Business value of IT for small and medium enterprises during COVID-19: a systematic literature review

Valor de negocio de TI para pequeñas y medianas empresas durante el periodo de COVID-19: una revisión sistemática de la literatura

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Resumen: El artículo aborda el impacto de la pandemia de COVID-19 en las Pequeñas y Medianas Empresas (PYMES), centrándose en las inversiones en Tecnologías de la Información (TI) realizadas entre 2020 y 2023. La crisis sanitaria generó importantes efectos económicos, particularmente en las economías emergentes, exacerbando la fragilidad económica y la desigualdad preexistentes. El estudio busca identificar, a través de una revisión sistemática de la literatura, las inversiones, aportes y usos de las TI por parte de las PYMES ubicadas en países de América Latina, Asia y Europa durante el período mencionado. Se concluye que, durante el COVID-19, las inversiones en TI en las PYMES no fueron solo una respuesta a las crisis, sino también una fuente estratégica de resiliencia y estabilidad financiera. La inversión en TI se destacó como esencial para la innovación, la transformación digital y la continuidad del negocio. Aunque persisten las bajas habilidades digitales de los empleados, la tendencia hacia la inversión en TI es positiva, lo que permite a las PYMES aprovechar las oportunidades tecnológicas y gubernamentales para enfrentar el desafiante contexto económico.

Palabras clave: *Tecnologías de la Información, PYMES, Inversión en Tecnología, COVID-19, Valor Empresarial.*

Abstract: The article addresses the impact of the COVID-19 pandemic on Small and Medium Enterprises (SMEs), focusing on the Information Technology (IT) investments made by these companies between 2020 and 2023. The health crisis generated significant economic effects, particularly in emerging economies, exacerbating pre-existing

economic fragility and inequality. The study seeks to identify, through a systematic review of the literature, the investments, contributions, and uses of IT by SMEs located in Latin American, Asian, and European countries during the aforementioned period. It is concluded that, during COVID-19, IT investments in SMEs were not only a response to crises, but also a strategic source of resilience and financial stability. IT investment was highlighted as essential for innovation, digital transformation, and business continuity. Although low employee digital skills persist, the trend towards IT investment is positive, allowing SMEs to take advantage of technological and governmental opportunities to face the challenging economic context.

Keywords: *Information Technology, SMEs, Investment in Technology, COVID-19, Business Value.*

1. Introduction

Small and Medium Enterprises (SMEs) have become agents of growth and evolution of world economies, both in developing and developed countries, are major generators of employment and are even becoming major exporters and importers of raw materials, products, and resources worldwide. In a report by the Organization for Economic Cooperation and Development (OECD), it detailed that in 2019, SMEs represent 60% of employment and between 50% and 60% of the added value in the industries in which they are inserted [1], while in its 2023 report, it points out that they represent 99% of the companies in OECD countries [2]. For this reason, it is worth analyzing the contribution of SMEs in increasing innovation, competitiveness, and innovation in a changing market, analyzed from the perspective of investments in Information Technology (IT) during the COVID-19 pandemic period between 2020 and 2023.

This pandemic generated a domino effect that impacted the world economy and triggered the biggest economic and health crisis of the century. The economic impacts of the pandemic affected emerging economies to a greater extent; income losses exacerbated pre-existing factors of fragility and economic inequality [3]. This situation is exacerbated by increased risk of default and reduced lending capacities, which led to increased debt and a lack of capacity to provide credit to businesses [3], to rescue them from economic shocks. According to the World Bank's World Development Report 2022, when the crisis began, large companies had a spending capacity to cover a total of up to 65 days, medium-sized companies had 59 days, and small and micro companies had between 53 and 50 days, respectively, to meet their operating expenses, regardless of their commercial nature [4]. Likewise, according to World Bank research, SMEs are over-represented among the sectors most affected by this health crisis; the SMEs that are facing these economic shocks most severely are the accommodation and food services; retail trade; and personal services sectors [3].

As noted in OECD reports, the COVID-19 pandemic has triggered increased pressure for SMEs, which, in their efforts to withstand the challenges brought on by the health crisis, have had to seek the implementation of several strategies - globally - to cope with the economic problems arrived with the pandemic. This study aims to identify the investment, contribution, and use of technology that SMEs applied during this period, through a systematic review of the literature, which also allows to understand the business value of IT. In the first instance, the methodology used for the elaboration of this research is defined, in which the questions, inclusion and exclusion criteria are defined, as well as the databases from which the publications were extracted. The discussion and results section are made up of four subsections that seek to clarify and investigate the business value of IT for SMEs; likewise, this publication concludes with a series of conclusions and future work.

