THE DIGITAL ENTERPRISE LANDSCAPE: HOW DESI METRICS SHAPE ECONOMIC GROWTH IN THE EU

Maria Magdalena Doroiman[1*], **Nicoleta Sîrghi**[2]
[1] *Doctoral School of Economics and Business Administration, Faculty of Economics and Business Administration, West University of Timisoara, Timișoara, Romania*
[2] *Department of Economics and Economic Modelling, Faculty of Economics and Business Administration, West University of Timisoara, Timișoara, Romania*
maria.doroiman10@e-uvt.ro
nicoleta.sirghi@e-uvt.ro

Abstract: *The European Union's (EU) economic growth is increasingly driven by digitalization across all areas, including the digital transformation of businesses. This paper explores how the digital transformation of enterprises could influence economic growth in the EU by analyzing data from the Digital Economy and Society Index (DESI) and economic metrics from Eurostat for the post-pandemic period (2021-2022). This paper uses econometric techniques like Panel Corrected Standard Errors (PCSEs) and Robust Regression with Huber Iteration (RRHI) to investigate the cause-and-effect relationships between digitalization and economic factors such as GDP growth rate and real GDP per capita growth. The results show that different digital strategies have varying effects on economic performance. The paper also emphasizes the critical role of real labor productivity in connecting digital transformation with economic performance. The implications of this paper highlight the need for nuanced policy strategies that foster digital skills, improve technological infrastructure and support the Small and Medium Enterprises (SMEs) in their digitalization efforts in order to achieve the ambitious objectives of the EUs Digital Decade. The results also propose a strategic focus on specific technologies that offer immediate economic advantages and enable a stronger incorporation of digital progress across various business operations in the member states.*

Keywords: digitalization, digital enterprises, digital policies, digital transformation, economic growth, econometric modelling**.**
JEL classification: I31, J24, O10, O30.

1. Introduction

The digital transformation of enterprises is increasingly recognized as a critical catalyst for economic growth and competitiveness within the EU (Ghazy et al., 2022; Dabbous et al., 2023). The Digital Economy and Society Index (DESI) serves as a measure of this transformation, tracking how EU member states are progressing in terms of digital transformation in four main directions: digital skills, digital infrastructure, digital transformation of businesses, and the digitalization of public services (EU, 2021). Given the EU's strategic commitment to achieving its Digital Decade objectives, it is essential to understand the relationship between DESI indicators and economic growth to adopt proper and effective policies and guide digital investments.

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This paper is based on recognizing that digital technologies have become essential for enterprises to maintain competitiveness in the changing global landscape. Those who effectively utilize social media, big data analytics, and e-commerce technologies can strengthen their market presence, enhance customer interactions, and stimulate economic growth. The main objective of this paper is to explore the relationship between DESI metrics on the digital transformation of enterprises and their impact on the economic growth in EU member states.

2. Theoretical background

Thompson and Garbacz (2007) explained the relationship between economic growth and information technology based on access to information, increased organizational efficiency and institutional functionality. Qu (2017) explores how digitalization drives economic growth, considering both productivity gains and the emergence of new economic opportunities as key factors, and demonstrates that digital technologies not only streamline business operations but also encourage innovation and entrepreneurial initiatives, which are crucial for sustainable economic development. Nambisan et al. (2019) illustrate how digital technologies are reshaping innovation and the entrepreneurial landscape. They argue that the digital transformation of enterprises has redefined value creation, empowering businesses to manage uncertainties more efficiently and expand their operations effectively. Other studies, such as the ones of Vu et al. (2020) and Fernández-Portillo et al. (2020), demonstrate the significant role of digitalization in fostering economic stability and growth. However, the authors argue that the main focus should be changed from highlighting the positive link between digital technologies and growth to a deeper exploration of the mechanisms by which these technologies could influence economic performance.

