



THE ROLE OF DIGITAL TRANSFORMATION IN ENHANCING MSME COMPETITIVENESS ACROSS EU

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Abstract: *This study investigates how digital transformation influences the competitiveness of micro, small, and medium-sized enterprises (MSMEs) in the European Union (EU). Using data from the Flash Eurobarometer 486 survey, the analysis focuses on the adoption of digital technologies and the barriers that hinder their effective integration. Key variables include the type of digital technologies adopted, perceived barriers to digitalization, firm size, and the presence of strategic growth planning. A linear regression model is employed to assess how these factors influence firm growth, measured by changes in employment and turnover. The results show that MSMEs adopting advanced digital tools – such as artificial intelligence, big data analytics, and cloud computing – tend to experience higher levels of growth and competitiveness. In contrast, technologies like robotics and blockchain show no significant effect. Barriers such as lack of financial resources, limited digital skills, and inadequate infrastructure do not significantly predict growth. However, internal resistance to change and uncertainty about future digital standards are negatively associated with firm performance. The study highlights the importance of internal capabilities and strategic planning over external constraints.*

Keywords: *Business Competitiveness; Digital Transformation; Machine Learning; Micro, Small and Medium-sized Enterprises*

1. INTRODUCTION

MSMEs are the backbone of the European Union (EU) economy, accounting for approximately 99% of all businesses and generating two-thirds of private-sector employment (Chládková, 2009). Their role is particularly prominent in Central and Eastern European countries, where they have become key drivers of economic transformation following the decline of large state-owned enterprises (Dobrzanski & Grabowski, 2019; Mockaitis & Bahl, 2014; Păun et al., 2008). In these transitioning economies, MSMEs contribute significantly to GDP, exports, and local job creation (Kallmuenzer et al., 2024; Vo Thai et al., 2023). Over the past decades, governments have introduced various policy initiatives – ranging from financial assistance and regulatory reforms to infrastructure development – to enhance the competitiveness of MSMEs (Akan, 2024; Garg & Agarwal, 2017). Beyond institutional support, digital transformation has become an increasingly critical factor for enhancing MSME competitiveness and resilience. Digital technologies such as artificial intelligence, big data analytics, and cloud computing enable businesses to improve productivity, streamline operations, and enter new markets (Kumar et al., 2024; Mikušová & Stanovská, 2025; Vo Thai et al., 2023). Nevertheless, several barriers hinder the effective adoption of digital tools – chief among them outdated infrastructure, lack of digital skills, and regulatory complexity (Kallmuenzer et al., 2024; Vo Thai et al., 2023).

In addition to technology, innovation remains a key engine of MSME growth, allowing firms to enhance product offerings, differentiate themselves in competitive markets, and strengthen long-term sustainability.

The successful integration of innovation and digitalization often depends on leadership support and the ability of firms to strategically align their growth planning with emerging market demands (Kallmuenzer et al., 2024; Vo Thai et al., 2023)

This study aims to investigate how organizational and strategic factors influence the competitiveness of MSMEs within the EU. Specifically, it examines the effects of digital technology adoption, perceived barriers to digitalization, firm size, and growth planning strategies on MSME competitiveness. The research question guiding this study is: *How do digital technology adoption, barriers to digitalization, firm size, and growth planning strategies affect the competitiveness of MSMEs in the EU?*

2. THEORETICAL BACKGROUND AND LITERATURE REVIEW

2.1. Institutional Theory and MSME Competitiveness

Institutional Theory is crucial for understanding how MSMEs adapt to formal rules (e.g., laws, and regulations) and informal norms (e.g., cultural expectations). Institutions act as the „rules of the game“ (North, 1990), influencing organizational behavior and either enabling or constraining growth—especially through their impact on innovation and access to finance. MSMEs often struggle with bureaucratic complexity and regulatory uncertainty (Meyer & Rowan, 1977), and digital transformation adds further pressure, particularly where infrastructure and support are lacking (Krasniqi & Mustafa, 2016; Scott, 1995). Recent research applies Institutional Theory to MSME challenges: Kumari et al. (2024) show how regulations influence internationalization; Pizzi and Coronella (2024) highlight isomorphic behavior in sustainability compliance; Abdissa et al. (2022) link political instability to growth barriers; and Croucher et al. (2024) show how institutional support during COVID-19 was vital for SME survival.

