

The performance effects of digitalization processes and digital competencies among SMEs

Los efectos de los procesos de digitalización y las competencias digitales en los resultados de las pymes

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Abstract: Digitalization is reshaping SMEs' competitiveness; however, research shows that the performance effects of digitalization processes are far from clear. Digital technologies create value through capability-building and strategic orchestration processes, and this editorial introduces the eight papers included in the special issue which adopt a mechanism-oriented view of the digitalization-performance connection. The contributions included in this special issue integrate different theoretical lenses and methodological approaches to explain heterogeneous outcomes resulting from digitalization processes. The papers highlight operational mechanisms (e.g., digital technology integration and innovation routines) and strategic mechanisms (e.g., digital strategy development, managerial and contextual factors) that shape financial, innovation, sustainability-oriented, and strategic-related performance dimensions. The special issue reinforces the view that digitalization is a complex organizational process. The editorial concludes by identifying promising directions for future research on digital capability complementarities, and digital transformation risks.

Keywords: Digitalization, digital technologies, cybersecurity, innovation, performance, SMEs.

Resumen: La digitalización está transformando la competitividad de las pymes; sin embargo, los resultados de diversas investigaciones muestran que los efectos de los procesos de digitalización en el rendimiento empresarial distan de ser claros. Las tecnologías digitales generan valor mediante el desarrollo de capacidades y la orquestación estratégica, y este editorial presenta los ocho artículos incluidos en el volumen especial, los cuales adoptan diversas perspectivas para analizar la conexión entre digitalización y rendimiento empresarial. Los artículos incluidos en este volumen especial integran diferentes perspectivas teóricas y enfoques metodológicos para explicar los resultados heterogéneos resultantes de los procesos de digitalización. Los trabajos destacan mecanismos operativos (p. ej., la integración de la tecnología digital y las rutinas de innovación) y estratégicos (p. ej., el desarrollo de la estrategia digital, los factores gerenciales y contextuales) que configuran las dimensiones de

rendimiento financiero, de innovación, orientado a la sostenibilidad, y estratégico. El volumen especial refuerza la visión de que la digitalización es un proceso organizacional complejo. El editorial concluye identificando direcciones prometedoras para futuras investigaciones sobre las complementariedades de las capacidades digitales y los riesgos de la transformación digital.

Palabras clave: Digitalización, tecnologías digitales, ciberseguridad, innovación, desempeño, pymes.

1. Introduction

In an increasingly complex and digitally integrated economic environment, small and medium-sized enterprises (SMEs) face the strategic challenge of adopting digital technologies that match their resource endowments and strategic objectives (Acs et al., 2022; Lafuente et al., 2023a and 2024). Digitalization processes are reshaping how firms build competitive capabilities and generate value, opening new pathways for improving innovation, operational efficiency, internationalization, sustainability, and other financial and non-financial performance dimensions (Goldfarb & Tucker, 2019; Björkdahl, 2020; Blichfeldt & Faullant, 2021; Berente et al., 2021; Lafuente et al., 2023b). At the same time, SMEs face pronounced constraints arising from liabilities of smallness and newness that limit their access to digital skills, financial resources, and technological knowledge, making digital transformation both an opportunity and a strategic risk (Li et al., 2018; Lafuente et al., 2021).

Although the relationship between digital technologies and performance has attracted increasing scholarly attention in recent years (Dalenogare et al., 2018; Björkdahl, 2020; Cennamo, 2021; Appio et al., 2022; Lafuente & Sallan, 2024), important challenges remain unresolved. From a resource-based perspective, organizations are bundles of heterogeneous resources and capabilities that do not operate in isolation. Consequently, performance is a multidimensional construct that extends far beyond narrow financial indicators and reflects complex interactions between operational routines, organizational structures, and strategic alignment mechanisms. In this context, the mere adoption of digital tools rarely translates directly into superior performance. Rather, digital resources exert their influence through capability-building, learning, and strategic orchestration processes that remain insufficiently unpacked—particularly in resource-constrained and institutionally diverse environments.

Furthermore, recent research has begun to highlight the “dark side” of digitalization by showing that digital technologies may generate organizational misalignment, cultural resistance, skill mismatches, cybersecurity vulnerabilities, and strategic rigidity when complementary resources and managerial capabilities are underdeveloped (Berente et al., 2021; Vaillant et al., 2025). These insights call for a more critical and theoretically grounded scrutiny of digitalization processes, emphasizing the need to understand both the enabling and constraining mechanisms through which digital technologies shape SMEs’ performance trajectories.