Recent studies highlight the pivotal role of digital transformation in driving performance at the enterprise level and, consequently, promoting further economic growth. Teng et al. (2022) highlight that the SMEs that embrace digital transformation experience higher operational efficiency, improved customer engagement, and overall growth in competitiveness. Liu (2022) shows the direct correlation between higher DESI scores and superior economic outcomes in the EU, arguing that nations with well-defined digital policies are better positioned. Marcysiak and Pleskacz (2021) studied the factors influencing digitalization in SMEs, highlighting the importance of skilled workforce availability, access to financial resources, and government support as critical enablers of digitalization. Furthermore, according to the OECD (2021) research, there is still a digital divide in many countries between SMEs and larger enterprises, even while digital technologies present new potential for SMEs to engage in the global economy. The European Union (EU, 2021) has set strategic and ambitious objectives for 2030 to enhance digital capabilities within small and medium-sized enterprises (at least 90% of SMEs). The recent data from DESI highlights the progress and disparities in these areas across EU member states, as they are correlated. The data reveals varying levels of skills and technology adoption among SMEs in different countries highlighting a digital gap that the EU aims to narrow through its policies. Figure 1 presents a detailed visualization of the relationship between basic digital skills and the digital intensity of SMEs across all EU member states.

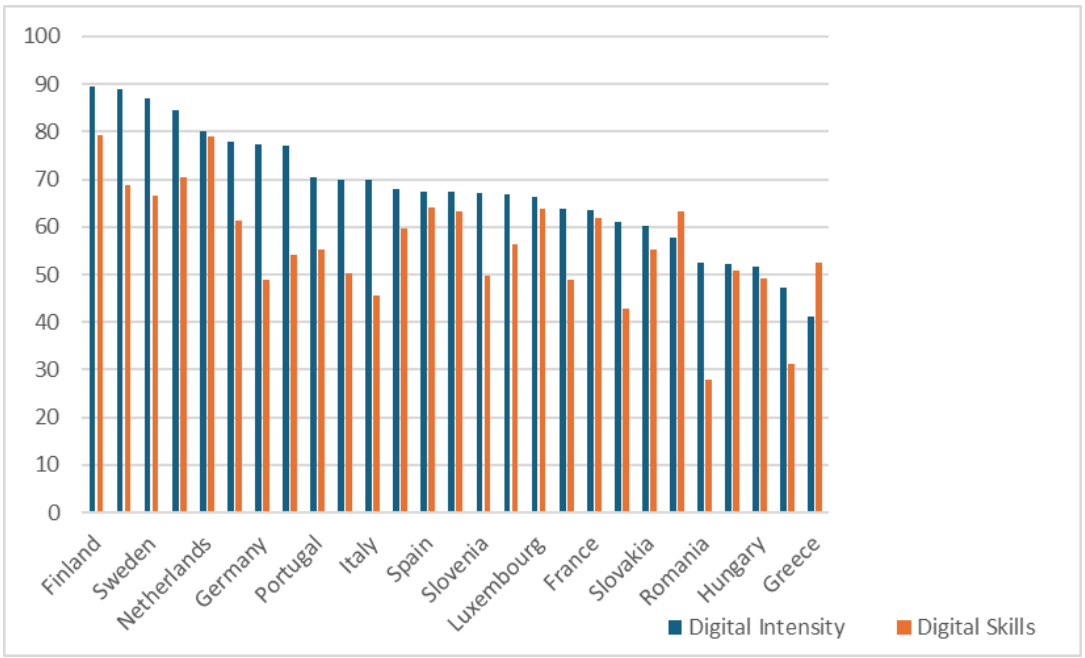

Figure 1: The relationship between the SMEs with basic digital intensity and the level of basic digital skills in EU
Source: Author's processing based on Eurostat data

