Journal of Multidisciplinary Engineering Science and Technology (JMEST)
ISSN: 2458-9403
Vol. 12 Issue 11, November - 2025

A Review On The Entrepreneurial Ecosystem's Digital Transformation

Faidon Komisopoulos, Antonios Kargas, Dimitrios Drosos, Elena Gkika, Athanasios Andriopoulos, Eleni Chaniotaki, Theodoros Rokkas, Vasileios Argiroulis, Spyridon Filios, Georgios Loumos

Department of Business Administration, University of West Attica, 12243 Athens, Greece

Dimitrios Katsianis
Department of Digital Industry Technologies, National and Kapodistrian University of Athens, Psachna 344 00, Greece

Konstantinos Alvertos, Dimitrios Kokkinis,

Department of Informatics and Telecommunications, National and Kapodistrian University of Athens, 15772 Athens, Greece

***Abstract*— Digital transformation represents a broad change in strategies for job creation and income generation, the implementation of agile management models to withstand competition, and the ability to respond rapidly to shifting demands. Digital transformation of companies, also disrupts their business ecosystem. The scope of the paper is to present a literature review on how digital technologies reshape entrepreneurship by creating new ecosystems.**

Keywords— Entrepreneurial Ecosystem; Digital Transformation; Digital Transformation Strategy; Business Environment

1. Digital Transformation of Businesses

All business processes are nowadays more effective due to technological developments (Türegün, 2019). Technology was firstly adopted by firms mainly due to the globalization of their clients and of their employees as well, aiming at reducing cost (Gunz & Thorne, 2020). Digital transformation is more than adopting technologies, involving processes by which companies develop new business models by digitally transforming their business operations on a whole (Gkika eta al. 2025).

This entails the utilization of digital resources such as big data (Kostakis and Kargas, 2021), the formulation of strategies capable to ensure viability and growth and in the global, digitally oriented business environment (Matt et al. 2015), and the reconfiguration of flexible and agile organizational structures (Kargas and Aretos 2023). It also involves the use of suitable key performance indicators and online metrics, in order to the business model to the digital era (Verhoef et al. 2021; Fischer et. al. 2020).

Digital transformation represents a broad change in strategies for job creation and income generation, the implementation of agile management models to withstand competition, and the ability to respond rapidly to shifting demands. It constitutes a process of reinventing the enterprise by digitizing operations, developing extended supply chain relationships, and employing digital tools in design, manufacturing, marketing, sales, presentation, and data-driven management models (Schallmo et al. 2017).

It may also be defined as the integration of digital technology into all aspects and functions of an organization, which leads to changes in its operational infrastructure and enhances the value provided to its customers (Vial 2019). Digital transformation has been associated with changes in several business aspects, including entering new – distance markets, redesign the firm's brand to increase its digital reputation, while improving products and services' characteristics to meet customers' needs and quality standards (Ferreira et al. 2019). This results in developing digital procedures to develop, promote and deliver products / services more effectively (Kargas et el. 2024), but moreover it changes the means by which firms conceive and generate value (Kargas and Tsokos 2020).

However, digital transformation may not necessarily lead to improved corporate performance if digital applications are not correctly implemented (Ukko et al. 2019). In practice, digital transformation can be a highly complex and resource-intensive procedure, requiring substantial effort for execution and adjustment (Psyrris et al. 2022). They are also costly, particularly when it comes in recognizing skills needed among employees to achieve digital transformation (Kargas et al. 2022), in recruiting capable personnel or training talented employees to enhance their technological skills (Guo and Xu, 2021).

Such an element explains why a digital transformation strategy should be aligned with direct and specific needs and goals. This alignment enables organizations to improve their performance and enhance process efficiency (Ukko et al. 2019; Zhai et al. 2022). Digital transformation is a long-term investment that can further improve firm's financial performance (Zhai et al. 2022; Teng et al. 2022; Wang

et al. 2022), operational efficiency (Guo and Xu, 2021), while reducing organizational barriers by enhancing innovation and internationalization (Zhai et al. 2022).

Digital transformation affects the functioning of economies and social classes by reshaping business operations and reshaping the structure of whole business sectors (Goldfarb and Tucker, 2017; Youngjin et al. 2012). Businesses are now focusing not only on implementing technology to optimize their operations but moreover on developing digital innovation (Berghaus and Back, 2016).

A company that fails to recognize, embrace, and transform through digital technologies risks its very survival (Goldfarb and Tucker, 2017; Matt et al. 2015). One of the main challenges faced by small and medium-sized enterprises (SMEs) lies in their limited resources—such as human capital and financial capacity—which restrict their ability to respond to competitive and market pressures (Toni, 2003). Under such a framework, adopting advanced, digital technologies can provide companies with new fields of knowledge, stronger relationships with stakeholders, suppliers and customers and increased productivity (Ensaria and Karabay, 2004). Therefore, large-scale enterprises have embraced digital transformation, positioning it at the heart of their business strategies (Holtz, 2018). Likewise, start-ups exhibit the same trend (Andersson 2018; Cuenca and Llorente, 2015). Based on digital transformation bibliography and principles, the goals should be established concerning time, finance, spatial scope, and quality (Schallmo et al. 2017). These goals include:

- Redesign business strategy to include digital business needs,
- Revaluation of existing business models and adaptation to digital era needs,
- Customer needs analysis,
- Digital maturity and future expectations,
- Well defined objectives for traditional and digital business,
- Skills capability development,
- Benchmarking of best practices for digital transformation,
- Enlight and implementation of information and communication technologies,
- Evaluation and planning of the digital value network,
- Reach customer feedback from digital sources.

Digital transformation therefore constitutes one of the most critical challenges and simultaneously one of the greatest opportunities for companies, particularly within a constantly evolving and competitive economic environment. It is not merely a technological issue but a profound transformation of the business model, decision-making processes, and the production and service delivery mechanisms (Kargas et al. 2024b).