Motivated by these gaps, this Special Issue was conceived to promote a multidisciplinary and mechanism-oriented debate on the digitalization–performance nexus in SMEs. The primary objective is to advance knowledge on how digital technologies interact with firm resources, organizational routines, and strategic choices to shape firm’s performance. In doing so, this Special Issue responds directly to calls for greater technological scrutiny of small businesses, for research that treats SMEs as theoretically distinct organizational forms, and for methodological pluralism that integrates quantitative, qualitative, and mixed approaches.

Our journey started in January 2025 with the intention of satisfying our academic curiosity, which motivated us to encourage contributors to produce research that challenges canonical approaches and adopts a critical angle that sheds valuable insights on the performance repercussions of digitalization and resource-based strategies in SMEs. Indeed, the call received great support from scholars in the field and the journal’s editorial team. Obviously, all our efforts simply would not have been possible without the support and nurturing of the journal’s Co-Editor-in-Chief, Juan Carlos Leiva, to whom we express our deepest gratitude.

As a result of our joint efforts, the collection of papers included in this special issue brings together studies that address various aspects related to digitalization and resource-based competencies in SMEs. In our view, this special issue advances our knowledge by emphasizing that digitalization is not a linear process, but rather a complex organizational transformation shaped by capability complementarities, strategic alignment, and contextual constraints. The contributions illustrate that digitalization outcomes are fundamentally endogenous to firms' resource configurations and organizational processes, while also uncovering barriers and unintended consequences that condition the performance effects of digital strategies in SMEs.

The remainder of this editorial is structured as follows. Section 2 overviews the eight manuscripts included in this Special Issue and their contribution. Next, based on the analysis of the selected papers, Section 3 concludes by outlining promising directions for future research, with particular attention to capability complementarities, performance multidimensionality, and the unintended consequences of digital transformation in resource-constrained environments.

2. The contributions of this special issue

After an exhaustive review process, this special issue includes eight articles that, in our view, significantly advance the analysis of the operational and organizational outcomes of digitalization processes in SMEs.

By analyzing the approaches adopted by the selected papers, we observe that the digitalization-performance connection in SMEs can be researched from multiple angles. Part of the value of the papers included in this Special Issue lies in their capacity to bring together theoretical premises from different fields, including the resource-based theory, innovation management, the Technology-Organization-Environment (TOE) framework, and arguments closer to operations management. This multidisciplinary integration enables a fine-grained understanding of how digitalization unfolds as a strategic and organizational process rather than as a purely technological input. The richness of the selected papers also becomes evident in their methodological diversity—which covers bibliometric (one study), qualitative (one study) and quantitative (seven studies) research based on a wide range of estimation techniques (linear and non-linear regression, cluster analysis, and PLS-SEM models)—and in the geographic variety of the analyzed settings, covering different Latin American economies (four studies), Bulgaria (one study), and SMEs from multiple Latin American countries (two studies).

By using multiple analytical methods applied to cross-sectional and multi-country datasets, the selected papers contribute to identifying distinct patterns that characterize digitalization processes and their performance outcomes in SMEs. In particular, the contributions contribute to understand how operational mechanisms—such as the adoption of cybersecurity protocols, digital process integration, and digitally-driven innovation routines—and strategic mechanisms—such as the development of digital strategies, and the alignment of digital organizational strategies—jointly shape various performance outcomes among SMEs.

The diversity of the selected papers is consistent with and further reinforces the logic underlying this Special Issue, which emphasizes the need to analyze the antecedents and impacts of digitalization through complementary organizational, technological, and strategic lenses. Concretely, the Special Issue brings together contributions that examine digitalization as a transformation process and as a strategic reconfiguration mechanism. In doing so, the selected papers show that, rather than being driven by the mere adoption of digital technologies, digitalization outcomes are contingent upon firms' resource endowments, organizational routines, and strategic alignment.

Overall, the collection of studies presented within this Special Issue delivers valuable insights into how SMEs capitalize on digitalization from an economic, strategic, and innovation management perspective. As such, their contributions confirm that SMEs generate relevant outcomes at different levels through different digitalization mechanisms. Also, the selected papers confirm that the outcomes of digitalization processes go beyond financial figures to encompass innovation and strategic competitiveness.

Table 1 briefly summarizes the contributions of the articles composing the Special Issue. For enhanced appreciation of their contributions, in what follows we analyze the selected papers according to their dominant digitalization-performance mechanisms and contextual settings.