While some countries have a high level of digital proficiency and integration, as shown in Figure 1, others are falling behind emphasizing the need for targeted measures to ensure equitable digital growth. According to DESI 2023 data, the average level of digital skills at EU level is 54%, with over 80% of the population from Finland, and Netherlands having at least basic digital skills, while countries as Romania and Bulgaria are lagging behind at a level of around 30%. In terms of digital intensity at SME level, the average is 69%, with top performers Finland, Denmark and Sweden very close to the target of 90%, while countries as Bulgaria, Romania and Hungary are reaching a level of approx. 50% of SMEs with a basic level of digitalization. These differences have impact on individual businesses competitiveness but also, they may influence broader economic dynamics within the EU affecting overall growth patterns and opportunities for innovation and progress in less digitally advanced markets. This bidirectional focus on improving digital skills and the digital technology integration could contribute to decreasing these disparities and to focus on the factors that might contribute to increased competitiveness and economic growth.

3. Modelling the impact of digital transformation of enterprises on economic growth

3.1. Data and methodology

Our research methodology is crafted to evaluate the impact of EU policies on economic growth, focusing on the "Digital transformation of businesses" section of DESI along with specific productivity metrics from Eurostat. Some of these variables (see Table 1) are measured at the EU level only after the pandemic, so in order to have continuity and relevant information, the analyzed period for all EU-27-member states is focused on the years 2021-2022. This period is crucial as it represents an effort toward achieving the EU-defined digital objectives, highlighting their importance in an increasingly digitized global context. The shift in terminology from "Integration of technology" to "Digitalisation of enterprises" within DESI

indicators, starting in 2021, signals a strategic change in focus and also emphasizes the need for a holistic approach to digital transformation. Table 1 presents all the indicators that are monitored in order to assess the digital performance of companies (from 3a1 to 3c3), serving as independent variables of our research. To these, we added real labor productivity, defined as GDP per person employed in all industries, a metric that provides insights into the productivity at national level.

Table 1: Variables used in the empirical analysis

Variables	Description	Unit of measure
3a1 SMEs with at least a basic level of digital intensity	Percentage of SMEs using at least 4 out of 12 selected digital technologies	% of SMEs
3b1 Electronic information sharing	Enterprises that use ERP (Enterprise Resource Planning) systems for internal information sharing	% of enterprises
3b2 Social media platforms	Enterprises using at least two social media platforms (e.g.social networks, blogs)	% of enterprises
3b3 Big data (large data volumes)	Enterprises that engage in analyzing large datasets from any source to extract valuable insights and drive business decisions.	% of enterprises
3b4 Cloud technology	Enterprises using cloud computing services for IT infrastructure and processes.	% of enterprises
3b5 AI (artificial intelligence)	Enterprises using AI for automation, customer experience or competitive advantage	% of enterprises
3b6 Electronic invoices	Enterprises issuing e-invoices that can be processed automatically	% of enterprises
3c1 SMEs selling online	SMEs generating at least 1% of their turnover from online sales.	% of SMEs
3c2 E-commerce turnover	Revenue generated by SMEs from e-commerce (electronic commerce) activities.	% of SMEs turnover
3c3 Cross-border online sales	SMEs making online sales to customers in other EU countries	% of SMEs
Real labour productivity	Gross domestic product (GDP) per employed person, reflecting national productivity	% change on previous year
Real GDP per capita	Real GDP per person, adjusted for population, year-on-year change	% change on previous year
GDP Growth Rate	GDP growth at market prices, year-on-year change	% change on previous year

Source: Author's processing based on Eurostat data

The variables selected as proxies in our empirical models are real GDP per capita and the GDP growth rate, commonly used indicators of economic growth. It is important to acknowledge that GDP may not fully capture societal welfare or long-term goals (Ward et al., 2016). Therefore, real GDP per capita and GDP growth rate are considered more

