadband, mobile broadband, fibre optics).
B10	% of enterprises with local area network (LAN) and wide area networks (WANs).
B11	% of businesses using extranets and collaborating with trading partners through secure platforms.
B12	% of companies that use the Internet for activities classified by type (email, videoconferences, teleworking platforms, among others).
B13	Conducting phone calls, video conferences and virtual meetings using advanced Internet protocols (IP and VoIP).
B14	Use of instant messaging, chat applications, and business communication platforms (e.g., Microsoft Teams, Slack).
B15	% of companies that obtain information on goods and services through the Internet and market intelligence platforms.
B16	% of companies that manage administrative and financial operations through digital platforms and ERP systems.
B17	% of companies that interact with government entities through e-government platforms.
B18	% of companies that use electronic banking services and digital payment platforms. % of companies that use ICTs to manage financial resources for strengthening or seed capital.
B19	% of companies that use platforms to access other financial services, such as fintechs.
B20	% of companies that offer customer service online and through artificial intelligence channels (chatbots, virtual assistants).
B21	% of companies that develop and manage online recruitment processes, including recruitment platforms and job portals.
B22	% of companies that carry out ICT training and training for their staff, including the use of e-learning platforms and cybersecurity training.
B23	% of companies using emerging technologies, such as big data analytics, artificial intelligence, and process automation (RPA).
B24	% of companies that implement cybersecurity policies and tools to protect ICT infrastructure.

Source: The Authors

Regulatory Framework in Colombia ICTs and SMEs

The regulatory framework in Colombia has promoted the use of Information and Communication Technologies (ICT) as a key to economic and social development,

highlighting the National Development Plan 2022-2026 and Law 1341 of 2009, amended by Law 1978 of 2019. These initiatives seek to promote digital transformation, connectivity and equitable access to ICTs, especially in SMEs, to strengthen competitiveness and reduce the digital divide. At the international level, Colombia has actively participated in global summits and in the eLAC2022 Plan, aligning itself with the objectives of the Information Society and sustainable development. (ECLAC, 2022).

In the local context, as in Boyacá, it seeks to promote business innovation through the integration of ICTs, promoting collaboration between the government, academia and the private sector. This strategic approach aims to insert Colombia into the global digital economy, improving competitiveness and strengthening digital capabilities in all sectors. (MinTIC, 2023). Drucker (2001) stressed that every company is unique and that management must evaluate how major trends, such as the adoption of information technologies, impact the survival of the organization.

Table 2. Regulatory Framework Structure For SMEs And ICTs In Colombia-Boyacá

Date/Standard	Main Content	Purpose of the Standard
Political Constitution (1991)	It recognises the fundamental role of SMEs in the economy and promotes their development and sustainability.	Establish the principles of promotion and economic development, including the recognition of SMEs as key actors.
Law 590 of 2000	It defines micro, small and medium-sized enterprises and establishes mechanisms for their promotion and development.	Promote the creation, formalization and development of SMEs through policies of support, promotion and access to resources.
Law 905 of 2004	It modifies and complements Law 590, expanded the ranges of operating income, allowing a more inclusive classification adapted to the characteristics of the market.	Update the definition of SMEs, establish incentives and strengthen financing and technical support mechanisms.
Decree 957 of 2019	It classifies companies by economic sectors (industry, commerce and services) based on their annual operating income expressed in UVT, for better application of policies and benefits.	Allow an accurate classification of companies according to their economic sectors and income, facilitating the implementation of differentiated policies adapted to their needs.
CONPES 3484 (2007)	National Productivity and Competitiveness Policy that includes strategies for the strengthening of SMEs.	Formulate strategies that increase the competitiveness and productivity of SMEs, improving their capacity for innovation and adaptation to the market.

