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Business digitization and its influence on competitive advantage in SMEs in the pastry sector in Huancayo

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A B S T R A C T

The digital transformation of companies enables process improvement, innovation, efficiency, and the strengthening of competitive advantage in the pastry industry in the market. The present research aims to determine the relationship between digitization activities and competitive advantage in pastry companies in the city of Huancayo. The methodological development was carried out in accordance with the general scientific method, using the hypothetical-deductive method with a non-experimental and cross-sectional design. It was an explanatory study that sought to determine the two-dimensional relationships between variables. Data was collected from 172 companies operating in the medium-scale pastry sector in the city of Huancayo. The information collected was processed using the structural equation modeling (SEM) method. The results show a significant relationship between three dimensions and competitive advantage, with a correlation coefficient of 0.841 in the technological infrastructure dimension, 0.794 in the marketing dimension, and 0.871 in the digital management and processes dimension. The main conclusion of the research is that digitization, understood as a comprehensive process, drives efficiency, innovation, and differentiation. In Huancayo's bakeries, digital marketing and process management significantly strengthen competitive advantage and business sustainability.

1. Introduction

Digitalization is now a pillar of business competitiveness worldwide. Yet there is still a large gap between big and small companies in this regard (Acciarini et al., 2022). Although the World Bank reports that the share of microenterprises investing in digital solutions doubled from 10% to 20% between 2020 and 2022, this figure still accounts for 80% of these companies that are not able to incorporate digital tools in their daily activities, meaning they are falling behind in an increasingly agile and automated market. This is exacerbated by the fact that digital transformation is not just a tool of social media marketing, but a necessity for an organization to change its processes at all levels of operation (Sitaridis & Kitsios, 2024). Automation of stock orders, digitization, e-invoicing, and data management not only saves costs and time, but it also allows for the introduction of new ideas. The lack of such tools in microenterprises is clearly lagging behind the world trend.

The impact of that divide is stark: the giant companies are using artificial intelligence, data analytics, and value chain coordination, while microenterprises remain mired in manual, experience-based methods. This makes them less competitive, since they do not have the freedom to immediately adapt to shifts in demand or to the expectations of a more digital consumer.

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The transformation of digital in Latin American countries is uneven. Although there have been large investments in infrastructure and connectivity, reports by international bodies point to a wide gap in the productive application of these tools (Petrova & Petrov, 2024). The vast majority of micro and small businesses in the region are still at the beginning of digitalization, limited to having a couple of social media pages without getting into process innovation. This disparity is crucial since it influences the traditional sectors' competitiveness directly, such as bakery and pastry shops. Here, its separation is not only a matter of product quality, but also of efficient input management, production control, and order fulfillment (Matalamäki & Joensuu-Salo, 2022). Without the processes being digitized, these microenterprises are a step behind the large chains that do use digital means to streamline their operations.

Although the governments of Latin America have tried to incentivize the digitalization of MSMEs, these programs of investment and training are usually geared towards technology or high-impact sectors, ignoring family or local businesses (Matalamäki & Joensuu-Salo, 2022). In other words, a large number of microenterprises operating in the food and beverage industry have no access to finance or assistance to adopt digital tools that can transform the way they work internally. In Peru, micro, small, and medium-sized enterprises (PYMES) form the backbone of the national economy, constituting approximately 99.5% of all businesses and employing over 80% of private sector workers. However, their level of digitalization remains low (Matalamäki & Joensuu-Salo, 2022). A very small number of microenterprises have utilized digital management or invoicing options such as electronic invoicing; instead, an overwhelming percentage rely on traditional methods that limit their productivity and ability to differentiate themselves. This difference in technology application is particularly evident in areas such as bakeries and patisseries, predominantly operated by micro and family businesses. The demand for bakery products is steady and increasing even in areas such as customised production and online services, but the nation's supply is very much dependent on manual labour, with little automation, drudgery and no innovation in production and sales mgmt.