2. Digital Transformation of Back Office Operations

A PWCs report (2018) respect to the use of robots in the employment sector suggests that by 2030 almost all back office functions (like accounting, sales forecasting etc) and many front office tasks, will be replaced by technology. According to Accenture (2019), automation substitutes many of the tasks traditionally completed by entry-level employees, hence due to technological trends, a 40% net reduction in staffing levels would have taken place by 2025.

Technology Acceptance Model (TAM) suggests that an individual intention to use a certain system depends on the perceived usefulness and perceived ease of use (Venkatesh et al., 2003). Smart systems and technologies, such as artificial intelligence, machine learning, block chain, big data use, internet of things, automation, cloud computing and others, can assist in solving business problems with radical changes and improvements in its service capabilities and efficiency (Türegün, 2019). Although the attention toward the employment of various technologies in all professions is increased, the need for modernizing the respected curriculum is missing (Qasim & Kharbat, 2020).

The application of ICT has been studied thoroughly in the field of professional employees' education, but the results are inconclusive (Gaviria et al., 2015). Some researchers report the beneficial effects of technology in classrooms (Hanson & Phillips, 2006) while others state that some (like accounting) has been negatively affected (Papageorgiou & Callaghan, 2020). Apart from the variety of reactions, this vein of literature addresses to developed nations, without taking into account the important role of cultural differences (Straub et al., 2002) especially in developing countries (Kamel et al., 2009).

Employees with technical knowledge and skills, able to cope with complex business transactions or models, are needed by organizations. Dai and Vasarhelyi (2017) document that digital technologies can secure the storage of transactional data, their instant sharing, and their verifiability. With digital transformation the increased accuracy may be a fact but ignoring the ethical aspects of technological adoption in the professional context is particularly alarming given that the key competitive advantage of any professional is the exercise of professional judgment and its inherent ethical duty to protect the public interest (Gunz & Thorne, 2020).

3. Entrepreneurial Ecosystem

Small and medium-sized enterprises play a significant role in various economical and business aspects, including job creation, innovation, and the overall economy (Braunerhjelm, 2008), even though they are vulnerable to external environment changes (Storey, 2018). Digital transformation helps companies to detect and effectively respond to changes and crises when appearing (Vial 2021). Technological capital—such as technology readiness, technological investments, and technological transformation—

significantly influences corporate transformation and growth (Jafari-Sadeghi et al. 2021; Wang and Su, 2021), leading enterprises across all sectors to redesign their operations (Steiber et al. 2021; Agostini et al. 2020).

Internationalized organizations are investing heavily in developing and implementing new technologies to achieve business, strategic and financial goals (Caputo et al. 2021). Moreover, digital technologies lead to an overall redesign of business processes and operations, helping companies to perform their activities more easily and rapidly (Setia et al. 2013). The adoption of new technologies enhances corporate operational efficiency, optimizes process management, and improves market orientation (Verhoef et al. 2021). Several researchers (Zhai et al. 2022; Wang et al. 2022) state that digitally transformed companies perform better than those which have not yet adopted such transformation. It should not be neglected that adopting these technologies is mainly due to external factors rather than internal ones (Prause 2019), leading researchers to put emphasis on understanding the true nature of the factors that drive digital transformation (Kraus et al. 2022).

Supranational authorities, such as the European Union, put emphasis on supporting digital transformation, but there still exist many steps to be done (Godlovitch and Bodin 2022). Despite notable adoption smaller companies still lag behind larger enterprises in terms of digital transformation maturity, and this gap contributes to widening inequalities among firms (OECD 2021). Moreover, the failure to adopt digitalization could damage the competitiveness of SMEs within the European Union (Li et al. 2017; Ulas 2019;).

Digital transformation encompasses both the digitalization of processes—with an emphasis on efficiency (Youngjin et al. 2012). Additionally, digital innovation brings changes in corporate strategy and processes, requiring businesses to reconsider their organizational logic. Firms today recognize the potential business value of data-driven innovation and are increasingly oriented toward leveraging it (Berghaus and Back 2016).

Enterprises that fail to recognize, embrace, and adapt to digital technologies become vulnerable to extinction, while those that adopt digital technologies can face exponential growth, contributing to national economies' development and societal transformation (Goldfarb and Tucker 2017; Laitsou et al. 2021). Generally, e-commerce provides a foundation for numerous business models, to rejuvenate traditional business forms into digitized operations and to attain strategic advantages (Hofstede 2011; Kohli and Johnson, 2011).

Operational management constitutes an adaptation of each entity's institutional and operational ecosystems concerning new business methods and mindsets, aiming to keep pace with digitalization by utilizing digital enablers. When referring to digital transformation, digitalization alone should not be the only consideration—it must also entail the implementation of a flexible business model. It is crucial that firms comply with evolving rules and competitive requirements (Godlovitch and Bodin 2022). Moreover, it is essential for companies to blend implementing technologies with market goals with learning activities and entrepreneurial orientations, in order to achieve high competitiveness and pursue innovation-driven growth opportunities (Quinton et al. 2018). Achieving and sustaining a competitive advantage is a viability issue for most companies in digital – business environment, while such an advantage mainly pass through innovative digital production methods (Matt et al. 2020). At the same time these methods should also meet environmental, and social targets (Gomez-Trujillo and Gonzalez-Perez 2021), leading to a path of the so – called sustainable development (Denicolai et al. 2021; Šimberová et al. 2022; Telukdarie et al. 2022).

Additionally, human resource management (HRM) practices are a critically important factor, as they are strongly associated with productivity and innovation. Technologies of the Fourth Industrial Revolution act as key enablers that make HRM transformative. Research acknowledges that HRM practices should be prioritized by any enterprise adopting the principles of the Fourth Industrial Revolution (Lu et al. 2020). A major success factor for businesses is to support transitional benefits for all stakeholders while the enterprise undergoes transformation (Philbin et al. 2022). In a technology-dominated era, SMEs face the challenge of adopting technology efficiently and effectively within their organizations, particularly as automation can lead to potential workforce reductions or replacements. Job reduction related to the automation of monotonous tasks is a direct consequence of technological adoption. Therefore, facilitating employee training and reskilling during transformation ensures workforce confidence and well-being (Müller et al. 2018). Although information technology is widely available to organizations, its effective implementation often remains lacking, resulting in adverse impacts on sustainable business performance (Haseeb et al. 2019).