2. Methodology

The systematic literature review is a method used to identify, evaluate, and interpret the research conducted in each area, its purpose being to identify research needs that are necessary due to the volume of scientific production to which there is potential access [4]. To carry out the systematic literature review, it was first necessary to critically evaluate the publications based on a PRISMA diagram [5] (see Figure 1).

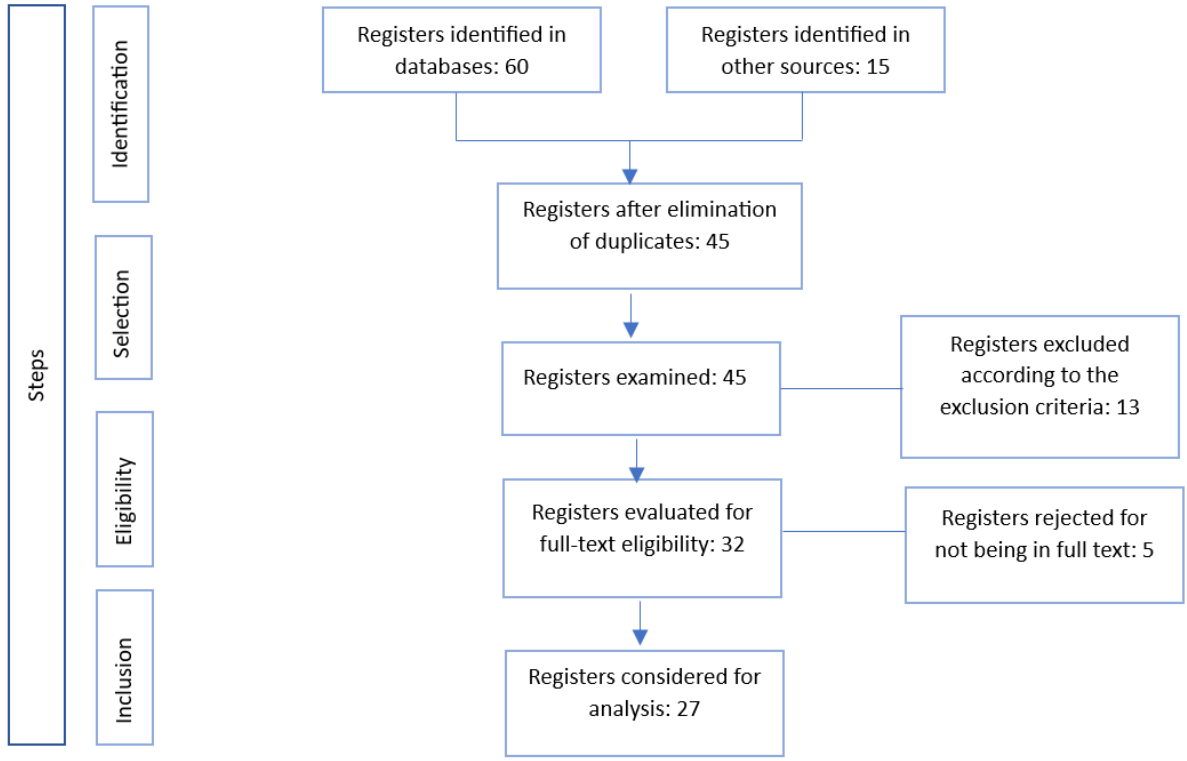

Figure 1. PRISMA flowchart.

2.1. Research Questions

The research starts from the central question: What are the main challenges and opportunities faced by Small and Medium Enterprises (SMEs) when implementing or using information technologies during the COVID-19 pandemic and how did it influence their performance and value contribution? It was defined with the purpose of 1) characterizing the factors influencing IT investment decision-making in SMEs during this period, as well as 2) identifying the contribution of IT to business value. This can 3) contrast the impact of IT investments in different industry sectors during the COVID-19 pandemic, and subsequently, 4) exemplify the use that SMEs made of technology and its business value during this period.

2.2. Data sources

The main electronic databases consulted and from which the documents analyzed here were compiled are presented in Table 1.

Table 1. Electronic databases consulted.

Databases	**URL**
Repository CEPAL	https://repositorio.cepal.org/home
Corvinus Research Archive	https://unipub.lib.uni-corvinus.hu/
Science Direct	https://www.sciencedirect.com/
Springer Link	https://link.springer.com/
SSRN eLibrary	https://papers.ssrn.com/sol3/DisplayAbstractSearch.cfm
Springer Open	https://www.springeropen.com/

Source: Own formulation.