The consequences are obvious: While some of today's bakeries have adopted online ordering, digital menus, and inventory management software, many still rely on notebook jottings, phone calls, or home-baked solutions passed down shared recipes. It keeps them out of a market whose service expectations are speed, customization, and reliability. At the regional level Junín has a diversity of economic realities, although trade and services are the main axes of job creation. In Huancayo, its capital, bakeries occupy a privileged place in the local gastronomic scene, but suffer from structural limitations. Their ability for modernization is hindered by both the lack of access to financing and a weak culture of technological innovation. These bakeries mainly use manual labor and traditional methods of managing the business. The absence of digital tools to monitor costs, trace inputs, and manage orders leads to waste, inefficiency and lost opportunities for new market expansion (Bouwman et al., 2018). Therefore, their viability and competitiveness in the long run is threatened. Digitalization-based process innovation thus represents a promising, but hitherto an underexploited, lever. The introduction of basic management systems, electronic invoicing, digital delivery services, and the partial automation of production, have the potential to change the way these micropisos shop for market share. Conversion, however, is not immediate. Local bakery owners also have to confront barriers to knowledge, investment and access to expert advice on modifying technologies for application in their context (Neligan et al., 2023. As a result, the majority of the measures boil down to opening a Facebook or WhatsApp Business page, rather than making any changes to the processes within. The situation is even critical when we consider that the consumers in Huancayo change their buying behaviors. Now they want it faster, more reliably, with digital payment and ordering capabilities. And if they don't, they will start to lose business to other companies and perhaps national chains—that already have the digital infrastructure in place.

In essence, the problem is the distance between what could be made available to Huancayo bakeries through digitalization and what they are actually able to access. The absence of technological and organizational integration within the production and business operations restrains potential creativity and novelty generation. To surmount this challenge means to realize that digitalization is more than a marketing instrument, but rather a holistic approach which when the means are properly aligned can bring about sustainability, differentiation and growth in the marketplace. Thus, the purpose of this study is to identify the impact of business digitalization with its dimensions (i.e. Management and digital processes, technological infrastructure, and Marketing and digital presence) on competitive advantage in the bakery industry.

2. Literature review

2.1. Business digitalization

Business digitalization is described as the application of digital technology to transform services businesses, through replacing non-digital or manual processes with digital processes within business models (Rachinger et al., 2019). It is more than simple application of technological instruments, but a deep change in the way of collecting and managing information, making decisions and interacting with the environment, that interior (processes) and outside (customers, suppliers, and markets). From an operations viewpoint, business digitalization is the application of technological infrastructure, management systems and digital platforms for business processes that enable automation of activities, cost reduction, and resource optimization (Rachinger et al., 2019). Therefore, are made more fluid, accurate, and scalable in the production, administrative and commercial processes. In addition, digitalization allows data to be gathered and analysed in real time, giving companies

increased agility in responding to evolving market needs and consumer tastes.

Finally, at the strategic level, digitalization is becoming an enabler for innovation and sustainable competitive advantage. When traditional processes are transformed into digitized processes, companies not only improve their efficiency, but they also create new business opportunities, access larger markets, and build stronger customer relationships via digital channels (González & Martínez, 2014). In such a scenario, the digitization of enterprises is no longer a choice but their survival and development in the intense global competition.

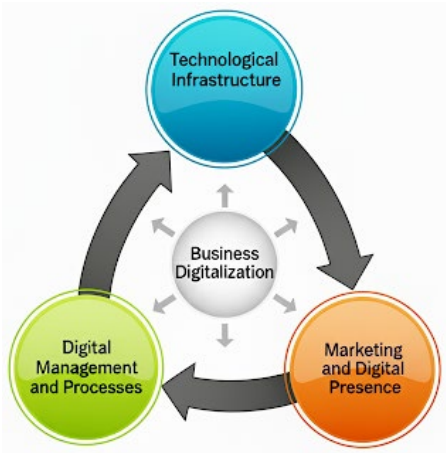

Fig. 1. Dimensions of business digitalization

a. **Technological infrastructure:** Technological infrastructure is defined as the physical and virtual components required for the provision of information technology (IT) services (Arms 2019). It involves hardware, computing equipment, software, network infrastructure and digital solutions used to manage an organisation internally as well as with its customers and suppliers. (Armas, 2019) this infrastructure is what ensures that things are done quickly, safely, and reliably.