appropriate for evaluating economic development across various scenarios. In the context of the Digital Decade goals set by the EU, there are objectives aimed at significantly boosting the digital capabilities of businesses. These goals are connected with some of these monitored indicators, as 90% of SMEs are expected to attain a fundamental level of digital proficiency (3a1), 75% of the enterprises should adopt advanced technologies such as AI, Big Data and Cloud computing (3b3, 3b4, 3b5) and the number of “unicorn' companies” will double by 2030 (EU, 2021). The progress towards these targets is closely tracked through DESI, indicating a shift in policy emphasis from mere technological assimilation to a more comprehensive approach of digital transformation, within the enterprises.
In this paper, to understand how digitalization at the enterprises level might affect economic growth, we tested the data with a variety of panel methods, out of which the most relevant were the Panel Corrected Standard Errors (PCSEs) and the Robust Regression with Huber Iteration (RRHI) to ensure that our estimates are accurate and reliable. PCSEs are helpful for dealing with issues like heteroskedasticity and autocorrelation in panel data, especially when there are cross-sectional units but limited time periods. This method adjusts the errors in regression models to improve statistical conclusions, making it ideal for analyzing data that combines both time series and cross-sectional elements. It is commonly used in science and economics research to validate findings from panel data. On the other hand, RRHI focuses on minimizing the influence of outliers on regression results. By combining robust regression techniques, with processes based on the Huber loss function, this approach enhances the accuracy of parameter estimates. Using this method, we reduce the impact of outliers with differences in their data points on the model. Data patterns could be better captured and data points are prevented from having too much influence on the results. This continuous fine-tuning process improves the model’s ability to handle effects, making our economic analysis more reliable and robust.

3.2. Empirical findings

As an initial step in the analysis process, we assessed the quality of the data through the descriptive statistics presented in Table 2. There are significant variations in all the indicators regarding the state of digital transformation within enterprises. On average, about 61.54% of SMEs meet the basic level of digital intensity with a standard deviation of 15.66, but the range of digital intensity varies from a minimum of 22.23% to a maximum of 89.5%, suggesting a significant disparity in digital adoption among SMEs in the EU member states. The average adoption rate of electronic information-sharing technologies across enterprises is 36.68% at the EU level, with variations ranging from 16.8% to 57.23%. About 30.28% of enterprises engage with social media platforms, with the adoption rates oscillating between 11.68% and 50.7% as the country average. Enterprises using big data are at 13.91%, with a relatively lower standard deviation of 7.57, indicating a tighter spread in the use of big data technologies from 5.1% to 30.05%. Cloud technology adoption is, on average at 36.48% but spreads widely from 9.9% to 69.2%, highlighting the varied levels of cloud integration at the country level. AI (Artificial Intelligence) adoption is still emerging among enterprises, with an average of 8.11%. The usage of electronic invoices shows a broader variation with an average of 30.74% and a substantial standard deviation of 22.65%, pointing to a wide disparity in its adoption. A modest average of only 21.08% of SMEs engage in online selling, while the contribution of e-commerce to SME turnover averages at 11.94%, indicating a moderate uptake with the highest values at 26.2%. Relatively few SMEs engage in cross-border online sales, with an average of 9.48% and a maximum reach of 16.22%. The real labor productivity shows a modest increase on average by 3.26%, with the performance ranging widely from countries with a decrease of 4.8% to countries with an increase level of 11.8%. The average rise in both GDP per capita and GDP growth rate is over 5%, highlighting a potential economic impact of digital advancements in the EU landscape.

Table 2: Descriptive statistics

Variables	***Obs***	***Mean***	***Standard Deviation***	***Minimum***	***Maximum***
3a1 SMEs with at least a basic level of digital intensity	54	61.54262	15.66345	22.2299	89.5
3b1 Electronic information sharing	54	36.6816	10.45217	16.8	57.226
3b2 Social media platforms	54	30.27671	11.10419	11.6845	50.7
3b3 Big data (large data volumes)	54	13.90774	7.574256	5.0956	30.0468
3b4 Cloud technology	54	36.48379	16.30884	9.9	69.2
3b5 AI (artificial intelligence)	54	8.11113	5.275496	1.3826	23.9
3b6 Electronic invoices	52	30.73921	22.65018	10	94.9
3c1 SMEs selling online	54	21.07543	7.92022	8.2	37.5806
3c2 E-commerce turnover	49	11.93573	4.739518	4.0008	26.2
3c3 Cross-border online sales	54	9.478309	3.396824	3.6735	16.2187
Real labour productivity	54	3.259259	3.219898	-4.8	11.8
Real GDP per capita % change	54	5.285185	3.232816	-0.8	15.6
GDP Growth Rate	54	5.264815	2.896593	-1.3	13.6