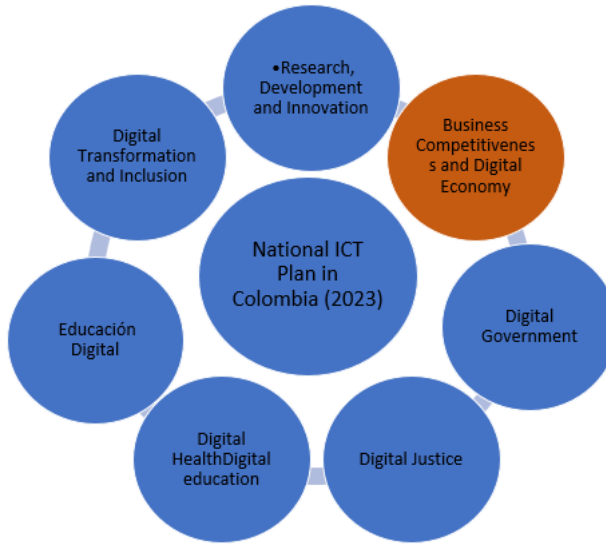
National Development Plan (NDP) 2022-2026	Framework that includes ICT policies and economic growth strategies, aligned with the development of SMEs.	Promote economic development through policies that promote digital inclusion, technological transformation and the growth of SMEs to achieve equitable development.
Business Regulatory Institutions in Colombia	**National Level** Ministry of Commerce, Industry and Tourism Confecámaras (Confederation of Chambers of Commerce) Bancóldex National Guarantee Fund INNPULSA Colombia	**Regional Level (Boyacá)** Government of Boyacá Local Chambers of Commerce Regional Development Agencies SENA (National Learning Service) Regional Entrepreneurship Network

Classification of Companies in Colombia				
Type of Company	**Assets (SMMLV)**	**Operating Income (UVT)**	**Number of Workers**	**Economic Sector**
Microenterprise	Up to 500	Up to 23,563 UVT	Between 1 and 10	Industry, Commerce, Services
Small Business	Greater than 500 and up to 5000	Greater than 23,563 UVT and up to 204,995 UVT	Between 11 and 50	
Medium Business	Greater than 5000 and up to 30,000	Greater than 204,995 UVT and up to 1,736,565 UVT	Between 51 and 200	
Large Company	Over 30,000	Greater than 1,736,565 UVT	More than 201	

UVT (Tax Value Units) are a standardized measure used in Colombia to express monetary values in the tax and regulatory system; the value of the UVT is adjusted annually by the National Tax and Customs Directorate (DIAN) and is used to determine the taxable bases, penalties, tax rates, and other related amounts in the Colombian tax system.

Source: The Authors

Figure 1. Updated Lines of Action of the National ICT Plan in Colombia (2023)



Source: The Authors

Competitiveness and Innovation of ICT in SMEs

The term competitiveness is widely used in the business environment, significantly influencing the way business initiatives are designed and developed. This causes a continuous evolution in business models and entrepreneurs' strategies. According to Qartuppi et al. (2018) highlight that competitiveness in modern organizations is a key factor for their sustainability in dynamic markets, emphasizing the importance of innovative strategies in business management, Díaz, Quintana et al. (2021), competitiveness is a determining factor for the growth of organizations, since it allows them to maintain a privileged position in the market and ensure their permanence in the medium and long term. They define it as the ability of an organization, whether public or private, to maintain and develop comparative advantages in an orderly and precise manner, allowing it to achieve and sustain a prominent position in the social and economic environment. Similarly, the Spanish Association of Accounting and Administration (AECA, 2010) describes competitiveness as the ability of an organization to acquire and maintain comparative advantages that allow it to achieve and improve its position in the socioeconomic context in which it operates.

Porter (1980) argues that competitiveness is directly related to productivity, which he defines as the value generated by a unit of labor or capital. To assess a company's competitiveness, it is crucial to analyse both the company and the sector in which it operates, identifying the factors that allow organisations to generate added value and their ability to maintain it in the market. These factors must be sustainable in the medium and long term. The main indicators of competitiveness, according to Porter, include: Positioning in the sector: The ability to stand out from the competition and attract a solid customer base; Technological innovation and management methods: The incorporation of advanced technologies, such as ICT, and the implementation of efficient management strategies that optimize internal processes; Efficiency in manufacturing costs and use of human resources: The ability to reduce costs without compromising quality, optimizing human and technological resources.

In the last decade, the adoption of information and communication technologies (ICT) has been a transformative factor for SMEs, contributing to the improvement of competitiveness and innovation. According to an ECLAC report (2022), SMEs that integrate ICT into their business processes have improved their productivity by 20% on average, compared to those that do not. In addition, digitalization allows companies to adapt more quickly to market changes and improve operational efficiency.