2.3. Selection criteria

A series of criteria were defined for the selection of sources to ensure the quality and relevance of the writings used for this research. The documents included were those published in Spanish and English; documents that were not primary research articles, company reports, and case studies were excluded. In addition, studies that do not directly address the impact of information technology on the business value of SMEs during the COVID-19 pandemic were excluded, so publications published between 2020 and 2023 were considered. Finally, we excluded studies that lacked methodological rigor or did not provide sufficient information on data collection methods and processes, as well as studies for which the full text was not accessible.

3. Discussion and results

During the COVID-19 pandemic, SMEs faced a series of both positive and negative situations, and this period analyzed, between 2020-2023, acted as a catalyst for the adoption of information technologies that brought much value to different organizations in different latitudes around the globe. The studies reviewed addressed the experience of SMEs in Southeast Asia, the southernmost tip of the African continent, East Asia, the Middle East, Europe, and Latin America (see Table 2), to contribute to the discussion of the challenges and opportunities they faced in implementing or using IT more broadly and how this was reflected in their performance and value contribution.

To this end, this section begins with the characterization of the factors influencing decision making about IT investments, followed by the identification of the contribution of IT to business value. Subsequently, a contrast of the impact of IT investments in the different industrial sectors is made; this analysis ends with an exemplification of the use of technology and its business value of these SMEs during the defined period.

Table 2. Region where the SMEs analyzed are located, by country and quantity.

Region	Country	Amount*
Asia	China	4
	Taiwan	1
	Hong kong	1
	Malaysia	2
	Indonesia	5
Europe	Latvia	1
	Hungary	1
	Italy	1
	United Kingdom	2
Latin America	Chile	1
	Colombia	1
	Brazil	2
	Ecuador	1
	Costa Rica	2
	Mexico	2
	Uruguay	1
	Argentina	1
	Panama	1
Middle East	Oman	2
	Bahrain	1
	United Arab Emirates	2
Africa	South Africa	2

*Quantity refers to the number of times each country appeared in one of the studies cited, since more than one publication analyzed more than one country or several countries in the same region. Source: Own formulation.

3.1. IT investment

The factors influencing IT investment decisions by SMEs during the period analyzed were economic factors, business conditions, government support, and IT adoption and innovation, closely linked to the perceptions of technology by managers and employees, as well as their need for effective adaptation. In detail, these were the three most recurrent factors found in the studies analyzed, the economic challenges in SMEs located in countries where their economies are considered to be developing were exacerbated by the lack of access to advanced technologies, which hinders the improvement of operations and processes both for those SMEs that are not as technologically open and those that are more mature in this area [6]. Hungarian SMEs also experienced a number of pandemic-related reductions, mainly focused on digitalization and innovation [7]. Meanwhile, on the Asian continent, during this period an initial drop in turnover growth occurs in these companies in China, SMEs with average growth in 2020 were prone to use government loan schemes [8]. This same scenario was experienced by British SMEs that due to low growth in 2020 and reduced billings, had to resort to government support [9].

So, government support becomes a determining factor for IT investment, this, contributed to the rapid digitization during the pandemic of both Chinese [8] and Hungarian [7] SMEs and Hong Kong SMEs [10] collaboration between government, investors and non-governmental organizations is presented as a key factor to support SMEs in IT adoption during this health crisis [11, 12]. With this, the factor of technological innovation and adoption appears, which was presented as a positive mediator for an SME's business models for greater revenue capture because of its digital capability [13]. This innovation brings with it a digital transformation process that acts as a mediator between the digital orientation and capacity with the income of these SMEs, as well as the complexity of the business model in the sector in which it is inserted [14].

The pandemic accelerated the adoption of technologies in SMEs, their ability to adapt and progress technologically is a key factor, according to perceptions of ease of use and perceived risk [9, 15, 16]. Other factors that influence IT investment decision-making in these companies are present and are summarized in Table 3.

Table 3. Influencing factors on IT investments, 2020-2023.

Studies	Factor	Conclusions
[6] [11] [28] [10] [14] [24] [17] [30] [22] [20] [8] [16]	Impact of COVID-19	Drop in turnover. Reduction of payroll. Lack of access to other markets. Need for adaptation.
[29] [6] [11] [12] [28] [24] [10] [8] [30] [7] [31] [9] [26] [23]	Economic	Little or no investment in software and hardware. Falling sales. Limited revenues.
[18] [25] [16] [14] [13] [17] [11] [29] [24] [15] [28] [9]	Government support	To ensure financial sustainability. Government policies. Exceptions in loan repayments and tax exemptions. Enabling environment for technology investments during and after the pandemic.
[28] [12] [6] [29] [8] [7] [32] [19] [22] [16] [13] [20]	Innovation and technology adoption	Digital transformation. Overcoming economic challenges. Inclusion of new markets. Business expansion.
[6] [8] [7] [22] [27]	Business resilience	To remain competitive. Adaptation to new environments and technologies. Financial sustainability of the business.
[22] [9] [21] [10] [24]	Collaboration and Connections	Institutional and non-governmental support. Collaboration among SMEs. Innovation network.
[9] [29] [23] [30]	Geographic impact	Increased business reach. Explore new markets.