All businesses get affected, directly or indirectly, by the ecosystem they are operating in. According to Mason and Brown (2014), an entrepreneurial ecosystem involves several co-existing actors, such as: existing or potential entrepreneurs, venture capitals, funds and and banks, alongside with institutions such as public organizations and universities. The above – mentioned actors are leading to productive entrepreneurship (Stam, 2015). According to Stam & Van de Ven (2021), entrepreneurs develop mutualistic interdependencies in order to start new businesses in a targeted region. In this way, any entrepreneurial ecosystem is actually a blend of economic, cultural, social and political components, which are linked and correlate with each other (Acs et al., 2017).

Although it is an understatement that each ecosystem is unique, Isenberg (2010) provided six main domains for any kind ecosystem, namely: policy, finance, culture, support, human capital and markets. On the other hand, Stam (2015) developed this idea to a framework of ten key elements for studying any entrepreneurial ecosystem, involving: culture, leadership, talent, financial resources, knowledge, physical infrastructure, demand, network density, formal institutions, intermediate services and research.

For entrepreneurs, access to knowledge is critical, having in mind that the interconnection between science and business lies within universities and educational systems in general (Cunningham et al., 2019). Mack and Mayer (2016) argue that culture, history, and institutional settings may shape the evolution of entrepreneurial ecosystems and the study of Audretsch and Belitski (2017) validates the latter for European cities, alongside the internet access which is important for all entrepreneurial activities. Entrepreneurial ecosystems have been largely studied using a macro-perspective to better conceptualize and map the determinants of entrepreneurial ecosystems' evolution (Cunningham et al., 2019).

Existing entrepreneurial ecosystem models recognize that skilled labor plays a significant role, indicating the importance of universities and publicly funded research, but research has neglected the micro-level interactions of various entrepreneurial ecosystem actors (Cunningham et al., 2019). Moreover, policymakers at a global level are yet in search of identifying key action points and to support the development of entrepreneurship (Jung et al., 2017). Currently, researchers are discussing how to measure the entrepreneurial ecosystem and gain a comprehensive understanding of the subject matter (Cavallo et al., 2019). Entrepreneurial ecosystems entail the entrepreneurial opportunities of discovering, pursing and scaling up new ventures (Autio et al., 2018). In this context, digitization plays a fundamental role in enabling new ventures to re-invent how to create, capture and deliver value (Cavallo et al., 2019).

4. The digital entrepreneurial ecosystem.

The digital entrepreneurial ecosystem refers to the network of actors, institutions, resources, and digital technologies that enable and support the creation, growth, and scaling of digital startups and entrepreneurial ventures. It's essentially an evolution of the traditional entrepreneurial ecosystem, adapted to the digital economy (Sussan & Acs, 2017).

A Digital Entrepreneurial Ecosystem is "A set of interdependent digital and physical components - such as platforms, policies, institutions, and communities- that collectively foster digital entrepreneurship and innovation". It integrates traditional ecosystem elements (like finance, talent, and culture) with digital infrastructure (such as online platforms, data, and connectivity) (Zhou and Cen, 2024). The key components of a digital entrepreneurial ecosystem consist of:

- **Entrepreneurs**: The entrepreneurs of a digital ecosystem may me relevant professionals, like application developers or other freelancers, mainly working remotely and with a digital mindset
- **Digital Infrastructure**: The digital infrastructure is a key element for such an ecosystem. Technologies, like cloud computing, are crucial resources of the digital value chain.
- **Financial Resources**: New financial resources and ways of transaction, like PayPal, crypto currencies, online fundraising and more, are creating a new field of economy.
- **Talents and education**: Access to talented employees and coworkers, as well as the way to up-skill or re-skill people has changed drastically with on line professional networks and online learning.
- **Culture**: Culture, is always an important business factor on the entrepreneurs way to success. The openness to innovation and the new mind set, leading to new habits and ways of working, like online communities and teleworking, is part of the new entrepreneurs perform their business.
- **New Markets**: Online marketplaces, geographically distant from the customer are popping up almost every day.
- **Policy making and Organizations**: All organizations, supporting or regulatory, play their role in the digital ecosystem. Supporting organizations may be virtual incubators that support entrepreneurship. Regulators may be e-government institutions and other policy making actors.
- **The digital Supply Chain**: In the digital entrepreneurial ecosystem, all involved actors in the supply chain rely on the fact that each and every one of the are digitalized enough in order to have sufficient and efficient flow of information through their supply chain.

The drivers of digital entrepreneurship and the respective digital ecosystem are mainly the digital platforms, the adaptation of technology (such as big data, blockchain and Artificial Intelligence), the automation of processes, the new way of working and co working (remote working and online work management tools) and of course the online global talent pools (Mitrache et al. 2025). So, how digital entrepreneurial ecosystem differs from traditional entrepreneurial ecosystems? The key differences are the following (Lado et al., 2024):

- **Market reach and geography**: For the traditional ecosystem, the market reach and geography is mainly local and regional. For the digital is global and mainly online.
- **Infrastructure and resources**: For the traditional ecosystem, the resources are

mostly tangible and the infrastructure is physical (logistics and brick and mortar). For the digital, resources intangible (e.g. data) and the infrastructure is digital .

- **Speed and control**: For the traditional ecosystem, speed of processing events and controlling the processes is quite linear and slow. For the digital is rapid and scalable.

