# The Importance of Digital Skills in Firms' Innovation: The Case of Western Balkans

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**Abstract**
This study analyzes data from 998 SMEs in the Western Balkans using probit regression analysis to explore the significance of digital skills in driving innovation. The findings indicate that variables such as offering staff training, operating in different Western Balkan countries (compared to the reference category), being in the manufacturing sector, and implementing concrete measures for digital skills have statistically significant effects on firms' probability of innovating. These results offer valuable insights to businesses, encouraging them to capitalize on the opportunities presented by emerging digital technologies and the ongoing trend of digitalization across industries. This study confirms the pivotal role of digital skills to the development of innovative products and services, enhancing business performance and our understanding of the interconnectedness between digital technologies, innovation, and digital skills in SMEs.Keywords: Digital skills, Innovation, Small and medium-sized enterprises, Western Balkans

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## Introduction

In today's economy, for businesses to thrive, they must embrace digital transformation (DT). According to Warner and Wager (2019), this transformation refers to a strategic approach that involves implementing digital projects to bring about organizational changes and drive substantial improvements in business operations. Fenech et al. (2019) describe it as adapting business processes, operations, and structures to leverage the advantages of new technologies. A successful DT necessitates thorough preparation and a willingness for bold decision-making, particularly from senior management (Pinzaru et al., 2018).

The COVID-19 pandemic has revealed that digitalization is not as complicated and time-consuming as it was once perceived. The required IT tools are readily available and can be integrated relatively fast. However, a significant issue arises when the focus is solely on IT, as it needs to consider the potential for a systematic and enduring digitalization process for individuals. It is essential to recognize that DT extends beyond merely an IT project; it encompasses much more than that (Nachmias & Hubschmid-Vierheilig, 2021).
Innovation is the goal of DT. Small and medium-sized enterprises (SMEs) development has found a new paradigm due to digital transformation. SMEs have the flexibility and ability to accept innovation over giant corporations. As a result, SMEs can implement DT as a method of organizational change. According to Fletcher and Griffiths (2020), digitally immature firms are more susceptible to the impacts of the COVID-19 pandemic and subsequent periods of economic stagnation. In contrast, organizations with a high level of digitalization are typically more adaptable. These digitally mature organizations recognize that external change is a crucial aspect of doing business and have made them respond faster and more strategically.

Drawing on the resource-based view and building upon its evolution, Teece et al. (1997) conceptualized dynamic capability as a company's capacity to effectively integrate, create, and adapt both internal and external resources to address the challenges posed by a rapidly evolving business environment. This led to the gradual emergence and subsequent rapid development of dynamic capability theory. Nevertheless, some research studies have indicated that SMEs need help initiating their DT due to insufficient resources and expertise constraints. Dynamic capabilities, as a facilitative mechanism, can enable and support the process of DT (Fischer et al., 2020).

We must enhance our understanding of how these elements coevolve to understand better the interconnected relationships between digital skills (DS) and innovation. This coevolution encompasses the interplay between the development paths of interconnected digital technologies, the innovation routines within firms, and the formation of skills. As organizations combine and adjust digital technologies, they necessitate new skill sets to drive innovation, learning, and adaptation to the ever-evolving digital landscape. Concurrently, digital technologies reshape how knowledge is coded for productive and innovative activities (Ciarli et al., 2021). Although there has been much academic research on DT recently, it should be noted that most of these studies target major organizations, platform enterprises, and native digital enterprises. Resource constraints have impeded the DT process for SMEs.

As a result, there needs to be more empirical studies on SMEs' DT (Fischer et al., 2020). Moreover, the existing literature has no consensus on the link between digital capabilities and firm growth (Martínez-Caro et al., 2020). Therefore, this research study seeks to fill this gap by analyzing the DS and performance of bringing innovation to SMEs. SMEs in the Western Balkans are the topic of this paper's

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investigation. This study used a sample of Balkan Business Barometer 2021 (i.e., the Regional Cooperation Council's annual public and business survey) comprising interviews of 998 businesses from Albania, Bosnia and Herzegovina, Kosovo, Republic of North Macedonia, Montenegro, and Serbia.

The structure of this study is as follows. Firstly, the literature review offers a theoretical framework and relevant literature about the subject upon which the research hypotheses are formulated. Subsequently, the study research design is introduced, providing a concise explanation of the Probit regression model. Then, the findings are summarized, followed by a discussion and evaluation of the limitations of the research and recommendations for further research.