[28] [6] [8] [31] [21] [27]	Perception of value	Business growth. Increased revenue capture. Optimization of the revenue structure. Process improvement.

Source: Own formulation based on content analysis.

The COVID-19 pandemic accelerated the adoption of technologies in SMEs, highlighting the importance of their ability to adapt and progress technologically to achieve a digital orientation that could cope with the scenarios of the moment. The capacity to adapt and technological innovation were factors that are linked to aspects such as resilience to remain competitive and to conceive a greater scope in the business, which generates as a result a growth of the business and an improvement of the processes, as summarized in Table 3.

3.2. Value to the IT business

The value contribution to the IT business in SMEs during the COVID-19 period ranges from improving operations and processes, creating competitive advantages, business continuity, financial sustainability through digital transformation, development of digital competencies, and government and institutional stimulus for IT investments. Taken together, these elements contribute to strengthening the position and resilience of SMEs in the face of the challenges arising from the pandemic. The strategic use of technologies following their adoption enabled SMEs to ensure business continuity during extreme situations, in this case the COVID-19 pandemic. Successful adoption of technologies such as FinTech, analytical algorithms, mobile applications can significantly improve business operations and processes in SMEs, while contributing to overall business performance [6, 18, 29].

IT provide a new conceptual framework that is envisioned with digital transformation, the drivers analyzed above, and business performance during the COVID-19 pandemic. Key terms such as digital orientation and capability are introduced in the studies analyzed, to analyze the investment, adoption, and use of cloud and artificial intelligence, for example, during this period, aspects that may be essential constructs in the context of technological innovation [13, 14].

Another contribution of IT investments to the business is, to facilitate communication with employees, suppliers, banks and customers, SMEs that took advantage of the contribution of IT in that sense, pointed out a more effective management of expectations and financial transparency [11, 30], which lies in the improvement of internal processes and extortions. In Table 4, the value contributions of IT to the business were grouped into a series of variables, constructed from the content analysis applied to the studies.

Table 4. IT value contribution to the business.

Variable	Value contributions
Innovation moderating factors	- Financial capacity: Increased financial capacity strengthens the innovation transition. - Networking: Important to support innovation in SMEs. - Knowledge Management System: Facilitates the acquisition and effective use of IT innovation. - Organizational Culture: Influences technology adoption and strategic decision making.
Technology in the adoption of innovation	- In SMEs with a low level of technology maturity, IT in itself is not a significant factor in the adoption of innovation; it must be mediated by organizational change as a whole.
Digital transformation	- The adoption of digital technologies, e-commerce and online marketing are key to improving the resilience and competitiveness of SMEs.

Needs and ease of use	- The ease of use of technology is an important factor in the SMEs' perception of its usefulness. - SMEs have specific needs for consulting services through these media.
Government support and regional collaboration	- Government policies and regional collaboration can play a crucial role in supporting the adoption of digital technologies by SMEs.
Adaptation and flexibility	- Rapid adaptation to change, long-term planning, and following IT regulations and policies are essential to the success of SMEs during the COVID-19 pandemic.

Source: Own formulation based on content analysis.

The value contributions of IT extend beyond business survival, including economic stimulation, internal process improvement and innovation capacity. IT investments enabled SMEs to overcome their most immediate challenges, to be resilient in both the short and medium term and provided them with the capacity to adapt to a changing business environment.

3.3. Impact of IT investments

In emerging markets and developing economies, the lack of upstream technology adoption highlights the urgent need for IT investments to improve business resilience. Lack of adoption of advanced technologies such as cloud computing and the Internet of Things results in the inability of these SMEs to design new business models and digitize operations [6]. In industries experiencing significant change, IT investments are considered essential for effective management of extreme events. Sustainability in SMEs during the pandemic was closely linked to digital transformation, and differences in digital competencies can influence the business value obtained through IT investments. Those that invest in business-relevant digital technologies can achieve sustainability through adaptation to online business models [25].