2.2. Resource-Based View and MSME Competitiveness

According to RBV, growth is not solely determined by firm size or financial capital, but by the strategic management of resources that are valuable, rare, inimitable, and non-substitutable (Barney, 1991, 2001). While larger firms benefit from greater access to financial, technological, and human capital, smaller firms can compete by leveraging organizational capabilities such as flexibility, responsiveness, and innovation (Liu & Yang, 2019). Firm size plays a relevant role in shaping growth. Although larger firms consolidate market position more easily, smaller firms often grow faster in the early stages by exploiting niche markets (Cesinger et al., 2018; Chan et al., 2006; Davidsson et al., 2002), challenging Gibrat’s Law, which suggests growth is independent of size (Cesinger et al., 2018; Efendic et al., 2016; Krasniqi & Mustafa, 2016). This relationship is influenced by factors like industry, leadership, and institutional support (Cesinger et al., 2018; Efendic et al., 2016; Krasniqi & Mustafa, 2016). RBV also emphasizes digital technologies as a strategic internal resource. Innovation enables firms to adapt, generate value, and differentiate themselves (Tolossa et al., 2025). It creates capabilities that sustain competitive advantage (Tolossa et al., 2025). By investing in innovation and strengthening internal resources, MSMEs can overcome constraints and ensure long-term growth (Butt, 2025; Liao et al., 2015).

2.3. Dynamic Capabilities Theory and MSME Competitiveness

Dynamic Capabilities Theory provides a crucial lens for understanding how MSMEs achieve sustainable growth in rapidly changing environments. It refers to a firm’s capacity to integrate, build, and reconfigure internal and external resources in response to evolving market conditions (Teece et al., 1997). Unlike static resource-based perspectives, this theory emphasizes that long-term competitive advantage arises from a firm’s ability to continuously innovate and adapt. For MSMEs, which often operate with limited resources,



the ability to develop and apply dynamic capabilities is essential to navigate technological disruptions, shifting regulations, and market volatility (Eisenhardt & Martin, 2000; Helfat & Martin, 2015). The core elements of dynamic capabilities include sensing opportunities, seizing them through innovation, and transforming organizational structures to maintain competitiveness. Recent studies have reinforced the importance of these capabilities. Barragan and Becker (2024) show that SMEs with a strong digital orientation and dynamic capabilities are more successful in managing digital transformation, especially after initial adaptation challenges. Wiklund et al. (2009) highlight that entrepreneurial orientation, combined with resource adaptability, contributes to sustainable growth. Similarly, Weaven et al. (2021) demonstrate that MSMEs with robust dynamic capabilities are more resilient during economic downturns, as they can reconfigure resources and pivot their strategies effectively.

2.4. Research model

The conceptual model (Fig. 1) illustrates the relationships between four independent variables – digital technology adoption, barriers to digitalization, firm size, and growth planning strategies – and the dependent construct competitiveness of MSMEs. Each hypothesis (H1 to H4) reflects a theoretical assumption about the direct influence of each factor on competitiveness. The model is designed to be tested empirically to assess the strength and significance of these proposed relationships.

3. RESEARCH METHODOLOGY

3.1 Data and sample

We used microdata from the „SMEs, Start-ups, Scale-ups, and Entrepreneurship“ survey, conducted by the European Commission in 2020 as part of the Flash Eurobarometer. This survey examines the challenges and barriers faced by businesses in EU countries, focusing on growth, sustainable practices, and digitalization. Data was collected through telephone interviews with managers between January and April 2020. The initial sample included 11,866 MSMEs, reduced to 10,888 after addressing missing values.

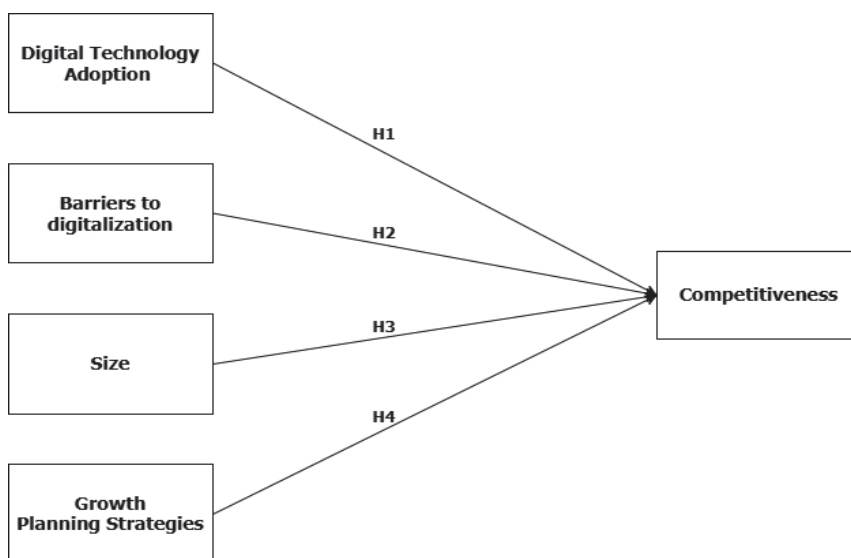


Fig. 1 – Research Model

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В ИНДУСТРИЯ 5.0**

3.2 Measures

Table 1 presents the variables used in this study, including their definitions and measurement scales, covering aspects related to business growth, regulatory barriers, digitalization challenges, innovation, country-specific factors, and control variables.