In business "adequate technological infrastructure" does not just mean having access to the internet or basic tools, but also the capability to connect with systems for e-billing, for selling online, and for storing data. For the smallest of businesses, such as bakeries, this infrastructure is necessary as a baseline in a process of modernization that links them to a wider and more competitive marketplace.

b. **Digital management and processes:** Digital management and process is the method by which an organization applies digital tools to reshape its production and administrative processes (Plaza, 2019). This ranges from task automation, inventory control, order digitization and data organization to effective inter-business unit coordination. The outcome is time savings, error reduction and decision-making enhancement.

2.3 Transformation of internal and B2B processes

This dimension is the ability for a company to apply digital solutions to the organization of its own processes and to the organization of the business with its partners. In the case of bakeries, that means digitizing inputs, batching production, monitoring sales in real time and cost-accounting (Armas, 2019). So, digitalization is not just about having an online presence, but it affects the efficiency of the firm even in terms of sustainable growth.

c. **Marketing and digital presence:** Digital marketing and presence are the practice of utilizing digital channels and platforms to present a brand, gain customers, and maintain business relations. communication on social media, websites, delivery apps, online ads and digital messaging services (Ritter & Pedersen, 2020). Companies can use these tools to reach more customers, offer more personalized customer service, and create loyalty.

And for small businesses, this dimension becomes critical for competing in an ever more digital market. A bakery, for example, can use social media to display its products, take custom orders or run promotions. In that sense, the role of digital marketing in visibility, contributes to sales increase and consolidates the competitive advantage in a local area.

2.2. Competitive Advantage

The term "competitive advantage" describes the situation where an enterprise stands out from the competition in the competitive environment due to some business characteristics. It is not only in terms of the good quality product and low price but also about how it develops capabilities, resources and strategies to compete to give customers unique and comparative

products (Porter, 1985). This let it express itself as a product, process, service differentiation, innovative, cost reduction, superior customer relation or such. From the strategic point of view, competitive advantage arises when a firm is able to transform its resources and capabilities into a sustainable position of strength that is not easily emulated (Buendía Rice, 2013). Therefore, always innovate, know your market and process efficiently and you will raise barriers to competition that will make your business survive in the long run. Competitive advantage, in this sense should not be an static ideal but a moving one as the organization's ability to adapt and continually improve plays a critical role. Nowadays, when market competition is so high and customers are more demanding, competitive advantage is the determining factor of survival and growth for any enterprise (Porter, 2007). The organizations that seem to be the best at growing and becoming more stable are those that have some combination of differentiation, cost leadership, or focus within a particular niche segment. In the final analysis, competitive advantage is nothing more than an intelligent strategy that balances innovation, efficiency, and a focused market viewpoint to achieve long-term success.