Sectors such as e-commerce [18, 29] benefited, while others, such as hospitality - to name but a few - [16] sought government support through IT-backed loans. The use of information technologies was crucial in sectors that required greater connectivity with their customers and suppliers [10, 15] each sector presented its own needs and challenges in the context of the pandemic. The Asian experience revealed that companies experienced a less pronounced initial downturn and a faster recovery than in other sectors, due to their early adoption of technology [10, 24].

3.4. Use of IT and its value in business

The use of IT allowed SMEs, regardless of the sector, to adapt to the challenging circumstances brought about and bequeathed by the COVID-19 pandemic, generating significant value by ensuring business continuity, optimizing operations, expanding outreach to different customers, and building loyalty among those who already frequented the business. For the sector of companies involved in e-commerce [6, 26, 28, 29] that already had solid digital platforms and electronic information systems, they were able to adapt quickly to online demand. Upstream investment in technology allowed for faster recovery and a stronger financial position.

Less innovative sectors were able to take advantage of IT investment to improve their digitization and participation in e-commerce; [8] the use of digital platforms allowed them to increase their resilience and competitiveness [20, 22, 23]. SMEs located in the hotel and hospitality sector [9, 16] used technologies such as online reservation systems, digital delivery services, and contactless payment solutions to adapt to health constraints and maintain their operations. IT investments contributed to the survival and adaptation of these companies.

Innovative solutions adopted in Hong Kong could have included the use of technologies such as mobile applications for contact tracking, online ordering systems, or contactless payment methods. Table 5 illustrates how SMEs, through strategic investments in technology, were able to adapt, innovate and remain competitive during the COVID-19 crisis; the frequency of evidence corresponds to the percentage of repetition that each use had in the different studies.

Table 5. IT uses according to frequency of implementation and countries, 2020-2023.

Uses	Frequency	Country
E-commerce and digital marketing adoption	35%	Italy, Hungary, Colombia, Argentina, Ecuador, Costa Rica, Brazil, Panama, South Africa, Taiwan, Hong Kong, Oman
Adoption of digital tools for business operations	30%	China, Taiwan, Hong Kong, Panama, Brazil, Indonesia, United Arab Emirates, Hungary, United Kingdom
Use of social networks and social media consulting	25%	All Latin American countries (see table 2), Indonesia, Bahrain, South Africa, United Kingdom,
Product booking and delivery platforms	15%	China, Taiwan, Hong Kong, Panama, Costa Rica, Mexico, Latvia, Indonesia, Malaysia
Use of unmanned delivery technologies	5%	China, Hong Kong
Application of digital technologies for online work of your employees	25%	South Africa, Italy, Hungary, Costa Rica, Colombia, Argentina, Uruguay
Internet of things (IoT) application	8%	China, Costa Rica, Brazil

4. Future work

It would be important to contribute to the dialogue on the challenges and opportunities faced by Small and Medium Enterprises when implementing or using information technologies during the COVID-19 pandemic, based on a geographically delimited study, investigating in detail each of the particularities of the region analyzed. As it could be determined in the reviewed studies, each latitude of the globe has its own particularities, which influence not only the impact that COVID-19 had on these sectors, but also their governmental support, to determine how it influenced their investment in IT and the value contribution.

5. Conclusions

During the COVID-19 period, IT investments in SMEs not only represented a response to the economic and health crises, but also provided value from a strategic perspective, allowing companies greater resilience, innovation, and financial stability. Investment in IT was perceived as an essential variable for the contribution of value to the business, digital transformation, and business continuity, allowing SMEs to take full advantage of the opportunities offered by technology, government support, and the harsh economic context brought about by the pandemic. In the face of this, a positive trend towards IT investment is identified, even though, in many of the studies analyzed, the digital skills of employees remain low.

Throughout the pandemic, the use of information technologies to remain competitive in the market was crucial. SMEs that adopted online product sales platforms, videoconferencing support, social networks and other digital tools were able to recover faster than those companies that lacked investment in these terms, as well as adding value by maintaining customer and employee loyalty. For all cases, but mainly in Latin America, the analysis suggested that SMEs can implement technologies to modify their business operations and strategies in response to the collateral effects caused by the pandemic.

This situation, together with the variables analyzed, highlights the fact that in addition to investment in IT and training of personnel in this area, it is necessary to bet on macro alternatives that allow governmental or institutional support, as pointed out by several of the experiences considered for analysis. Governmental support that makes it possible to meet the needs of SMEs, whether in terms of training, education or even the incorporation of incentives, since, as the World Bank inferred, SMEs have greater complications when obtaining credit to solve the shortcomings caused by economic crises [3], caused in this case by COVID-19.

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