Variables	Measure
Business competitiveness	
Over the next few years, on average how much does your company plan to grow per year in terms of the number of full-time or full-time equivalent employees?	1 - Does not plan to grow; 2 - Grows less than 10% per year; 3 - Grows between 10 and 20% per year; 4 - Grows more than 20% per year
Over the next few years, on average how much your company plans to grow per year in terms of turnover	1 - Does not plan to grow; 2 - Grows less than 10% per year; 3 - Grows between 10 and 20% per year; 4 - Grows more than 20% per year
Business competitiveness	Mean of employees and turnover growth (1 – 4)
Digital technology adoption	
Artificial intelligence, e.g. machine learning or technologies identifying objects or persons, etc.	0 - No; 1 - Yes
Cloud computing, i.e. storing and processing files or data on remote servers hosted on the internet	
Robotics, i.e. robots used to automate processes for example in construction or design, etc.	
Smart devices, e.g. smart sensors, smart thermostats, etc.	
Big data analytics, e.g. data mining and predictive analysis	
High-speed infrastructure	
Blockchain	
Barriers to digitalization	
Lack of financial resources	0 - No; 1 - Yes
Lack of skills, including management skills	
Lack of information technology infrastructure, such as high-speed internet connection	
Regulatory obstacles	
IT security issues	
Uncertainty about future digital standards	
Internal resistance to change	
Strategic planning	
Have a strategic growth plan	0 - No; 1 - Yes
Firm size	Number of employees
Control Variables	
Country	EU countries
NACE sector	Sections B to Q
Part of a national or international business group	0 - No; 1 - Yes
Predominantly family-owned	0 - No; 1 - Yes

Table 1 – Overview of variables used in the study

4. RESULTS

We employed linear regression analysis to examine the factors influencing firm growth, measured through changes in employment and turnover expected. This method was selected to quantify the direct effects of various explanatory variables – such as the adoption of digital technologies, digitalization barriers, firm size, and strategic planning – on the level of firm growth. The results are presented in Table 2.

Firms that have adopted artificial intelligence technologies show a significantly higher likelihood of growth ($B = 2.14$; $p < 0.05$), suggesting a strong positive effect on employment and turnover expansion. Similarly, the adoption of cloud computing ($B = 0.07$; $p < 0.01$), smart devices ($B = 0.02$; $p < 0.001$), and big data analytics ($B = 0.07$; $p < 0.001$) is positively associated with business growth. These technologies appear to play a crucial role in enhancing firm scalability and market performance. In contrast, other technologies such as robotics ($B = 0.06$; $p = 0.530$), high-speed infrastructure ($B = 0.09$; $p = 0.264$), and blockchain ($B = 0.02$; $p = 0.119$) do not show statistically significant effects on growth in this sample.



Regarding barriers to digitalization, none of the resource-related constraints – including lack of financial resources ($B = 0.07$; $p = 0.291$), lack of skills ($B = 0.02$; $p = 0.389$), or inadequate IT infrastructure ($B = 0.02$; $p = 0.241$) – significantly predict growth. Similarly, regulatory obstacles ($B = 0.03$; $p = 0.799$) and IT security issues ($B = 0.01$; $p = 0.922$) are not significant predictors.