5. Conclusion

The information provided after the review analysis reveals that digital transformation is a rather complex and multidimensional process, which affects and reshapes not only technological aspects but almost every business area (Porfírio et al. 2021; Lokuge et al. 2019; Sawy et al. 2016). Especially when it comes to small and medium-sized enterprises existing bibliography reveals that most of them cannot implement changes fast enough, while the smaller the company, the more the obstacles and the lower the likelihood of adopting new digital solutions (European Investment Bank 2021). The overall level of digital maturity among small enterprises remains low, and there exist a significant gap compared with large enterprises (OECD 2021; OECD 2019; Zaidi and Rupeika - Apoga 2021).

Small enterprises are also often more exposed to external crises that threaten market stability compared with large enterprises, due to limited resources—a phenomenon known as the “liability of smallness” (Eggers 2020). Even though digital technologies can support many business aspects, there exist many research issues under consideration. For example, it is not yet empirically supported how the adoption of digital technologies by small enterprises is related with sustainability outcomes (Philbin et al. 2022; Mago and Modiba 2022). Even though small enterprises are the backbone of many economies, including both developed and developing countries (Gherghina et al. 2020), yet they are vulnerable to capital concentration (Brown et al. 2020), and thus economic crises have a profound impact on them (Cucculelli and Peruzzi 2020).

Beyond its technological dimensions, digital transformation can provide a new, more agile and open orientation that redirect strategic mindset to the digital – business environment and can provide a competitive advantage. This perspective aligns with digital strategies that involve efficient resource allocation and dynamic managerial capabilities. Such a strategic orientation explains superior firm performance because it shapes how businesses transform and reconfigure their resources (Newbert 2007; Kindermann et al. 2020). One dimension of digital orientation defines the scope of digital technology as the set of technological enablers that allow firms to achieve strategic growth (Kindermann et al. 2020).

Digitalization is transforming economies worldwide and reshaping how businesses develop, trade, and deliver goods and services (Gaglio et al. 2022). The advancement of digitalization promotes an environmental orientation that SMEs are expected to cultivate and optimize in terms of performance and operations, to achieve desired growth through enhanced products and services (Ribeiro-Navarrete et al. 2023). Companies can optimize their digital capabilities, while adapting to changing conditions, mitigating risks, and identifying new opportunities (He et al. 2023). Following existing research, digital transformation comprises four main components (Guo et al. 2020):

- Redesign processes to a more flexible and online way,
- Digitalize the supply chains,
- Developing new digital products or services,
- Delivering products / services via online platforms.

It can be influenced by several factors (Isensee et al. 2020):

- Strategic orientation
- Internal capabilities
- Management system
- Attitudes toward digital adoption

Several barriers hinder enterprises from adopting digital transformation, including budgetary limitations, inability to invest due to high capital and operational costs, insufficient understanding of internet technologies, sectoral burdens, data security and privacy concerns, rapid technological changes, lack of information regarding digital standards, limited awareness of digitalization benefits, inadequate qualifications, and connectivity issues. While many enterprises are increasingly aware that the internet is key to success, in many cases they still lack a website optimized for mobile devices. Enterprises use the internet for a range of purposes, such as finding general business information, communicating via email with clients, performing electronic banking transactions, paying bills, ordering supplies, and filing taxes online. It is therefore essential that enterprises be able to conduct cost-benefit analyses of digital technologies and develop awareness of their potential (Ulas 2019).

Digitally oriented firms tend to apply digital technologies across all functional areas and to adopt digital initiatives quickly through strategic commitment and adaptive thinking (Verhoef et al. 2021). Digital orientation influences the development and acquisition of new skills, competencies, and knowledge—key resources that facilitate digital transformation (Ardito 2021). Drawing on the Resource-Based View, digitally oriented firms achieve higher levels of innovation due to their broader vision and commitment to leveraging new technologies for developing innovative products (Khin et al. 2019). Meanwhile, according to Resource Dependence Theory, such firms emphasize the importance of relationships with external actors for gaining access to unique resources (Parsehyan 2020).

Governments also play a crucial role in stimulating the digital transformation of enterprises. Policy interventions include legal and regulatory frameworks that can support digital transformation

and can provide incentives. As the business landscape evolves under the Fourth Industrial Revolution, it becomes evident that manufacturing and production are increasingly practical and technology-driven activities. Today, those who can survive in the rapidly expanding digital era are individuals and enterprises that align themselves with contemporary technological advancements (Ulas 2019).

Finally, the decisive role of organizational culture (Kargas and Varoutas 2015) should not be neglected, since when aligned with technology adoption and data management, it increases the likelihood of a successful digital transformation procedure. Organizational culture has been directly associated to several business issues from the implementation of digital technologies up to reaching the market orientation needed (Kargas and Papadimitriou 2012). Achieving innovation and high performance implies that management priorities must focus on transformation rather than the complexity of the technology itself (Philbin et al. 2022). Digital transformation is finally associated with sustainable development as well (Kargas et al. 2024c), while it is worth mentioning its relationship with skills and competencies capable to lead to added – value innovation (Kargas et al. 2022b).

REFERENCES

[1] Accenture. (2019). Finance reimagined. Accenture. Available at: https://www.accenture.com/_acnmedia/pdf-97/accenture-finance-reimagined-igniting-the-spark-to-unlock-value.pdf

[2] Acs, Z. J., Stam, E., Audretsch, D. B., & O'Connor, A. (2017). The lineages of the entrepreneurial ecosystem approach. *Small Business Economics*, 49(1), 1-10.

[3] Agostini, L., Galati, F. and Gastaldi, L., "The digitalization of the innovation process", European Journal of Innovation Management, 2020, Vol. 23 No. 1, pp. 1-12.

[4] Andersson, P., Movin, S. and Mähring, M., Managing Digital Transformation, Stockholm: BrandFactory, Göteborg, 2018

[5] Ardito, L., Raby, S., Albino, V. and Bertoldi, B., "The Duality of Digital and Environmental Orientations in the Context of SMEs: Implications for Innovation Performance", Journal of Business Research, 2021, Vol. 123, pp. 44–56

[6] Audretsch, D. B., &Belitski, M. (2017). Entrepreneurial ecosystems in cities: establishing the framework conditions. *The Journal of Technology Transfer*, 42(5), 1030-1051.