## Literature Review

### Digital Transformation

The widespread influence of digital technologies and their diverse applications is causing significant disruptions across various industries, posing a threat to established practices and business models (Lorenzo et al., 2018). This comprehensive shift, encompassing the integration of digital technology in all aspects of human society, is commonly known as DT (Bounfour, 2016). Consequently, devising an appropriate response to this digital upheaval is the primary medium-term challenge confronting businesses today.

In essence, DT represents a profound and all-encompassing change in technology utilization to enhance company performance. As Kaplan et al. (2010) stated, it can be described as a transformative process triggered or influenced by integrating digital technology into various facets of human existence. As per Lankshear et al. (2008), an alternative definition of DT refers to the highest level of digital proficiency attained, characterized by integrating digital technologies that enable but promote innovation and creativity, leading to substantial changes within professional or knowledge domains. Furthermore, DT entails swift adaptations in all strategies, necessitated by evolving demands, the digitization of operations, and the expansion of supply chain relationships. Specific definitions emphasize the extensive drive, innovation, and outcomes associated with DT. Consequently, SMEs can implement digital business model choices, utilize information technology (IT), comprehend and assess digital value networks, and incorporate customer feedback into their processes (Schallmo et al., 2018).

DT involves leveraging technology tools, exploring opportunities to enhance business processes, and expanding the target market. During a pandemic-induced shift, businesses can capitalize on the situation by intensifying promotions through online applications, leading to solutions for sales and logistics challenges. The success of DT comes with SMEs' commitment to taking action, such as product offerings through social media and offering discounts. Four key aspects that can be implemented in the pursuit of DT are: (1) ensuring business competitiveness, (2) streamlining business processes for greater efficiency, (3) enhancing customer satisfaction, and (4) facilitating strategic decision-making for business owners (Winarsih et al., 2021).

Digital adoption encompasses three crucial aspects. Firstly, DT urgency extends beyond mere technology adoption; it empowers businesses to compete more effectively by significantly reducing costs across various dimensions. Secondly, enhancing digital knowledge and skills relevant to business operations is paramount. Interestingly, not all businesses require a website; some can thrive by leveraging suitable promotional channels. However, inadequate comprehension of digital tools often leads to ill-fitted decisions in DT that do not cater to the business's unique needs. Thirdly, integrating e-wallet services represents another vital component of digital adoption (Winarsih et al., 2021).

### The pandemic period and digital transformation

The pandemic has brought critical lessons related to DT about the deployment of data information, technology, and employee behavior and well-being. Fletcher and Griffiths (2020) identify three key lessons: organizations must improve their digital maturity, less digitally mature organizations are more fragile, and organizations with higher levels of digital maturity are generally more flexible. The first concerns digital maturity, meaning that firms do not undertake this short-term activity. During the lockdown, firms learned they lacked a supported video conferencing solution, had systems that could be accessed only on-site due to security concerns or the need for remote access had never been modeled, a static workforce and processes that assumed constant physical workplace, as well as many workers who lack remote skills and mindset. Thus, DT programs are necessary to bring work efficiency and productivity. The second lesson is that organizations with less digital maturity tend to be vulnerable. Behind the scenes, DT is a comprehensive process of ongoing adjustments that replaces fragility with flexibility and is fueled by people's ability to respond in a novel and creative way and the constant availability of data. The third lesson is that higher-level, digitally mature organizations are typically more flexible, meaning they changed their business model to explore different options more rapidly.

The COVID-19 pandemic is still a problem for many nations today, and its many effects have not yet materialized to their full extent. At this point, digital technology, particularly during lockdown, has made our lives easier while enabling businesses to continue operating to some extent. According to recent statistics, Internet traffic grew by 60% between December 2019 and May 2020, with videoconference traffic increasing by almost 120% over pre-outbreak levels (Soto-Acosta, 2020). It means that our economy is becoming more digital. The plain economy is increasingly being impacted by digital technologies like the Internet, mobile connectivity, cloud computing, big data, machine learning, artificial intelligence (AI), blockchain, Internet of Things (IoT), robotics, smart manufacturing, predictive and data analytics, and other constantly developing digital technologies, which is what is referred to as the digital economy. In this sense, we refer to digitalization as the process of making interactions, communications, commercial endeavors, and business models (more) digital. A company that conducts essential business activities and relationships with its stakeholders (suppliers, customers, workers, business partners) entirely or in part using digital methods is referred to as a digital firm (Laudon & Laudon, 2019; Soto-Acosta et al., 2016).