Source: Author's analysis in Stata based on Eurostat data

We developed two-panel regression models with dependent variables, GDP growth rate, and real GDP per capita growth rate, in order to evaluate the relationships between the EU digital policies for enterprises impact economic growth. The explanatory variables are the EU-DESI indicators from the area "Digital transformation of enterprises," measures supporting the EU digital policy. These models were analyzed using PCSE and RRHI advanced econometric methods and the outcomes of the baseline regression data and GDP growth are outlined in Table 3.

Table 3: Regression results

Methods	***PCSEs***	***RRHI***	***PCSEs***	***RRHI***
Variables	GDP Growth Rate	GDP Growth Rate2	Real GDP per capita % change	Real GDP per capita % change2
3a1 SMEs with at least a basic level of digital intensity	0.0264	0.0218	-0.000661	0.0000615
	(0.0339)	(0.0434)	(0.0174)	(0.0307)
3b1 Electronic information sharing	-0.131***	-0.121*	-0.0672	-0.0648
	(0.0155)	(0.0453)	(0.0347)	(0.0320)
3b2 Social media platforms	0.106***	0.103	0.0295	0.0336
	(0.0170)	(0.0693)	(0.0406)	(0.0491)
3b3 Big data (large data volumes)	0.106***	0.117	0.0734***	0.0825
	(0.0309)	(0.0587)	(0.0060)	(0.0416)
3b4 Cloud technology	-0.122***	-0.121*	-0.0520*	-0.06
	(0.01500)	(0.0521)	(0.0205)	(0.0369)
3b5 AI (artificial intelligence)	0.0065	-0.00136	-0.0162	-0.0265
	(0.0149)	(0.0912)	(0.0402)	(0.0645)
3b6 Electronic invoices	0.0304**	0.0301	0.0266***	0.0294
	(0.0100)	(0.0207)	(0.0029)	(0.0146)
3c1 SMEs selling online	0.00835	0.00453	0.0613***	0.0637
	(0.0295)	(0.0714)	(0.0172)	(0.0505)
3c2 E-commerce turnover	0.185***	0.173	0.0426*	0.0357
	(0.0074)	(0.1070)	(0.0192)	(0.0757)
3c3 Cross-border online sales	0.102***	0.101	0.00351	-0.000737
	(0.0252)	(0.1430)	(0.0299)	(0.1010)
Real labour productivity	0.631***	0.665***	0.894***	0.892***
	(0.1100)	(0.1240)	(0.0839)	(0.0874)
_cons	1.9320	1.9750	2.3810	2.3700
	(1.8890)	(2.1410)	(1.3630)	(1.5150)
N	47	47	47	47
R^2	**0.736**	**0.675**	**0.888**	**0.856**

Note: Standard errors in parentheses, * p<0.05, ** p<0.01, *** p<0.001.
Source: Authors' research.

The analysis of the relationship between digital transformation measures at the enterprise level and economic growth offers insightful findings, as can be seen in Figure 2.