The Inter-American Development Bank (IDB, 2021) stresses that investment in ICT and human capital training are essential for SMEs to be able to take full advantage of these technologies. Companies that adopt new digital tools not only improve their management and production capacity, but also strengthen their competitive positioning in the sector, driving innovation and long-term sustainable value creation.

Methodological Framework

The present study is framed in a non-experimental and descriptive methodological design, aimed at observing and analyzing reality without manipulating the study variables. The research is based on the study proposed by the CEA, ECLAC and OSILAC, which prepared a diagnosis with relevant observations and recommendations on the key indicators for measuring the adoption and use of ICT in companies.

Population and Sample

Brito (2002, p. 38) defines population as a "finite or infinite set of elements, people, or things belonging to the researchers who wish to carry out." According to the author, Arias (2006, p. 83) defines a sample as "a representative and finite subset that is extracted from the accessible population"; according to the above, the population under study is composed of a total of approximately 17,580 companies registered in the department of Boyacá, mainly concentrated in the municipalities of Tunja (4,557 companies), Duitama (2,533) and Sogamoso (2,776) (Confecámaras, 2023). These cities were selected for being the main economic centers of the region and for concentrating more than 70% of the department's business fabric.

The sample was defined by means of a proportional stratified sampling, dividing the population into strata according to the selected cities and classifying the companies into micro, small and medium-sized enterprises, in accordance with the criteria established by Law 905 of 2004 and Decree 957 of 2019; Micro-enterprises (1-10

employees**):** They represent the majority of the business fabric and are key to evaluating the adoption of ICT at a basic level; Small Businesses (11-50 employees**):** Allow you to understand the use of ICT in a context of business growth and expansion; Medium-sized companies (51-200 employees): They offer a more structured view of the use of advanced technologies and management methods. The representativeness of each stratum was guaranteed considering a confidence level of 95% and a margin of error of 5%. Thus, the sample was made up of 87 companies, distributed as follows: See table No. 3

Table No. 3 Population and sample

City	Microenterprises (1-10 employees)	Small Businesses (11-50 employees)	Medium Enterprises (51-200 employees)	Total, Companies by City	Proposed Sample Size
Tunja	4299	205	53	4557	40
Duitama	2370	122	41	2533	22
Sogamoso	2594	135	47	2776	25
Total	9263	462	141	9,866	87

Source: The Authors

Data collection was carried out through a structured survey composed of 45 closed questions, designed based on a Likert scale. According to Hernández, Fernández & Baptista (2014), this scale is defined as "a set of items presented to which the subject is asked to externalize his reaction by choosing one of the points of the scale". This approach allowed the quantitative measurement of respondents' perceptions and opinions in a systematic and replicable way.

The instrument was designed following the methodologies established by the CEA, ECLAC and OSILAC, ensuring methodological rigor aimed at collecting essential information for the objectives of the project. The variables included reflect key dimensions related to the adoption, use and impact of Information and Communication Technologies (ICT) in SMEs, organized as follows:

1. Company Identification (5 items): Includes indicators on size, economic sector, geographical location and years of operation.
2. ICT infrastructure (5 items): Evaluates aspects related to the availability of hardware, Internet connectivity and use of basic and specialized software.
3. ICT Training and Skills (5 items): Analyzes the technological training of personnel, the frequency of training and investment in the development of digital competencies.
4. Use of ICT in Business Processes (5 items): Examines the integration of ICT in e-commerce, information management and the use of online collaboration tools.

5. Adoption and Use of the Internet (5 items): Considers digital presence through websites and social networks, as well as the use of electronic communication tools.
6. Innovation and Technological Development (5 items): Measures investment in emerging technologies and the implementation of technological innovations in the company.
7. External and Institutional Factors (5 items): Analyzes financial limitations, access to government support, and the impact of public policies related to ICTs.
8. Financial management and ICTs (10 items): Analyzes the dynamics of SMEs with the use and planning of ICTs for resource management.