[7] Autio, E., Nambisan, S., Thomas, L. D., & Wright, M. (2018). Digital affordances, spatial affordances, and the genesis of entrepreneurial ecosystems. *Strategic Entrepreneurship Journal*, 12(1), 72-95.

[8] Berghaus, S. and Back, A., "Stages in Digital Business Transformation: Results of an Empirical Maturity Study", 10th Mediterranean Conference on Information Systems, Cyprus, 2016

[9] Braunerhjelm, P., "Entrepreneurship, Knowledge and Economic Growth", Foundations and Trends® in Entrepreneurship, 2008, Vol. 4: No. 5, pp. 451-533

[10] Brown, R., Rocha, A. and Cowling, M., "Financing entrepreneurship in times of crisis: Exploring the impact of COVID-19 on the market for entrepreneurial finance in the United Kingdom", International Small Business Journal: Researching Entrepreneurship, 2020, Vol. 38, pp. 380-390

[11] Cavallo, A., Ghezzi, A., &Balocco, R. (2019). Entrepreneurial ecosystem research: Present debates and future directions. *International Entrepreneurship and Management Journal*, 15(4), 1291-1321.

[12] Caputo, A., Pizzi, S., Pellegrini, M.M. and Dabić, M., "Digitalization and business models: Where are we going? A science map of the field", Journal of Business Research, 2021, Vol. 123, pp. 489–501.

[13] Cucculelli, M. and Peruzzi, V., "Post-crisis firm survival, business model changes, and learning: Evidence from the Italian manufacturing industry", Small Business Economics, 2020, Vol. 54, pp. 459–474

[14] Cuenca and Llorente, "Digital transformation: the art of being a startup", Developing Ideas, Madrid, 2015

[15] Cunningham, J. A., Menter, M., & Wirsching, K. (2019). Entrepreneurial ecosystem governance: A principal investigator-centered governance framework. *Small Business Economics*, 52(2), 545-562.

[16] Dai, J., and Vasarhelyi. M. A. (2017). Toward blockchain-based accounting and assurance. *Journal of Information Systems*, 31(3), 5-21.

[17] Denicolai, S., Zucchella, A. and Magnani, G., "Internationalization, digitalization, and sustainability: Are SMEs ready? A survey on synergies and substituting effects among growth paths", Technological Forecasting and Social Change, 2021, Vol. 166, 120650

[18] Eggers, F., "Masters of disasters? Challenges and opportunities for SMEs in times of crisis", Journal of Business Research, 2020, Vol. 116, pp. 199-208

[19] Elia, G., Margherita, A. and Passiante, G. (2020). Digital entrepreneurship ecosystem: How digital technologies and collective intelligence are reshaping the entrepreneurial process. Technological Forecasting and Social Change, [online] 150(150), p.119791. doi: https://doi.org/10.1016/j.techfore.2019.119791.

[20] Ensaria, M. Ş. And Karabay, M. E., "What Helps to Make SMEs Successful in Global Markets?", Procedia - Social and Behavioral Sciences, 2004, pp. 192 – 201

[21] Ferreira, J.J.M., Fernandes, C.I. and Ferreira, F.A.F., "To be or not to be digital, that is the question: firm innovation and performance", Journal of Business Research, 2019, Vol. 101, pp. 583-590.