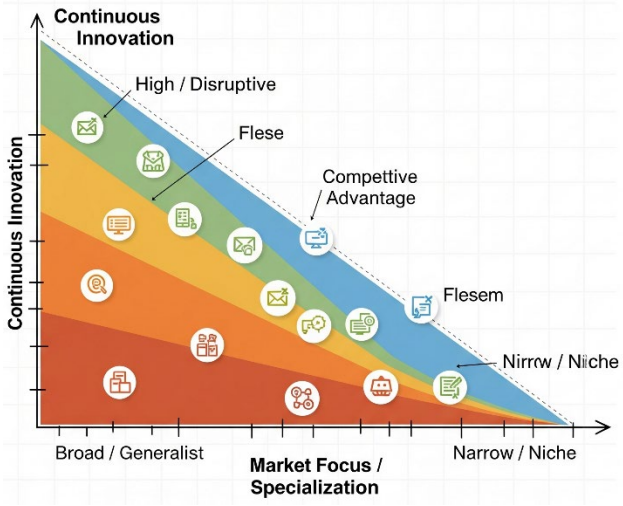

Fig. 2. Main elements of competitive advantage

A company achieves competitive advantage when it correctly balances two core dimensions of its business: how to differentiate through innovation and how to define and target its market (Cañar Tinitana & Hidalgo Ávila, 2021). Those organizations that are able to focus on continued innovation while at the same time targeting their offerings to a well-defined group of customers can separate, sustain, and outperform their competitors. On the other hand, those who fail to innovate or to clearly articulate who they serve, are left behind in obscurity and have limited potential for sustainable growth.

a. **Market focus or specialization:** A company gets a competitive advantage when it successfully combines these two basic elements, among others: the capacity to innovate constantly and its talent to identify and serve a market with precision (Cañar Tinitana & Hidalgo Ávila, 2021). Continuous innovation committed organizations, and at the same time, clearly address their offering to a well identified target group, can be different, keep themselves over time and beat their competitors. On the other hand, companies that are either not innovative, or don't have a clear definition of whom they serve, are left behind with poor growth potential and limited options of keeping a sustainable edge.

In essence, market specialization reinforces competitive advantage in that it minimizes effort dispersion and focuses the value proposition on a well-defined target market. For example businesses such as bakeries can diversify their product lines by making customized wedding cake, healthy dessert or party pastries etc that not only earn customer loyalty but also permit them to carve a place in a less competitive market.

b. **Continuous innovation:** It encompasses the capacity of an entity to create and apply ongoing enhancements to its products, processes and services to be able to adjust to changes in its environment and to keep its market position (Limas Suárez & Sierra Forero, 2023). This dimension is not only related to radical or disruptive innovation, but also to incremental improvements that, accumulated over time, lead to greater efficiency and value for customers.

By promoting an atmosphere of continual innovation, the company differentiates itself and quickly responds to the market (consumer trends) (Cabiço Muibo et al., 2022). For bakeries, continuous innovation could be the launch of a new flavour, creative presentations on old favourites, sustainable packaging or the use of digital platforms for ordering and payments. All of this contributes to building a competitive advantage that is difficult to imitate and durable.

2.3. Structural equation model

SEM (Structural Equation Modeling) is a sophisticated statistical method that can be used to analyze at once several relationships among observed variables (indicators) and latent variables (theoretical constructs that are not directly observable). Traditional statistical methods are not combined in SEM; rather, confirmatory factor analysis and multiple regression analysis are integrated into one model to test theoretical complex models and to assess hypotheses concerning the manner in which variables relate to one another in a phenomenon (Romero-Sánchez & Barrios, 2023).

SEM is particularly useful in social and management sciences as it allows the causal relationships put forward in a theoretical model to be represented graphically and the fit of the theoretical model to observed data be evaluated (Legate et al., 2023). This not to mention imply that it is easier to check whether these proposed relationships are statistically supported or not and to see how well the latent variables are explained by the selected dimensions and indicators. In brief, SEMs are an enabler to confirm conceptual models and to deliver robust evidence in scientific research (Guenther et al., 2023).

3. Methodology

3.1 Research methodology

This was applied research in which it was intended the analysis of the problem under study and its effects sought to produce a knowledge that could be applied to the business reality (Luz et al., 2018). The study applied a non-experimental design in which the variables were not manipulated but observed and described as they occurred in real life (González, 2019). In this case, the analysis was conducted in a natural setting, without conditioning the environment, or contextualising the situations in the truth of study units.