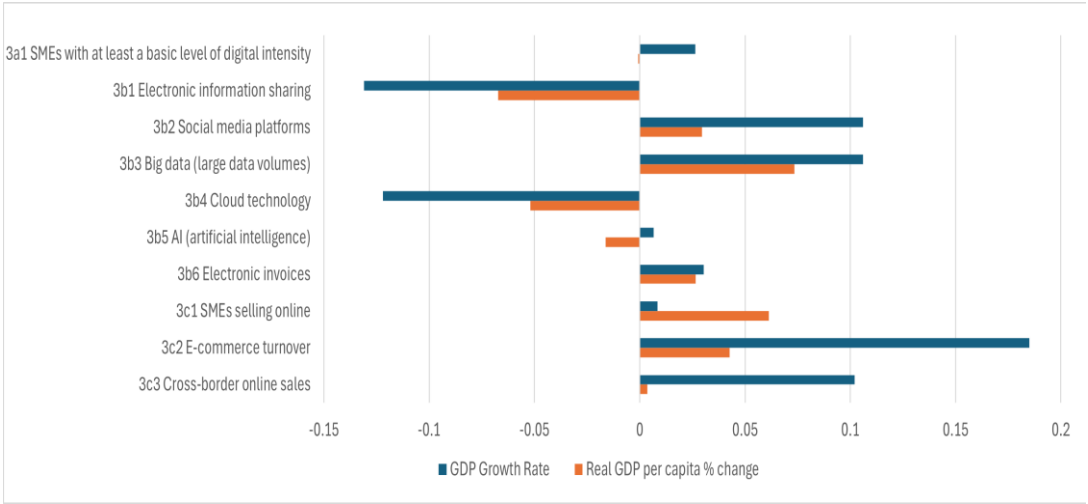

Figure 2: Regression Coefficients: Impact on GDP Growth and GDP per Capita
Source: Author's processing based on Eurostat data

Regarding the impact of SMEs with at least a basic level of digital intensity on GDP growth, the positive coefficients across both econometric models indicate a favourable connection. Still, the lack of statistical significance implies that the simple integration of new digital technologies within SMEs cannot have a robust effect on economic expansion. This outcome indicates the need for further investigation into whether more advanced digital capabilities or a more comprehensive range of adoption are required to achieve a more significant impact on macroeconomic performance. The negative and statistically significant correlation between electronic information sharing and GDP growth highlights the challenges of the digital transformation process. When companies introduce systems like ERP or CRM for sharing information, although these technologies are intended to improve internal processes and operational efficiency, the initial expenses and learning curves may cause interruptions, particularly during the early stages of implementation. Because of the complexities, inefficiencies, or transitional challenges that accompany the integration of such systems within businesses, they seem to have a negative impact on GDP growth. These findings suggest that although digital infrastructure is essential, the success of digital initiatives relies on effective implementation and organisational adjustment.

Enterprises benefit from utilizing social media platforms, as there is a positive and statistically significant impact on GDP growth. We can attribute this outcome to social media's role in enhancing marketing capabilities and fostering customers' engagement. This can stimulate economic growth by expanding the enterprise's market reach and enabling more direct consumer interactions. These results highlight the importance of digital marketing tools in improving competitiveness and promoting growth in an increasingly digital economy. However, the adoption of cloud technology is associated with a negative and statistically significant effect on GDP growth. This indicates that, despite the acknowledged long-term advantages of cloud solutions, the short-term disruptions or transitional costs may initially outweigh these benefits. The deployment of cloud infrastructure requires substantial investments, changes in business processes, and technical challenges, which could explain the negative impact for the studied period. Although cloud technologies enhance the digital transformation, managing the transition with caution is necessary to mitigate adverse effects on economic performance.

For the current analysis, AI usage does not show a statistically significant impact on economic growth. The zero coefficients imply that the adoption of AI technologies while promising, is not yet widespread or mature enough to influence economic performance on a

large scale among EU enterprises. The findings regarding electronic invoices demonstrate a positive and statistically significant impact on GDP growth. If done properly, digital invoicing can streamline financial procedures and reduce transaction costs, boosting operational efficiency.