Table 1: Digitalization-performance mechanisms and methodology of the articles included in the special issue

Performance dimension	Operational mechanism (digitalization improves operations and efficiency outcomes)	Strategic mechanism (digitalization improves performance via strategic paths)
Financial	1) Seclen-Luna et al. (2026) Sample= 2834 Peruvian service firms Method: Linear regression (OLS) models Outcome: Sales and productivity (sales by employee)	2) Vladimirov et al. (2026) Sample= 338 Bulgarian SMEs Method: Exploratory factor model (EFA) and cluster analysis Outcome: Financial (sales, market share) and non-financial (customer-oriented) performance
		3) Faith-Vargas (2026) Sample= 477 SMEs in five Latin American countries Method: Multilevel logit regression model Outcome: Product innovation
Innovation		4) Núñez and Mora-Esquivel (2026) Sample= 3733 manufacturing SMEs in Latin America Method: Partial Least Square model (PLS-SEM) Outcome: Product innovation
Strategic outcomes	5) Maldonado-Guzmán et al. (2026) Sample= 378 Mexican manufacturing firms Method: Partial Least Square model (PLS-SEM) Outcome: Sustainable development	7) Verschoore et al. (2026) Sample= 14 interviews (Brazil) Method: Qualitative analysis Outcome: Strategic digitalization process
	6) Arce et al. (2026) Sample= 66 Costa Rican firms Method: Cluster analysis and ordered logit regression Outcome: Cybersecurity maturity level	8) Yordanova et al. (2026) Sample= 196 articles on digitalization in family firms Method: Bibliometric analysis Outcome: Research agenda (digitalization process in family firms)

2.1) Analysis of operational mechanisms

Three studies deal with the analysis of *how digitalization at the operational level influences different performance dimensions*.

Focusing on service firms, [Seclen-Luna et al. \(2026\)](#) analyze how digital resources shape service performance in Peruvian SMEs. The main findings of the study reveal that the financial benefits of digitalization are contingent upon the integration of digital tools into internal routines and service delivery processes. Rather than exerting direct performance effects, digital resources improve financial outcomes through the reconfiguration of service workflows and interactions with end users. This study extends the operational digitalization literature by showing how SMEs in service sectors use digital inputs to generate performance gains via the reconfiguration of operational processes.

Motivated by the need to understand how digital technologies translate into tangible operational and sustainability outcomes, [Maldonado-Guzmán et al. \(2026\)](#) investigate how Industry 4.0 technologies foster sustainable development in Mexican manufacturing SMEs. Drawing on survey data from 378 firms in the automotive and aerospace industries,

the authors test a model in which circular economy practices mediate the relationship from Industry 4.0 technologies to sustainable development. The results show that digital production technologies improve sustainability outcomes primarily when they activate circular practices such as resource efficiency, recycling, and waste reduction. This contribution is particularly relevant in highlighting that operational digitalization is not intrinsically sustainable; instead, it must be embedded into circular economy routines that translate technological investments into environmental and developmental benefits for the organization.

Adopting a configurational approach, [Arce et al. \(2026\)](#) analyze the cybersecurity maturity level in Costa Rican small and large firms, and evaluate if the adoption of cybersecurity practices is explained by firm size and the adoption of a digital strategy. The results indicate that firms' cybersecurity maturity level is highly conditioned by firm size and the adoption of a digital strategy, which reinforces the notion that the observed discrepancies in firms' cybersecurity maturity reflect differences in firms' resource endowments and digital capabilities. This contribution strengthens the view that operational digitalization unfolds through alternative transformation pathways rather than along mere adoption investments.

2.2) Analysis of strategic mechanisms

The second group of paper analyzes the *strategic mechanisms through which digitalization impacts various performance outcomes*.

The strategic heterogeneity of digitalization pathways is explored by [Vladimirov et al. \(2026\)](#), who integrate Technology-Organization-Environment (TOE) drivers with upper echelons theory to explain different digital transformation profiles among 338 Bulgarian SMEs. The study finds that managerial education, experience, and workers' skills make a difference when it comes to explain advanced digitalization levels from laggards. These findings highlight managerial human capital as a strategic factor that conditions the effectiveness of technological assets and competencies, in terms of digitalization outcomes.

Focusing on collaborative strategies (vertical collaborations with suppliers and customers) and firm's R&D efforts, [Faith-Vargas \(2026\)](#) analyze how digitally enabled co-creation practices influence product innovation in outcomes in 477 Latin American SMEs. The contribution of the study lies in showing that strategic collaborations, in particular with suppliers, are important for SMEs lacking internal R&D capabilities. The results also show the strategic role of R&D teams in shaping the design of co-creation collaborations, thus reinforcing the centrality of capability complementarities in the analysis of innovation processes.

Building on sustainability-oriented strategy, [Núñez and Mora-Esquivel \(2026\)](#) examine how digital orientation and green management practices influence innovation performance (product innovation) among 3733 manufacturing SMEs in Latin America and the Caribbean. The key findings show that digital orientation—measured by the adoption of cybersecurity practices and IoT tools—significantly improves product innovation, and that the adoption of green practices is a relevant mediator in the relationship from digital orientation to innovation activities. This study contributes to the RBV-based literature by showing that the positive effect of digital technologies on value creation (in this case, product innovation) amplifies among firms that have integrated sustainability routines into their processes.