This way we could detect some variable relations by a statistical inference procedure to approach the existing dynamics in the studied industry (Gallardo, 2017). The sample consisted of 172 microbusinesses in the bakery sector in the city of Huancayo, chosen for being those appearing in the official records of the Chamber of Commerce of Huancayo. This institution, recognized for its work in promoting business registration, organizational strengthening, and productive coordination, plays a fundamental role in driving the economic and social development of the region and the country as a whole.

3.2 Research Model

The research model is presented in the following figure.

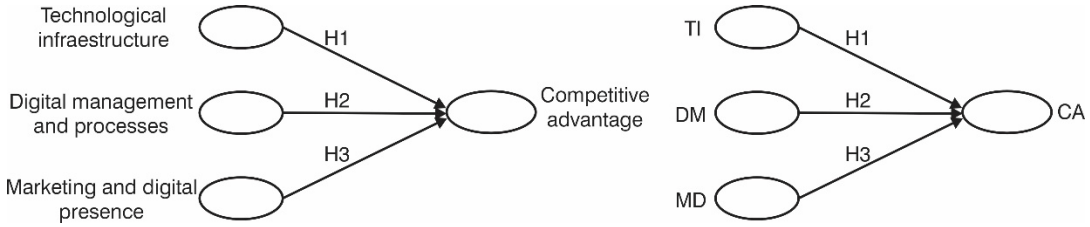

Fig. 3. Proposal of theoretical model and model using structural equations.

According to the model presented, the specific hypotheses raised were the following:

Specific hypothesis 1 (H1) Technological infrastructure (Ti) significantly impacts competitive advantage (CA) in the Huancayo pastry industry.
Specific hypothesis 2 (H2) Digital management and processes (Dm) significantly impact the competitive advantage (CA) in the Huancayo pastry industry.
Specific hypothesis 3 (H3) Marketing and digital presence (Md) significantly impacts the competitive advantage (CA) in the Huancayo pastry industry.

The theoretical model proposes that the **competitive advantage (CA)** of organizations is the result of the influence of three key dimensions related to digital transformation and strategic resource management.

Theoretical model relationships

Relationship H1: Technological infrastructure (IT) → Competitive advantage (CA)

It is established that technological infrastructure has a direct impact on competitive advantage. This implies that the more robust, modern, and adaptable the technology implemented in an organization, the greater its potential for generating efficiency, innovation, and market differentiation.

Relationship H2: Digital management and processes (Dm) → Competitive advantage (Ca)

The second relationship indicates that process management and digitalization influence a company's ability to achieve competitive advantage. Proper digital management allows for the optimization of resources, improved internal communication, streamlined decision-making, and increased productivity, which strengthens the organization's position relative to its competitors.

Relationship H3: Marketing and digital presence (Md) → Competitive advantage (Ca)

Finally, it is argued that digital marketing and presence in virtual environments have a significant impact on competitive advantage. A well-designed digital marketing strategy increases an organization's visibility, improves customer engagement, and facilitates expansion into new markets, all of which strengthen its competitiveness.

Overall, the model maintains that the three dimensions (Ti, Dm and Md) act as determining factors that, independently but complementarity, influence competitive advantage (Ca).