[22] Fischer, M., Imgrund, F., Janiesch, C. and Winkelmann, A., "Strategy archetypes for digital transformation: defining meta objectives using business process management", Information and Management, 2020, Vol. 57 No. 5, 103262.
[23] Gaglio, C., Kraemer-Mbula, E. and Lorenz, E., "The effects of digital transformation on innovation and productivity: Firm-level evidence of South African manufacturing micro and small enterprises", Technological Forecasting and Social Change, 2022, Vol. 182, 121785
[24] Gaviria, D., Arango, J., & Valencia, A. (2015). Reflections about the use of information and communication technologies in accounting education. *Procedia-Social and Behavioral Sciences*, 176, 992-997.
[25] Gherghina, Ș.C., Botezatu, M. A., Hosszu, A. and Simionescu, L.N., "Small and Medium-Sized Enterprises (SMEs): The Engine of Economic Growth through Investments and Innovation." Sustainability, 2020, Vol. 12 No. 1, p. 347
[26] Gkika EC, Kargas A, Salmon I, Drosos D. Unveiling Digital Maturity: Key Drivers of Digital Transformation in the Greek Business Ecosystem. Administrative Sciences. 2025; 15(3):96. https://doi.org/10.3390/admsci15030096
[27] Goldfarb, A. and Tucker, C. E., Digital Economics, Working Paper No. 23684, National Bureau of Economic Research, Cambridge, 2017
[28] Godlovitch I. and C. Bodin, C., "Addressing the Challenges of the Digital Transition in National RRF Plans: Measures to Support Digitisation of SMEs", European Parliament, ECON committee, 2022
[29] Gomez-Trujillo, A.M. and Gonzalez-Perez, M.A., "Digital transformation as a strategy to reach sustainability", Smart and Sustainable Built Environment, 2021
[30] Guo, L. and Xu, L., "The effects of digital transformation on firm performance: evidence from China's manufacturing sector", Sustainability, 2021, Vol. 13 No. 22, 12844
[31] Guo, H., Yang, Z., Huang, R. and Guo, A., "The digitalization and public crisis responses of small and medium enterprises: Implications from a COVID-19 survey". Frontiers of Business Research in China, 2020, Vol. 14 No. 1, pp. 1–25
[32] Haseeb, M., Hussain, H. I., Ślusarczyk, B. and Jermsittiparsert, K. (2019). Industry 4.0: A Solution towards Technology Challenges of Sustainable Business Performance. Social Sciences, 2019, Vol. 8 No 5, p.154
[33] Hanson, E., & Phillips, F. (2006). Teaching financial accounting with analogies: Improving initial comprehension and enhancing subsequent learning. *Issues in Accounting Education*, 21(1), 1-14.
[34] He, Z., Huang, H., Choi, H. and Bilgihan, A., "Building organizational resilience with the digital transformation", Journal of Service Management, 2023, Vol. 34 No. 1, pp. 147-171
[35] Hofstede, G., Dimensionalizing Cultures: The Hofstede Model in Context, Netherlands, 2011
[36] Holtz, M., How Fortune 500 Companies are placing Digital Transformation at the centre of their Innovation Strategies, The digital transformation people, 2018
[37] Isensee, C., Teuteberg, F., Griese K.-M. and Topi, C., "The relationship between organizational culture, sustainability, and digitalization in SMEs: A systematic review", Journal of Cleaner Production, 2020, Vol. 275, 122944
[38] Jafari-Sadeghi, V., Garcia-Perez, A., Candelo, E. and Couturier, J., "Exploring the impact of digital transformation on technology entrepreneurship and technological market expansion: the role of technology readiness, exploration and exploitation", Journal of Business Research, 2021, Vol. 124, pp. 100-111.
[39] Jung, K., Eun, J. H., & Lee, S. H. (2017). Exploring competing perspectives on government-driven entrepreneurial ecosystems: lessons from Centres for Creative Economy and Innovation (CCEI) of South Korea. *European Planning Studies*, 25(5), 827-847.
[40] Kamel, S., Rateb, D., & El-Tawil, M. (2009). The impact of ICT investments on economic development in Egypt. *The Electronic Journal of Information Systems in Developing Countries*, 36(1), 1-21.
[41] Kargas A., Gialeris E., Filios S., Komisopoulos F., Lymperiou A., & Salmon I., (2024). Evaluating the Progress of Digital Transformation in Greek SMEs. In F. Theofanidis, O. Abidi, A. Erturk, S. Colbran, & E. Coşkun (Eds.), Digital Transformation and Sustainable Development in Cities and Organizations (pp. 81-105). IGI Global. https://doi.org/10.4018/979-8-3693-3567-3.ch004
[42] Kargas, A., Gkika, E.C., Komisopoulos, F., Ntanos, S., Drosos, D. (2024b). Reaching Organization Productivity and Innovation Through Customer Satisfaction: The Case Study of Greek Mobile Market. In: Kavoura, A., Borges-Tiago, T., Tiago, F. (eds) Strategic Innovative Marketing and Tourism. ICSIMAT 2023. Springer Proceedings in Business and Economics. Springer, Cham. https://doi.org/10.1007/978-3-031-51038-0_60
[43] Kargas A, Gkika EC, Sepetis A. Exploring Digital Transformation Intensity and Its Relationship with Sustainability: Greek Managers' Perspectives. Sustainability. 2024c; 16(14):6077. https://doi.org/10.3390/su16146077
[44] Kargas A. & Aretos A. "Transforming Strategic Management Using Agile Methodologies." New Perspectives and Possibilities in Strategic Management in the 21st Century: Between Tradition and Modernity, edited by Javier Martínez-Falcó, et al., IGI Global, 2023, pp. 349-368. https://doi.org/10.4018/978-1-6684-9261-1.ch018
[45] Kargas A., Giannakis A. & Foukas I., "Recognizing Skills and Competencies Required Under Industry 4.0's Framework for Achieving Business Digital Transformation", Management Strategies for Sustainability, New Knowledge Innovation, and Personalized Products and Services, edited by Mirjana Pejic-Bach and Çağlar Doğru, IGI