Companies are altering the economic rules through digitalization as the economy grows more global and digital. As a result, during the past few years, digitization and globalization have been two phenomena that have run concurrently and mutually reinforced one another. Almost every sector of the economy, starting from manufacturing to consumption, has been impacted by digitalization. The distribution of goods has undoubtedly changed due to the Internet, mobile devices, and their continuous connectivity, as businesses now have access to a far broader and more global reach of consumers than ever before. Every consumer now has access to much broader offerings at the same time. As a result, the economy has evolved from a regionally restricted economy to an actual global economy (Soto-Acosta, 2020). In the future, achieving a particular level of digital maturity will be on many people's agendas because digital is no longer a choice or a bonus. There will likely be a moment of reflection for many people as they consider what happened, whether the response was adequate or too late, and how to rebuild a firm after the epidemic while remaining adaptable and continuously learning from the past.

The COVID-19 pandemic has played an essential role in the DT of companies, especially in the case of SMEs. More specifically, using cloud-based accounting services enables owners to quickly and securely monitor financial reports at a reasonable expense. Additionally, companies can access systems that facilitate tracking inventory, sales, and expenses and create workflows that optimize business efficiency. As a result, cloud-based accounting services present a viable option for companies to enhance their operations. It is crucial to encourage SMEs to become part of the digital economic ecosystem, which can be accomplished by offering transformation and innovation opportunities (Winarsih et al., 2021).

The COVID-19 pandemic has sped up SMEs' DT processes. The effects of COVID-19 are different among countries. Countries with high development index (HDI) responded rapidly using more efficient capacity. At the same time, those with low HDI encountered more recovery problems because of poor infrastructure, limited public health resources for vaccination, and increased informal work (Caballero-Morales, 2021; Egger et al., 2021). Thus, higher HDI countries recognize better the importance of digital capabilities in new normality. More specifically, China has changed new infrastructure development policy in order to support digital systems within firms (Teng et al., 2022). DT is a long-term sophisticated system engineering that entails four successive stages of DT. Due to their scarce resources, SMEs need help with DT at a complicated stage.

**Small and medium-sized enterprises and digital transformation**

SMEs are considered a significant force in the European Union economy (Mullet et al., 2018). More than 95% of European businesses are micro-enterprises, a subgroup of SMEs with less than ten employees. To maintain their competitiveness, SMEs must embrace digitalization. DT is crucial for being competitive and responding to pressure and ongoing change. However, only 17% of SMEs in Europe have high levels of digitalization (European Court of Auditors. 2019). Large corporations are at the forefront of DT (Barann, 2019), whereas SMEs need more resources and knowledge gaps that hold down their efforts to go digital (Bouwman, 2019). Short planning horizons, a lack of IT skills, low customer or supplier usage, and inadequate capabilities and resources to develop and maintain an e-business operation are some of the most significant barriers to adopting digital (e-business) services and applications in SMEs (Schwertner, 2017). However, SMEs need more assistance implementing DT (Barann et al., 2019). Furthermore, it is critical to realize that DT influences more than just the technological aspect of a company; it also impacts things like procedures, culture, employee engagement, customer orientation, and business models (Bouwman, 2019). DT is seen as multidisciplinary as a result (Verhoef, 2019).

During their journey towards digitization, SMEs, which form the foundation of many economies (North & Varvakis, 2016), are often characterized by greater flexibility and faster decision-making than more giant corporations. However, SMEs frequently need help advancing their (technological) capabilities because of limited resources or strategic focus (Ramdani et al., 2009). SMEs are motivated to adopt the digital economy primarily due to internal efficiency improvements, cost reductions, enhanced collaboration, the opportunity to offer new products and services, and intelligent decision-making in the digital era to manage risks better and promote sustainable development (Grand Coalition for Digital Jobs, no year). Quinton et al. (2017) suggest that SMEs have the potential to thrive in a digitalized organizational environment because digital technology facilitates intelligence gathering, cost reduction, and expanding their audience. As smaller business partners, they often have no choice but to adapt to the demands of others (EU Commission, 2014). The competitiveness of SMEs will primarily rely on their ability to establish stronger connections within an integrated business network (EU Commission, 2014).

**The importance of digital skills in firms**

Different expressions are employed to describe the human qualities related to Information and Communication Technology (ICT) use. As digital technologies have become widespread, terms like IT, ICT, and computer literacy have gained popularity (Bawden, 2008). The dominant technology in use often determines the significance of particular skills. These concepts typically consist of two parts: a domain aspect (e.g., computer, ICT, internet, multimedia) combined with a specific perspective on knowledge (e.g., competence, literacy, skills) (Hatlevik et al., 2015). These concepts mainly refer to fundamental skills in utilizing computers or Internet technology, such as simple tasks like shutting down a computer, navigating folders, and saving files. However, they need to encompass the broader range of abilities necessary to fully harness the potential of ICT. Nevertheless, these technical skills catalyze the demand and importance of 21st-century skills, vital for acquiring comprehensive digital abilities relevant to the modern era.