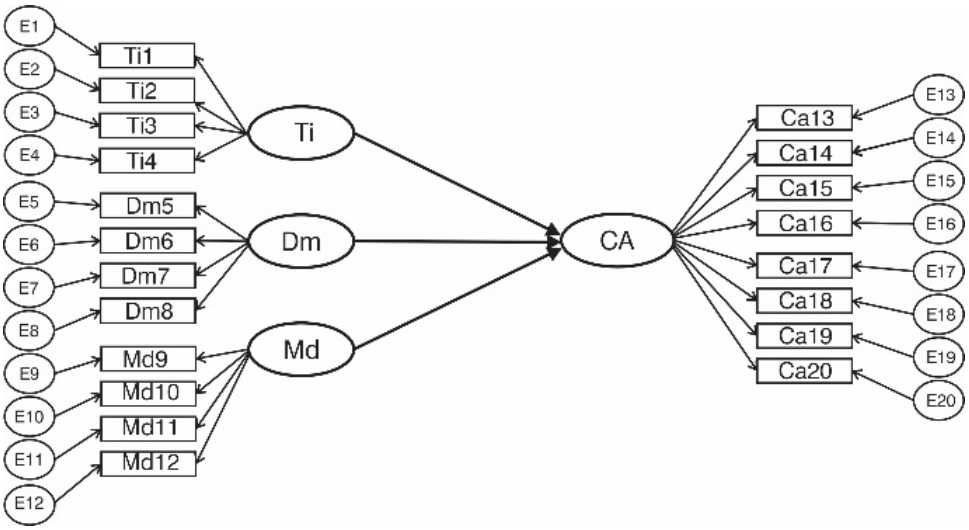

Fig. 4. Research model using structural equations

4. Results

4.1 Model confirmation

Table 1
Confirmatory model

	Reliability		variance extracted	Discriminant validity			
	Cronbach Alpha	Composite reliability	Average variance extracted (AVE)	Ti	Dm	MD	AC
Technological infrastructure	0.836	0.865	0.617	0.785			
Digital management and processes	0.863	0.895	0.682	0.712	0.826		
Marketing and digital presence	0.831	0.842	0.574	0.654	0.688	0.758	
Competitive advantage	0.932	0.941	0.668	0.741	0.771	0.704	0.817
Reference values	>0.7	>0.7	>0.5				

The validity of the model was analysed in Table 2, using Cronbach's α and composite reliability to determine its consistency. The results indicate, in accordance with Nunnally (1994), acceptable internal consistency, since Cronbach's α was greater than 0.7 in all cases. Similarly, composite reliability coefficients, such as satisfaction, also meet this criterion, indicating a high level of reliability. Construct validity was assessed using convergent and discriminant validity, in accordance with the proposal by Cepeda and Roldán (2004). In this sense, it is considered that the AVE coefficient, which represents the amount of variance shared between a construct and its indicators, must be greater than 0.50 to be acceptable, as indicated in Hair et al. (2022).

The obtained values were above 0.57, which shows that the convergent validity was acceptable based on the recommendation of Fornell and Larcker (1981). Discriminant validity was comparably tested by the square root of the AVE and correlations of latent variables cross-examined under the same theoretical framework. In this respect, the measurement model in the research is illustrated in Table 2 tabulating the corresponding items.

The overall fit of the structural equation model was evaluated based on some of the main indices recommended in the literature. In this regard, an SRMR score ≤ 0.08 is considered a good fit to the model, while scores ≤ 0.05 indicate an excellent

fit. In addition, comparative indices such as NFI, CFI, and TLI are satisfactory if they are greater than 0.90 and are considered ideal if they are above 0.95. Finally, the RMSEA index indicates a good fit when it is less than 0.08 and an adequate fit when it is less than 0.05, which together allows us to conclude the overall validity of the structural model.

4.2 Analysis of structural equation models

According to the results obtained in Fig. 5, the rejection or acceptance of the specific hypotheses formulated was established.