The questionnaire was validated by experts in the field, ensuring the relevance and clarity of the items. Data collection was carried out over a period of three months, using an online platform to facilitate access to entrepreneurs and ensure efficiency in the collection of responses; Prior to the application of the survey, the informed consent of the participants was obtained, ensuring the confidentiality and ethical use of the data.

The data obtained were analyzed using descriptive statistical tools, such as frequencies, percentages, and weighted averages, to identify patterns and trends in ICT use. In addition, comparative analyses were used between the defined strata (micro, small and medium-sized enterprises) to evaluate significant differences in ICT adoption.

RESULTS

The analysis of the results obtained shows that the surveyed companies, mostly microenterprises, show a moderate level of adoption of Information and Communication Technologies (ICT), with a significant use in basic aspects such as Internet connectivity (78.65%) and presence on social networks (78.65%), which reflects an intention to maintain channels of interaction with customers and suppliers. However, this adoption does not translate into complete integration into strategic processes, as only 44.94% of companies report having partially digitized their operations and only 33.71% use advanced tools such as ERP or CRM.

In addition, although the use of electronic banking reaches 38%, e-commerce is at low levels (28.09%), which limits the use of digital opportunities in the market. This situation is aggravated by the limited investment in technological innovation, where only 20.22% of companies allocate resources regularly, and only 4.49% report the use of emerging technologies such as artificial intelligence or big data, which reduces their ability to compete in more dynamic environments.

ICT training is presented as an area with potential for improvement, since, although 50.56% of companies offer training to their employees, the impact on work performance is perceived as moderate due to the low budget allocation (22.47% allocate more than 5% of the budget to this item). In addition, the lack of advanced cybersecurity, reported by 33.71% of companies, puts both internal data and online operations at risk, hindering progress towards secure digitization. Regarding external factors, significant barriers were identified such as high implementation costs and lack

of adequate technological infrastructure in the region, which affects the adoption of ICTs, especially in microenterprises. Finally, government support programs and external financing have a limited scope, with only 15% of companies actively participating, which shows the need to strengthen these initiatives to increase the technological and competitive capacity of companies in the region, as can be seen in Figure No. And the Table of results of sessions 1 to 7, allowed relevant data to be obtained.

Figure No. 2. In original language Spanish

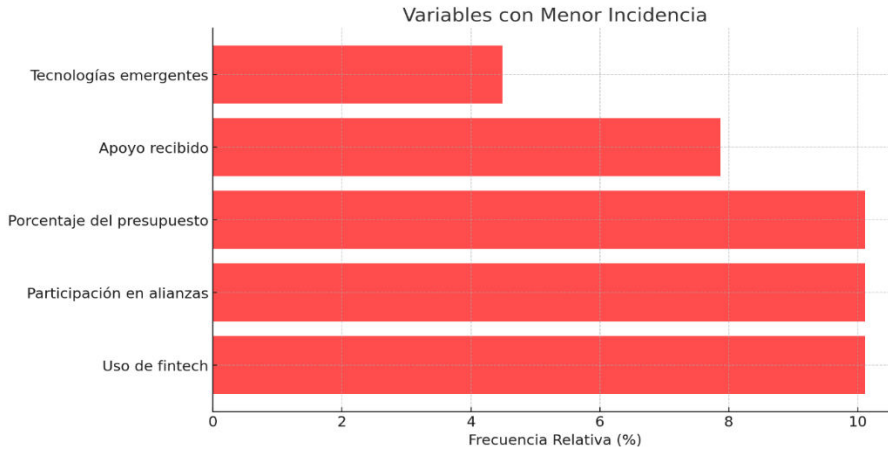


Table No. 4

Section	Variable	Absolute Frequency (N)	Relative Frequency (%)	Stocking/ Average	Standard deviation
Section 1: Company Identification	Company size	70	78,65	-	-
	Economic sector	65	73,03	-	-
	Geographical location	89	100	-	-
	Use of ICT	80	89,89	85%	±10%
Section 2: ICT Infrastructure	Hardware Availability	76	85,39	-	-
	Connection Type	70	78,65	-	-
	Connection speed	35	39,33	38 Mbps	±12 Mbps
	Cybersecurity	30	33,71	-	-
Section 3: ICT Training and Skills	Regular training	45	50,56	-	-
	ICT Budget	20	22,47	4.5%	±1.2%
	Impact of training	60	67,41	-	-
	ICT Skills	55	61,8	-	-