Regarding the SMEs selling online, the coefficients are positive in both models, showing a positive relationship with economic growth, particularly when measured by changes in Real GDP per capita change. However, the relationship with the overall GDP Growth Rate is weaker and not statistically significant. While supporting SMEs in online sales appears beneficial, especially for per capita economic growth, the modest coefficients suggest that this should be part of a broader digital strategy rather than the sole focus. E-commerce turnover and cross-border online sales have a positive role in driving economic growth, as the analysis shows positive and statistically significant coefficients, highlighting the importance of digital sales channels in expanding market reach and boosting revenue generation. The global outreach facilitated by e-commerce particularly highlights the benefits of digital trade integration within the EU. The strong positive and highly significant coefficients underscore the continued importance of traditional economic factors in driving growth, even in the digital age. The analysis reveals that by incorporating advanced technology in enterprises, we can positively impact GDP growth and the change in real GDP per capita. However, some technologies or practices, such as data sharing and cloud adoption, show coefficients that point to possible drawbacks or inefficiency.

4. Conclusions

The importance of this paper lies in the analysis of DESI components in relation to GDP growth and GDP per capita, and the identification of important connections between digital adoption and macroeconomic performance. Our findings show that while certain aspects of digital transformation positively impact economic growth, others are challenging and need a strategic approach. The positive impact of social media usage, big data analytics, and e-commerce on GDP growth aligns with studies emphasising the significance of digital tools in improving competitiveness and market expansion (Nambisan et al., 2019; Teng et al., 2022). The strong positive correlation between e-commerce turnover and cross-border online sales with economic growth indicators highlights the potential of digital markets to foster economic integration within the EU, supporting the findings of (Goldman et al., 2021) on the positive effects of cross-border e-commerce.

However, the negative correlation between electronic information sharing and GDP growth, along with the initial negative impact of cloud technology adoption, proves the complexities of the digital transformation, supporting the observations of Acemoglu et al. (2014) on the potential short-term disruptions caused by technological changes. The simple adoption of basic digital technologies may be insufficient to drive strong economic growth, as proved by the lack of statistical significance in the relationship between basic digital intensity in SMEs and GDP growth, supporting the arguments of Gal et al. (2019) on the need for comprehensive digital strategies.

Our paper contributes to the growing body of literature on the digital economy by providing empirical evidence on how different digital technologies and practices at the enterprise level impact economic growth in the EU. It emphasises the need for nuanced policy approaches that consider both the advantages and the challenges of digital transformation. The findings hold implications for policymakers that should adapt the digital plans at national and EU level in order to enhance the digital adoption for progess towards the EU digital goals, focusing resources on areas with the strongest positive associations with growth: to harmonize e-commerce regulations across EU member states in order to reduce the barriers to cross-border digital trade, invest in digital infrastructure to support secure and efficient online transactions, provide targeted support for SMEs to develop e-commerce capabilities,

develop EU-wide standards for data-sharing and interoperability, create incentives for enterprises, especially SMEs, to adopt data analytics tools and invest in data-science education and training programs might be some examples of actions that could be done at EU level. While promoting digital adoption is crucial for economic competitiveness and resilience, proper strategies should also be tailored at enterprise level to maximise positive impacts while mitigating potential negative effects. The focus should be on fostering advanced digital skills and supporting the effective integration of digital technologies into business processes, rather than simply encouraging basic digital adoption.

This paper has some limitations because the analysis is based on aggregated data at the country level, so significant variations could not be observed at the industry or enterprise level. These will constitute our future research directions that will help guide the EU's transition to a competitive and inclusive digital economy in the coming years.

References

Acemoglu, D., Akcigit, U. and Kerr, W., 2016. Innovation network. *Proceedings of the National Academy of Sciences*, *113*(41), pp.11483-11488.

Dabbous, A., Aoun Barakat, K. and Kraus, S., 2023. The Impact of Digitalization on Entrepreneurial Activity and Sustainable Competitiveness: A Panel Data Analysis, *Technology in Society*, 73, 102224, Available at: https://doi.org/10.1016/j.techsoc.2023.102224.

European Union, 2021 - Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - 2030 Digital Compass: the European way for the Digital Decade, Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021DC0118

Fernández-Portillo, A., Almodóvar-González, M. and Hernández-Mogollón, R., 2020. Impact of ICT development on economic growth. A study of OECD European union countries,*Technology in Society*, 63, 101420, Available at: https://doi.org/10.1016/j.techsoc.2020.101420.