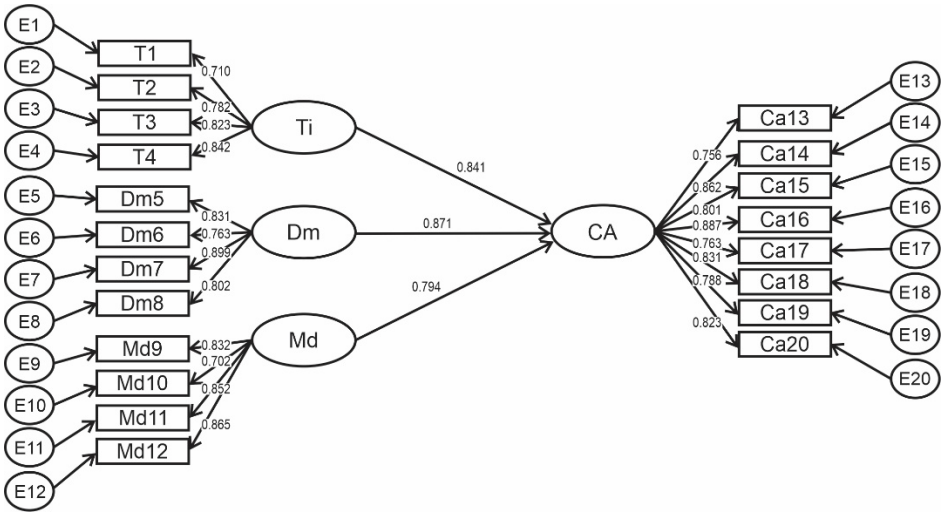

Fig. 5. Confirmatory structural model

Table 2
Hypothesis testing

Hypotheses	Coefficient (β)	Gl	p value	Decision
H1: Ti → CA	0.841	172	0.000	Accepted
H2: Md → CA	0.794	172	0.000	Accepted
H3: Dm → CA	0.871	172	0.000	Accepted

The first hypothesis: (H1) based on the analysis of the structural model, technological infrastructure (Ti) had a positive and significant effect on competitive advantage (CA) with a path coefficient of 0.841. This figure suggests that the consolidation of technological resources is a good predictor of strategic success in the baking industry. With a p-value of 0.000 with 172 degrees of freedom, there is sufficient statistical evidence to accept the hypothesis in its entirety. Therefore, it is proven that investment in IT enables these institutions to differentiate themselves significantly in the Huancayo market.

In the second hypothesis (H2), the trajectory coefficient of the relationship between Marketing and Digital Presence (Md) and Competitive Advantage (CA) was 0.794, confirming a direct positive effect. Although it is the lowest coefficient in the model, it still ensures a model predictive force to help consolidate the brand over the competition. In a test with a significance of 0.000, this means that the statistical decision is to take the hypothesis proposed in the research as true. This proves that active management of digital identity and social networks is essential to maintaining business competitiveness.

In the third hypothesis (H3), Digital Management and Processes (Dm) is the most powerful determinant in the model for obtaining competitive advantage (CA), with a weight of 0.871. This finding highlights that digitizing internal operations and workflows is the most profitable strategy for increasing business efficiency and value. The p-value for the statistical test is 0.000, which leads to the unqualified acceptance of the hypothesis. In general, the operational efficiency achieved through digitally converting processes is what drives competitive advantage.

5. Discussion and Conclusion

5.1 Relationship between technological infrastructure and competitive advantage

The results show that technological infrastructure has a direct and positive influence, with a high level of significance, on the competitive advantage of companies in the pastry sector. The statistical analysis obtained a standardized trajectory coefficient (β) of 0.841 (Nicomedes, 2018). This number indicates a strong predictive capacity, suggesting that every time there is an improvement in technological infrastructure, we increase 0.841 standardized units in competitive advantage.

In relation to SMEs in the pastry sector in Huancayo, technological infrastructure is one of the main factors contributing to consolidating competitive advantage, as it can be used to improve production, administrative, and sales processes. The acquisition of machinery, management software, electronic invoicing systems, and digital connectivity facilitates greater control of inventories, costs, and production times, which are key points for ensuring product quality and operational efficiency (Reim et al., 2022). This is particularly important in a highly competitive local market, where smaller companies must generate the maximum possible return on their resources in order to survive and grow.