Section 4: Using ICT for Business Processes	Process digitalization	40	44,94	45%	±10%
	Management software	30	33,71	-	-
	Collaboration tools	22	24,72	-	-
	Active social networks	60	67,42	-	-
Section 5: Internet Adoption and Use	Internet presence	70	78,65	-	-
	Digital Sales	25	28,09	-	-
	SEO Optimization	18	20,22	-	-
	Online Cybersecurity	27	30,34	-	-
Section 6: Innovation and Technological Development	Investment in innovation	18	20,22	-	-
	Percentage of budget	9	10,11	-	-
	Emerging technologies	4	4,49	-	-
	Impact of innovation	13	14,61	-	-
Section 7: External and Institutional Factors	Program Knowledge	13	14,61	-	-
	External factors	15	16,85	-	-
	Participation in alliances	9	10,11	-	-
	Support received	7	7,87	-	-

Most of the companies surveyed use basic digital financial management tools (accounting software), where more than 60% of financial operations are digitized, which reflects a medium-high level of adoption, it can be said that there are opportunities for improvement such as Increasing the use of digital payment platforms and fintech services, given their low level of implementation in addition to increasing the budget allocated to digital tools to improve coverage Technological; manage training on the subject since they limit adoption and use. It is gratifying to see how companies that have adopted digital financial technologies report significant improvements in efficiency, evidencing a positive return on investment, in more detail you can see the results in table No. 5 and Figure no.3

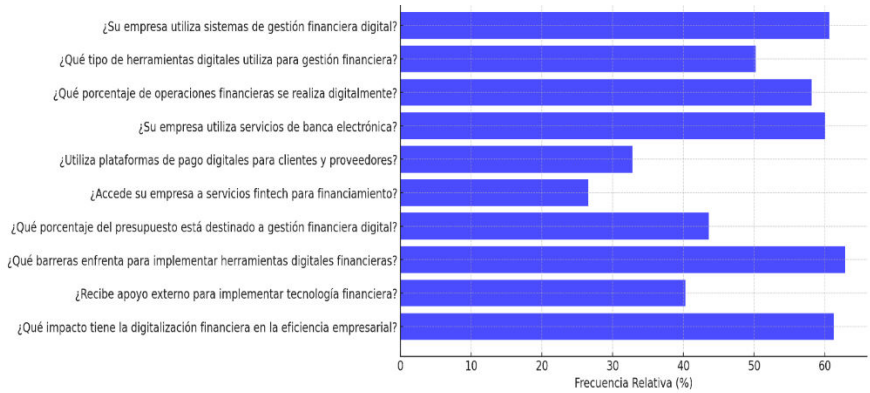
Table No. 5 Results Financial management with ICTs.

Question	Absolute Frequency	Relative Frequency	Interpretation:
1: Does your company use digital financial management systems?	35 companies reported the use of digital financial management systems	65%	More than half of companies have implemented digital systems for financial management, indicating a positive development in the digitization of their accounting and administrative processes.

2: What kind of digital tools do you use for financial management?	40 companies reported the use of varied digital tools	70%	The adoption of tools such as accounting software (e.g., Siigo or QuickBooks) is high, reflecting a significant disposition towards financial automation.
4: Does your company use e-banking services?	45 companies use electronic banking	50%.	Although common, the use of electronic banking services could be higher considering the benefits in terms of speed and security
5: Do you use digital payment platforms for customers and suppliers?	25 companies reported the use of these platforms	45%	This result shows an opportunity for growth in the implementation of platforms such as PayPal or Mercado Pago to improve transactions
6: Does your company access fintech services for financing?	15 companies reported access to fintech services	25%	: The low adoption of fintech suggests ignorance or barriers to access, despite the benefits of these platforms for agile and flexible financing
8. What barriers do you face in implementing digital financial tools?	30 companies reported barriers.	55%	The most common barriers include high costs, lack of trained staff, and resistance to change, suggesting critical areas for intervention
9: Do you receive external support to implement financial technology?	20 companies reported receiving external support.	35%	Although some companies receive support (e.g., consultancies or incentives), this remains limited and could be expanded through government programs or strategic partnerships.
Question	Average	Standard deviation	Interpretation:
3: What percentage of financial transactions are carried out digitally?	60% of financial operations are managed digitally.	±15%.	Although the average is high, the standard deviation indicates considerable variability between firms, with some fully digitized and others still with manual operations