Global, 2022, pp. 1-34. http://doi:10.4018/978-1-7998-7793-6.ch001
[46] A. Kargas, D. Papakyriakopoulos, F. Komisopoulos, E. Gkika, S. Filios, “Tracing innovation with skill and competences”, ISPIM Connects Athens – The Role of Innovation: Past, Present, Future, on 28-30 November 2022b. Event Proceedings: LUT Scientific and Expertise, 1-11, 2022, Publications: ISBN 978-952-65069-1-3. Order number in series 110.
[47] Kargas A. & Tsokos A., “Employer Branding Implementation and Human Resource Management in Greek Telecommunication Industry”, Administrative Sciences, Vol. 10, no. 17, pp. 1-14, 2020 DOI: 10.3390/admsci10010017
[48] Kargas A. & Varoutas D., "On the relation between organizational culture and leadership: An empirical analysis", Cogent Business & Management, Taylor & Francis, Vol. 2, no 1, pp. 1-18, Jun. 2015. DOI: 10.1080/23311975.2015.1055953
[49] Kargas A. & Papadimitriou A., "The Relationship between Organizational Culture and Market Orientation in the Greek Telecommunication Industry", Netnomics: Economic Research and Electronic Networking, Springer, vol. 13, no 1, pp. 1-23, April 2012. DOI: 10.1007/s11066-012-9066-0
[50] Khin, S. and Ho, T.C., “Digital Technology, Digital Capability and Organizational Performance: A Mediating Role of Digital Innovation”, International Journal of Innovation Science, 2019, Vol. 11, pp. 177-195
[51] Kindermann, B., Beutel, S., Garcia de Lomana, G., Strese, S., Bendig, D. and Brettel, M., “Digital Orientation: Conceptualization and Operationalization of a New Strategic Orientation”, European Management Journal, 2020, Vol. 39, pp. 645-657
[52] Kohli, R and Johnson, S. (2011), “Digital Transformation in Latecomer”, MIS quarterly Executive, 2011, pp. 141-156
[53] Kostakis P., Kargas, A. “Big-Data Management: A Driver for Digital Transformation?” Information; 12(10):411, 2021. https://doi.org/10.3390/info12100411
[54] Kraus, S., Durst, S., Ferreira, J.J., Veiga, P., Kailer, N. and Weinmann, A., “Digital transformation in business and management research: an overview of the current status quo”, International Journal of Information Management, 2022, Vol. 63, Article 102466
[55] Lado, A., Castro-Abancens, I., Moreno-Menéndez, A.M. and Casillas, J.C. (2024). Traditional and digital entrepreneurial ecosystems: a framework of differences and similarities. Journal of global entrepreneurship research, 14(1). doi: https://doi.org/10.1007/s40497-024-00404-5.
[56] Laitsou E., Kargas A. & Varoutas D., “How ICT affects economic growth in the euro area during the economic crisis”, Netnomics: Economic Research and Electronic Networking, Springer, 21 (1), 59–81, 2021 DOI: https://doi.org/10.1007/s11066-020-09141-9
[57] Li, L., Su, F., Zhang, W. and Mao, J.Y. “Digital transformation by SME entrepreneurs: a capability perspective”, Information Systems Journal, 2017, Vol. 28 No 6, pp. 1129-1157
[58] Lokuge, S., Sedera, D., Grover, V. and Xu, D., “Organizational readiness for digital innovation: development and empirical calibration of a construct”, Information and Management, 2019, Vol. 56 No. 3, pp. 445-461
[59] Lu, J., Ren, L., Zhang, C., Rong, D., Ahmed, R. R. and Streimikis, J., “Modified Carroll's pyramid of corporate social responsibility to enhance organizational performance of SMEs industry”, Journal of Cleaner Production, 2020, Vol. 271, 122456
[60] Mack, E., & Mayer, H. (2016). The evolutionary dynamics of entrepreneurial ecosystems. Urban Studies, 53(10), 2118-2133.
[61] Mago, S., and Modiba, F.S., "Does informal finance matter for micro and small businesses in Africa?”, Small Business International Review, 2022, Vol. 6 No. 1, e415.
[62] Mason, C., & Brown, R. (2014). Entrepreneurial ecosystems and growth oriented entrepreneurship. Final report to OECD, Paris, 30(1), 77-102.
[63] Matt C., Hess T. and Benlian A., Digital transformation strategies, Business & Information Systems Engineering, 2015, Vol. 57 No.5, pp. 339-343.
[64] Matt, D.T.; Modrák, V. and Zsifkovits, H. (Eds.), “Industry 4.0 for SMEs: Challenges, Opportunities and Requirements”, Springer International Publishing: Cham, Switzerland, 2020, ISBN 978-3-030-25424-7, pp. 1-401
[65] Mitrache, Marius-Daniel & Spulbar, Lucian & Smarandescu, Andrei. (2025). Exploring the Ecosystem of Digital Entrepreneurship. 1. 63-70. Available at: https://www.researchgate.net/publication/387739443_Exploring_the_Ecosystem_of_Digital_Entrepreneurship
[66] Müller, J. M., & Voigt, K., “Sustainable Industrial Value Creation in SMEs: A Comparison between Industry 4.0 and Made in China 2025”, International Journal of Precision Engineering and Manufacturing-Green Technology, 2018, Vol. 5 No. 5, pp. 659–670
[67] Newbert, S.L., “Empirical Research on the Resource-Based View of the Firm: An Assessment and Suggestions for Future Research”, Strategic Management Journal, 2007, Vol. 28 No. 21, pp. 121–146
[68] OECD, Organisation for Economic Co-operation and Development, “The digital transformation of SMEs and Entrepreneurship”. Paris, France: OECD, 2021, ISBN 978-92-64-39245-8
[69] OECD, Organisation for Economic Co-operation and Development, “Measuring the digital transformation: A roadmap for the future”. Paris, France: OECD, 2019, ISBM 978-92-64-31199-2
[70] Papageorgiou, E., & Callaghan, C. W. (2020). Accountancy learning skills and student performance in accounting education: evidence from the South African context. *Accounting Education*, 29(2), 205-228.