Similarly, adequate technological infrastructure contributes to the differentiation and consolidation of SME bakeries in Huancayo by enabling the use of digital channels for the promotion and marketing of their products. The use of digital platforms, social media, and online ordering systems contributes to greater business visibility and stronger customer relationships, leading to increased loyalty (Bouwman et al., 2018). In this regard, technological infrastructure is not only perceived as an operational resource but also as a strategic resource that facilitates innovation, incorporation into the digital environment, and the achievement of a sustainable competitive advantage.

5.2 Relationship between Marketing and digital presence and competitive advantage

The results of the study indicate that marketing has a positive, direct, and significant effect on competitive advantage in companies in the pastry sector. Statistical analysis revealed a coefficient value for the standardized path (β) of 0.794 (Nicomedes, 2018). This result indicates strong predictability; that is, for each unit increase in marketing, competitive advantage increases by 0.794 standardized units.

Digital marketing, and especially online platform presence, makes it easier for bakeries to diversify their reach and gain visibility within the local market. Through social media, websites, and delivery apps, companies can convey their value propositions, sell innovative products, and have much more direct contact with customers (Lima et al., 2024). This greater exposure helps differentiate the brand from the competition, which translates into a competitive advantage by attracting and retaining a larger and more diverse customer segment.

5.3 Relationship between Digital Management and Processes and Competitive Advantage

The results of the study indicate that digital management and processes have a positive and significant influence on competitive advantage in companies in the pastry sub-sector. The resulting statistic was a standardized trajectory coefficient (β) of 0.871 (Nicomedes, 2018). This number shows a strong prediction, determining that competitive advantage increased by 0.871 standardized units for each unit increase in digital management and processes.

With digital process management, bakeries in Huancayo can maximize their resources while also achieving greater efficiency in executive, production, and customer service tasks. Digital technologies applied to processes such as billing, inventory control, and order scheduling reduce errors, improve efficiency, and lower operating costs (Broccardo et al., 2023). These internal improvements also provide a competitive advantage by freeing up resources that can be used for strategic activities, such as innovative products or market expansion.

Digital processes provide greater traceability and control of information in real time, facilitating informed and rapid decision-making. With the inclusion of digital management tools, bakeries can quickly detect changes in demand, adjust their production, and improve coordination with suppliers (Reim et al., 2022). This ability to respond immediately enhances competitiveness, as it allows businesses to adapt to changes in customer preferences and respond more efficiently to competition.

The adoption of digitalization in their processes also impacts customers, which is a key factor in developing competitive advantages. The digitalization of services such as online ordering, electronic payments, or loyalty programs also contributes to consumer convenience and satisfaction (Plaza, 2019). This added value, anticipated and sustained through efficient management of digital processes, not only helps the company differentiate itself in the market, but also increases its ability to build loyalty and gain a competitive advantage over those who cannot implement these practices.

Conclusions

The results show that basic technological infrastructure (hardware, internet connectivity, and basic software) is a key element in increasing the competitiveness of bakeries in Huancayo. In this regard, it is suggested that owners prioritize the adoption of electronic invoicing, digital inventory control, and sales records, as these procedures will help them optimize costs, minimize losses, and make better operational decisions.
The digital management processes that can be adopted by bakeries are mainly those that are not complex and do not require organizational change (e.g., spreadsheets for input control, apps for order tracking, and digital payment methods). These are

tools that SMEs in the sector can afford and that will bring immediate improvements to their operations, without large investments or technical knowledge.

In marketing, the results suggest that the most viable and effective digital marketing strategies are HC and WABGOC for product promotion, publishing offers, and customer service. These strategies can increase business visibility, strengthen relationships with local customers, and differentiate businesses in a market as competitive as Huancayo.

In terms of public policy, it is considered that local and regional governments need to promote training programs in digital management and digital marketing specifically aimed at bakery owners and SMEs in the food sector. It is also suggested that incentives and technical support be developed for the incorporation of digital technologies, which will strengthen the local business fabric and sustainable economic growth in the city of Huancayo.

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