Table 2 – Linear regression for employment growth and turnover growth

	B (SE)	p
(Constant)	2,14 (0,04)	0,000
Artificial intelligence	0,07 (0,03)	0,022*
Cloud computing	0,06 (0,02)	0,001**
Robotics	0,02 (0,03)	0,530
Smart devices	0,07 (0,02)	0,000**
Big data analytics	0,09 (0,02)	0,000**
High speed infrastructure	0,02 (0,02)	0,264
Blockchain	0,07 (0,04)	0,119
Lack of financial resources	0,02 (0,02)	0,291
Lack of skills, including management skills	0,02 (0,02)	0,389
Lack of information technology infrastructure	0,03 (0,02)	0,241
Regulatory obstacles	0,01 (0,02)	0,799
IT security issues	0,00 (0,02)	0,922
Uncertainty about future digital standards	-0,06 (0,02)	0,004**
Internal resistance to change	-0,06 (0,02)	0,008**
Size	-0,01 (0,00)	0,000**
Have a strategic growth plan	0,3 (0,02)	0,000**
Part of a national or international enterprise group	-0,06 (0,03)	0,022*
Predominantly family owned	-0,04 (0,02)	0,042*
FR - France	-0,06 (0,05)	0,258
BE - Belgium	0,00 (0,05)	0,980
NL - The Netherlands	0,04 (0,05)	0,410
IT - Italy	-0,07 (0,06)	0,247
LU - Luxembourg	-0,12 (0,07)	0,115
DK - Denmark	0,11 (0,05)	0,037*
IE - Ireland	0,03 (0,05)	0,601
GR - Greece	0,18 (0,05)	0,001*
ES -Spain	-0,14 (0,06)	0,011*
PT - Portugal	0,08 (0,05)	0,129
FI - Finland	0,15 (0,05)	0,005*
SE - Sweden	0,04 (0,05)	0,450
AT - Austria	-0,04 (0,05)	0,447
CY - Cyprus (Republic)	-0,14 (0,07)	0,059
CZ - Czech Republic	-0,04 (0,06)	0,461
EE - Estonia	0,11 (0,06)	0,063
HU - Hungary	0,02 (0,06)	0,728
LV - Latvia	0,01 (0,06)	0,911
LT - Lithuania	0,31 (0,06)	0,000*
MT - Malta	-0,05 (0,08)	0,473
PL - Poland	0,05 (0,06)	0,326
SK - Slovakia	0,17 (0,06)	0,005*
SI - Slovenia	-0,13 (0,05)	0,017
BG - Bulgaria	0,14 (0,06)	0,012
RO - Romania	0,17 (0,05)	0,002*
HR - Croatia	0,15 (0,06)	0,006*
B - Mining and quarrying	0,13 (0,15)	0,369
C - Manufacturing	0,06 (0,02)	0,018*
D - Electricity, gas, steam, and air conditioning supply	-0,17 (0,13)	0,187
E - Water supply, sewerage, waste management	-0,02 (0,08)	0,836
F - Construction	0,17 (0,03)	0,000*
H - Transportation and storage	0,02 (0,04)	0,683
I - Accommodation and food service activities	-0,02 (0,04)	0,630
J - Information and communication	0,24 (0,04)	0,000*
K - Financial and insurance activities	-0,08 (0,05)	0,146
L - Real estate activities	-0,03 (0,05)	0,523
M - Professional, scientific and technical activities	0,15 (0,03)	0,000*

Note: * $p < 0.05$; ** $p < 0.01$; OR – Odds Ratio; CI – Confidence Interval

However, uncertainty about future digital standards shows a statistically significant negative association with growth ($B = -0.01$; $p < 0.01$), and internal resistance to change is negatively associated with business growth ($B = -0.06$; $p < 0.01$), highlighting the importance of internal readiness and flexibility. Finally, firm size shows a significant negative association with growth ($B = -0.06$; $p < 0.001$), suggesting that smaller firms are more likely to experience higher growth rates. In contrast, having a strategic growth plan remains a strong positive predictor ($B = 0.01$; $p < 0.001$), highlighting the importance of proactive planning in driving business expansion.

5. DISCUSSION

The findings of this study contribute to understanding how digital technologies, firm characteristics, and internal strategies influence MSME growth in the EU. The results support the Resource-Based View (RBV), showing that strategic internal resources—especially digital innovations—are key drivers of competitiveness. Firms adopting artificial intelligence, cloud computing, smart devices, and big data analytics report significantly higher growth in employment and turnover. These technologies enhance operational efficiency and open new market opportunities (Kumar et al., 2024; Tolossa et al., 2025). In contrast, robotics, high-speed infrastructure, and blockchain show no significant effect, possibly due to limited adoption or high investment costs.

Interestingly, barriers such as lack of financial resources, digital skills, or infrastructure do not significantly predict growth. This contrasts with earlier studies (e.g., Kallmuenzer et al., 2024), suggesting that internal transformation may reduce the impact of external constraints. However, uncertainty about future digital standards and internal resistance to change negatively affect growth, reinforcing the importance of adaptability and strategic alignment. These findings align with Dynamic Capabilities Theory (Teece et al., 1997), highlighting the need for sensing opportunities and transforming routines.

Firm size is negatively associated with growth, supporting RBV insights and challenging Gibrat's Law (Cesinger et al., 2018). Smaller firms may benefit from greater agility and innovation capacity, particularly in niche markets. Conversely, having a strategic growth plan strongly predicts growth, aligning with Institutional Theory (North, 1990; Scott, 1995), which stresses the value of structured, future-oriented approaches.

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