7: What percentage of the budget is allocated to digital financial management?	5% of the annual budget is allocated on average	±2%.	Although budget is allocated, it is low, which could limit the adoption of more advanced and effective tools
10: What impact does financial digitalization have on business efficiency?	70% of companies perceive significant improvements.	±10%.	Companies that have adopted digital technologies report a substantial improvement in operational efficiency, highlighting the importance of continuing to promote financial digitalization

Figure No. 3. In original language Spanish



Conclusions

Microenterprises are the central axis of the business fabric in the region; however, their limitations in income, access to technology and training place them in a vulnerable position in the face of a constantly changing competitive environment. This scenario highlights the need to implement specific strategies that include technical, financial, and educational support adapted to the characteristics and capabilities of these companies, to ensure their sustainability and growth.

Small and medium-sized enterprises (SMEs) in Boyacá face a challenging landscape in their transition to digital transformation. Despite the fact that more than 60% of companies have adopted basic digital technologies, such as internet connectivity and social media presence, the integration of advanced tools into strategic processes remains limited, with only 33% using business management platforms. This scenario highlights the need to design specific programs that promote the adoption of emerging technologies, improve ICT training, and facilitate access to financial resources for technology investment.

In addition, financial digitalization has proven to be a key axis for improving business efficiency. Companies that have adopted tools such as accounting software and

electronic banking services report significant increases in productivity and resource optimization. However, the low implementation of digital payment platforms and fintech shows opportunities for improvement to strengthen business competitiveness in increasingly digitized markets.

Finally, it is concluded that limitations in technological infrastructure, lack of specialized training and high implementation costs continue to be significant barriers for SMEs in the region. Overcoming these barriers will require coordinated efforts between the public and private sectors, with an emphasis on creating an inclusive digital ecosystem that allows SMEs not only to adapt to changes in the environment, but also to compete in global markets.

Discussion

The analysis shows a high concentration of microenterprises in the region, highlighting them as the main engine of the local economic fabric. These companies, although fundamental in the generation of employment, face important challenges to guarantee their sustainability and growth in a competitive environment. This finding is consistent with studies by the CEA, ECLAC and OSILAC, which recognize microenterprises as key actors, but also as the most vulnerable to technological and market changes. In this context, their limited capacity to adopt information and communication technologies (ICTs) becomes a critical obstacle that demands priority attention.

The findings show that microenterprises, as the main component of the business fabric of Boyacá, face great challenges in the adoption of information and communication technologies (ICT). Although these companies have made progress in basic aspects such as connectivity and the use of social networks, the integration of advanced technologies in strategic processes is still limited. This result coincides with studies by ECLAC and the IDB, which highlight the vulnerability of microenterprises to technological and financial barriers.

In terms of financial digitalization, companies that have implemented digital technologies report clear benefits, such as improvements in operational efficiency and business management capacity. However, the low adoption of digital payment platforms and fintech reflects a lack of knowledge and access to these tools. This fact highlights the need for specific dissemination and training programs that promote its use.

On the other hand, ICT training is presented as a critical area that requires priority attention. The lack of formal programs and the low frequency of updating digital skills limit the ability of companies to adapt to a competitive environment. This aspect is consistent with ECLAC's recommendations, which underline that the development of human capacities is essential to close the digital divide.

Finally, external barriers, such as insufficient technological infrastructure and high implementation costs, reinforce structural inequalities in the region. Overcoming these limitations will require significant investments in digital infrastructure, economic incentives, and collaborative strategies between government and the private sector. This approach will not only reduce the digital divide, but also ensure that SMEs in

Boyacá can take full advantage of the opportunities of digital transformation and compete in global markets.

These reflections highlight the importance of designing strategies that consider the particularities of micro, small and medium-sized enterprises in Boyacá, prioritizing equity in access to technologies and sustainability in their integration.

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