[71] Parsehyan, B.G., “Digital transformation in human resources management: HR 4.0”, Turkish Studies, 2020, Vol. 15 No. 2, pp. 211-224
[72] Philbin S., Viswanathan R. and Telukdarie A., “Understanding how digital transformation can enable SMEs to achieve sustainable development: A systematic literature review”, SMALL BUSINESS INTERNATIONAL REVIEW JOURNAL, 2022, EISSN: 2531-0046
[73] Porfírio, J.A., Carrilho, T., Felício, J.A. and Jardim, J., “Leadership characteristics and digital transformation”, Journal of Business Research, 2021, Vol. 124, pp. 610-619
[74] Prause, M., “Challenges of Industry 4.0 Technology Adoption for SMEs: The Case of Japan”, Sustainability, 2019, Vol. 11 No. 20, 5807
[75] Psyrris A., Kargas A. and Varoutas D., "A survey on the deployment of smart factory in the Post COVID-19 Era: The role of 5G, deployment options, benefits and business models", Handbook of Research on Digitalization as a Driver for Smart Economy in the Post-COVID-19 Era, IGI Global, 2022, pp 132-152, DOI: 10.4018/978-1-7998-9227-4.ch008
[76] PWC (2018). Will robots really steal our jobs? PWC Report PricewaterhouseCoopers LLP. Available at:
https://www.pwc.com/hu/hu/kiadvanyok/assets/pdf/impact_of_ automation_on_jobs.pdf
[77] Qasim, A., &Kharbat, F. F. (2020). Blockchain technology, business data analytics, and artificial intelligence: Use in the accounting profession and ideas for inclusion into the accounting curriculum. *Journal of emerging technologies in accounting*, 17(1), 107-117.
[78] Quinton, S., Canhoto, A., Molinillo, S., Pera, R. and Budhathoki, T., “Conceptualising a digital orientation: antecedents of supporting SME performance in the digital economy”, Journal of Strategic Marketing, 2018, Vol. 26 No. 5, 427–439
[79] Ribeiro-Navarrete, B., Martín Martín, J.M., Guaita-Martínez, J.M. and Simón-Moya, V. (2023). “Analysing cooperatives’ digital maturity using a synthetic indicator”, International Journal of Information Management, 2023, Vol. 72, 102678
[80] Sawy, O.A.E., Kræmmergaard, P., Amsinck, H. and Vinther, A.L., “How lego built the foundations and enterprise capabilities for digital leadership”, MIS Quarterly Executive, 2016, Vol. 15 No. 2, pp. 141-166
[81] Schallmo, D., Williams, C.A. and Boardman, L., “Digital transformation of business models—best practice, enablers, and roadmap”, International Journal of Innovation Management, 2017, Vol. 21 No. 08, 174001
[82] Setia, P., Setia, P., Venkatesh, V., & Joglekar, S., “Leveraging digital technologies: How information quality leads to localized capabilities and customer service performance”. MIS Quarterly, 2013, Vol. 37 No 2, pp. 565–590
[83] Šimberová, I., Korauš, A., Schüller, D., Smolíkova, L., Straková, J. and Váchal, J., “Threats and Opportunities in Digital Transformation in SMEs from the Perspective of Sustainability: A Case Study in the Czech Republic”, Sustainability, 2022, Vol. 14 No. 6, p. 3628
[84] Stam, E. (2015). Entrepreneurial ecosystems and regional policy: a sympathetic critique. *European Planning Studies*, 23(9), 1759-1769.
[85] Stam, E., & Van de Ven, A. (2021). Entrepreneurial ecosystem elements. *Small Business Economics*, 56(2), 809-832.
[86] Steiber, A., Alänge, S., Ghosh, S. and Goncalves, D., “Digital transformation of industrial firms: an innovation diffusion perspective”, European Journal of Innovation Management, 2021, Vol. 24 No. 3, pp. 799-819.
[87] Storey, D., “Understanding the Small Business Sector. D J Storey”, The world bank (2018, June), 1994, available at: https://www.worldbank.org/en/country/srilanka/overview.
[88] Straub, D. Loch, K. Evaristo, R. Karahanna, E. and Srite, M. (2002). Toward a Theory-based Measurement of Culture. *Journal of Global Information Management*, 10(1), 13-23.
[89] Sussan, F., & Acs, Z. J. (2017). The digital entrepreneurial ecosystem. *Small Business Economics*, 49(1), 55-73.
[90] Telukdarie, A., Philbin, S., Mwanza, B.G. and Munsamy, M., “Digital Platforms for SMME Enablement”, Procedia Computer Science, 2022, Vol. 200, pp. 811–819
[91] Teng, X., Wu, Z. and Yang, F., “Research on the relationship between digital transformation and performance of SMEs”, Sustainability, 2022, Vol. 14 No. 10, p. 6012
[92] Toni, A. D., “Small and medium district enterprises and the new product development challenge: Evidence from Italian eyewear district”, International Journal of Operations & Production Management, 2003, pp. 678-697
[93] Türegün, N. (2019). Impact of technology in financial reporting: The case of Amazon Go. *Journal of Corporate Accounting & Finance*, 30(3), 90-95.
[94] Ulas, D. “Digital transformation process and SMEs”, Procedia Computer Science, 2019, Vol 158, pp. 662–671
[95] Venkatesh, V., and Morris, M. G., Davis. G. B., and Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425-478.
[96] Verhoef, P.C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J.Q., Fabian, N. and Haenlein, M., “Digital transformation: a multidisciplinary reflection and research agenda”, Journal of Business Research, 2021, Vol. 122, pp. 889-901.
[97] Vial G., “Understanding digital transformation: A review and a research agenda”, The Journal of Strategic Information Systems, 2019, Vol. 28 No. 2, pp. 118-144.
[98] Vial, G., “Understanding digital transformation: A review and a research agenda”, Managing Digital Transformation, 2021, Vol. 26, pp. 13-66.

[99] Wang, H., Cao, W. and Wang, F., "Digital transformation and manufacturing firm performance: evidence from China", Sustainability, 2022, Vol. 14 No. 16, 10212
[100] Wang, Y. and Su, X., "Driving factors of digital transformation for manufacturing enterprises: a multi-case study from China", International Journal of Technology Management, 2021, No. (2-4), pp. 229-253.
[101] Youngjin, Y., Jr., R. J., Lyytinen, K. and Majchrzak, A., "Organizing for Innovation in the Digitized World", Organization Science, 2012, pp. 1398-1408
[102] Zaidi, S.H. and Rupeika-Apoga, R., "Liquidity Synchronization, Its Determinants and Outcomes under Economic Growth Volatility: Evidence from Emerging Asian Economies", Risks, 2021, pp. 9, 43
[103] Zhai, H., Yang, M. and Chan, K.C., "Does digital transformation enhance a firm's performance? Evidence from China", Technology in Society, 2022, Vol. 68, 101841
[104] Zhou, J. and Cen, W. (2024). Digital Entrepreneurial Ecosystem Embeddedness, Knowledge Dynamic Capabilities, and User Entrepreneurial Opportunity Development in China: The Moderating Role of Entrepreneurial Learning. Sustainability, 16(11), p.4343. doi: https://doi.org/10.3390/su16114343.
[105] European Investment Bank, "Building a Smart and Green Europe in the COVID-19 Era", EIB Investment Report 2020/2021, Luxembourg, 2021, ISBN 978-92-861-4811-8
[106] Gunz, S. & Thorne, L. (2020). Thematic Symposium: The Impact of Technology on Ethics, Professionalism and Judgement in Accounting. *Journal of Business Ethics*, 167(2), 153-155.
[107] Isenberg, D. J. (2010). How to start an entrepreneurial revolution. *Harvard Business Review*, 88(6), 41-50.
[108] Ukko, J., Nasiri, M., Saunila, M. and Rantala, T., "Sustainability strategy as a moderator in the relationship between digital business strategy and financial performance", Journal of Cleaner Production, 2019, Vol. 236, 117626