By shifting attention to strategic mechanisms, [Verschoore et al. \(2026\)](#) propose a framework to guide firms in aligning digital transformation processes with firm strategy and value creation. The main results obtained from the qualitative analysis of 14 in-depth interviews shows that digitalization can be understood as a strategic orchestration process, in which technology adoption patterns should be coupled with the restructuring of internal organizational processes and lead to renew firm' business model. This way, strategic digital alignment emerges as a core dynamic capability for professional service SMEs.

Finally, [Yordanova et al. \(2026\)](#) provide a bibliometric analysis of digital transformation processes in family firms, seeking to identify dominant thematic groups and develop a research agenda centered on governance and strategic renewal. The main findings of the study reveal that the study of digitalization in family firms is fragmented across diverse research streams and theoretical perspectives; however, the authors concluded that the theoretical foundations of this research field

(strategic management, behavioral theory and behavioral agency model perspective, entrepreneurship, and socioemotional wealth) are consistent with the theoretical approaches adopted by existing work on other topics addressing the complexity of family businesses. This contribution anchors the Special Issue within a broader intellectual structure and highlights relevant intersections between ownership, governance, and digital strategy that might guide future research in this field.

3. Concluding remarks and future research

To conclude, building on the review of the eight studies included in this Special Issue, we believe that the authors' efforts have contributed to structuring the debate on digitalization as a capability- and performance-shaping process in SMEs. Overall, the contributions demonstrate that digital transformation is not a purely technological phenomenon but rather an organizational and strategic reconfiguration process in which performance outcomes depend on how digital resources are combined with key operational and organizational complementary routines. But the debate remains open and several promising research avenues emerge from the findings of this Special Issue.

The first promising research direction concerns the interplay between internally generated and externally sourced digital knowledge. While several contributions emphasize the role of internally developed routines, dynamic capabilities, and organizational alignment mechanisms, others show that strategic collaborations and co-creation practices with key external partners are critical channels through which external digital knowledge is internalized into firm operations and strategic processes (Meier, 2021; Lafuente & Vaillant, 2023). Future research should explore how different digitalization processes complement or substitute for each other in different institutional contexts (Lafuente et al. 2022). This research line would help to grasp how inter-firm networks and internal collaborative arrangements (between-team collaborations) shape SMEs' digitalization, and what tools—e.g., digital platforms and data-sharing practices—may help firms to better capitalize on heterogeneous knowledge sources (Lafuente et al., 2020 and 2021; Hu et al., 2024).

A second important research direction relates to the dynamics of digital capability obsolescence and renewal. Several studies in this Special Issue implicitly address digital maturity trajectories and dynamic capability development. However, little is known about the depreciation rates of digital competencies in fast-changing technological environments characterized by frequent technology updates, cybersecurity threats, and changes in regulatory rules. Future studies should examine which digital routines and assets are most vulnerable to obsolescence, how firms decide which capabilities to upgrade or abandon, and how organizational mechanisms such as modular IT architectures, continuous training systems, and digital governance structures help sustain competitive advantage over time (Pergelova et al. 2019; Vaillant et al., 2025).

A third promising avenue concerns the expanding role of Internet-of-Things (IoT) and Artificial Intelligence (AI) in shaping SMEs' strategies (e.g., Usai et al., 2021; Vaillant & Lafuente, 2024). IoT technologies enable real-time data generation by connecting physical and virtual objects, while AI facilitates descriptive, diagnostic, and prescriptive analytics that increasingly inform managerial decision-making. Future research should scrutinize how SMEs integrate algorithmic insights with human judgment, how trust in AI-mediated recommendations develops, and under which ethical, organizational, and regulatory conditions digitally generated information can be absorbed into strategic routines and transformed into performance-enhancing actions (Dalenogare et al., 2018; Cennamo, 2021; Lafuente & Sallan, 2024; Pergelova & Yordanova, 2025).

Finally, ownership structures, governance arrangements, and the analysis of the compatibility between digital technologies and other management systems represent underexplored dimensions of digital transformation, particularly in family-owned SMEs (Lafuente et al., 2010; Appio et al., 2021). For example, future work should examine how ownership concentration in family and non-family firms, socioemotional wealth considerations, and the adoption of management systems (e.g., ISO standards) influence digitalization investments, risk attitudes, and digital capability development in small and large firms.

We are hopeful that this Special Issue will advance our understanding of digitalization and resource-based competencies in SMEs and will add an impulse to increase theoretical and empirical research in this field. Such research

is relevant and necessary if scholars are to better understand how SMEs, with different degrees of operational and organizational complexity and operating in different institutional settings, can implement and renew their digital strategies to sustain their competitive edge over time.

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