Gal, P. et al., 2019. Digitalisation and productivity: In search of the holy grail – firm-level empirical evidence from European countries. *International Productivity Monitor*, 37 (Fall), pp. 39-71. Available at: https://doi.org/10.1787/5080f4b6-en .

Goldman, S.P., van Herk, H., Verhagen, T. and Weltevreden, J.W.J., 2021. Strategic orientations and digital marketing tactics in cross-border e-commerce: Comparing developed and emerging markets, *International Small Business Journal*, 39(4), pp. 350–371. Available at: https://doi.org/10.1177/0266242620962658.

Ghazy, N., Ghoneim, H. and Lang, G., 2022. Entrepreneurship, productivity and digitalization: Evidence from the EU, *Technology in Society*, 70, 102052. Available at: https://doi.org/10.1016/j.techsoc.2022.102052.

Liu, T. C., 2022. Digital policy in European countries from the perspective of the Digital Economy and Society Index, *Policy & Internet*, 14(1), pp. 202–218. Available at: https://doi.org/10.1002/poi3.274.

Marcysiak, A. and Pleskacz, Ż., 2021. Determinants of digitization in SMEs, *Entrepreneurship and Sustainability Issues*, 9(1), pp. 300–318. Available at: https://doi.org/10.9770/jesi.2021.9.1(18).

Nambisan, S., Wright, M. and Feldman, M., 2019. The digital transformation of innovation and entrepreneurship: Progress, challenges and key themes, *Research Policy*, 48(8), 103773. Available at: https://doi.org/10.1016/j.respol.2019.03.018.

OECD, 2021. The Digital Transformation of SMEs. Paris: Organisation for Economic Co-operation and Development. Available at: https://www.oecd-ilibrary.org/industry-and-services/the-digital-transformation-of-smes_bdb9256a-en

Qu, J., Simes, R., and O'Mahony, J., 2017. How do digital technologies drive economic growth?. *Economic Record*, *93*, pp. 57-69. Available at: https://onlinelibrary.wiley.com/doi/10.1111/1475-4932.12340
Teng, X., Wu, Z. and Yang, F., 2022. Research on the Relationship between Digital Transformation and Performance of SMEs, *Sustainability*, 14(10),6012. Available at: https://doi.org/10.3390/su14106012.
Thompson, H.G. and Garbacz, C., 2007. Mobile, fixed line and Internet service effects on global productive efficiency, *Information economics and policy*, 19(2), pp. 189–214. Available at: https://doi.org/10.1016/j.infoecopol.2007.03.002.
Vu., K., Hanafizadeh, P. and Bohlin, E., 2020. ICT as a driver of economic growth: A survey of the literature and directions for future research, *Telecommunications Policy*, 44(2),101922. Available at: https://doi.org/10.1016/j.telpol.2020.101922.
Ward, J.D. et al., 2016. Is Decoupling GDP Growth from Environmental Impact Possible?, *PloS one*, 11(10), e0164733. Available at: https://doi.org/10.1371/journal.pone.0164733.

Bio-note

Maria Magdalena DOROIMAN, is a PhD Student, at the *Doctoral School of Economics and Business Administration, at the Faculty of Economics and Business Administration, West University of Timisoara, Romania.* She is a PhD student in the field of Economics. Her research interests are in digital transformation and economic growth. Her doctoral thesis is a project that studies aspects of the role of digitization in increasing market competitiveness. *Nicoleta SÎRGHI*, is *a Professor PhD habil. and a PhD coordinator, at the Faculty of Economics and Business Administration, West University of Timisoara, Romania.* She teaches and researches various subjects in economics. The current research field is related to the study of economics and game theory. She has authored several books and published many articles in international academic journals about his research interests. She is a member of the scientific council of the ERECO-PGV network.