In general, digital literacy and skills encompass a range of interconnected concepts. Through a comprehensive examination of the existing literature, Curtarelli et al. (2016) identify three primary categories of DS, which are applied in various frameworks for measuring and developing digital competencies. The first group pertains to basic

digital literacy competencies and skills essential for becoming digitally literate. These skills hold significance for the workforce and the general population in a knowledge-based economy and society. The second group comprises DS relevant to employment, encompassing fundamental workplace skills and those required in a professional setting. The third group consists of DS specific to ICT professions, incorporating the categories above and the skills demanded in the ICT sector. These often involve elements of creativity and innovation.

Companies should assess their employees' technological abilities and provide opportunities to improve or acquire new skills. They may also consider hiring new talent with the specific expertise needed. It is crucial to know that some companies overestimate their competencies, particularly in the digital realm. When internal resources and skills are insufficient, collaborating with external partners within an ecosystem can be a viable solution (Duerr et al., 2018; Vey et al., 2017). Regarding hard skills, data management, data analytics, and related domains such as artificial intelligence, machine learning, and statistical modeling were frequently highlighted in relevant articles as crucial for a successful DT (Bleicher & Stanley, 2016; Sousa & Wilks, 2018). In addition to these hard skills, soft skills are equally essential. Change management skills were considered valuable (Billington & Ellersgaard, 2017).

DS encompasses a range of abilities and proficiencies that empower businesses to leverage ICT opportunities, leading to improved efficiency, effectiveness, exploration of new business methods, and the establishment of new ventures (European eSkills Forum, 2004). The term DS encompasses not only technical expertise but also broader organizational competencies, including market and domain knowledge, strategic and operational management skills, and softer managerial abilities. SMEs are encouraged to acquire DS to foster entrepreneurship, innovation, and job creation and enhance their competitiveness in the global market (Empirica, 2014). According to Tarutėa and Gatautis (2014), incorporating ICT impacts various performance dimensions of SMEs, including profitability, growth, market value, social and environmental performance, and satisfaction. As per the European Digital Transformation Scoreboard (EU, 2017), 53% of European companies investing in digital technologies have experienced an increase in annual turnover, but only 6% of technology adopters have observed decreased operational costs. BCG (2013) surveyed IT technology adoption among over 4000 SMEs in Germany, China, India, and Brazil. They discovered that technology adoption leaders created jobs at nearly twice the rate of other SMEs and achieved faster annual revenue growth compared to firms with lower levels of technology adoption.

Despite the current need for consolidated evidence in this emerging research and practice area, there is a growing number of surveys and case studies shedding light on the learning process of SMEs in developing digitization capabilities. In an online survey of Irish SMEs, Harrigan et al. (2011) found that these businesses are adopting relatively simple Internet-based technologies to enhance customer communication and information management, creating competitive advantage in their unique strategic ways. External support from digital platform service providers often facilitates digitization (Li et al., 2017; Chen et al., 2016). In case studies of 68 German manufacturing SMEs, Müller et al. (2018) illustrate that these firms tend to approach Industry 4.0 with caution and are still trying to grasp the potential of business model innovation in value creation, offer, and capture. A survey of 300 SMEs in the U.K. (IDC, 2017) echoes this cautious or reactive view, with 45% viewing IT as a necessary cost rather than a driver (20%) of competitive advantage. Similar findings are presented in another research study by Karltorp (2017). According to the IDC–SAP (2017) study of 3900 SMEs in 14 countries, companies prefer to proceed cautiously by investing in small, quick-impact projects that pave the way for more ambitious and demanding initiatives. Learning from and observing other SMEs is a commonly employed approach in their incremental move toward digitization (Baker et al., 2015). A study of Swiss SMEs (PwC et al., 2017) reveals that digital maturity positively correlates with the organization's size and negatively correlates with the age of its management.

Previous research indicates that DT significantly influences the financial performance of companies (Mubarak et al., 2019). Enterprise DT contributes positively to overall enterprise performance (Hu, 2020). This positive impact of DT is particularly noticeable in large enterprises, state-owned enterprises, mature enterprises, and non-manufacturing (service) enterprises (Li et al., 2021). The DT of SMEs is positively influenced by three primary resources: IT, human resources, and business strategy, and DT leads to favorable business outcomes for SMEs (Hai, 2021). Moreover, DT enhances the dynamic capabilities of enterprises. The stronger the intensity of individual forgetting and the more robust the entrepreneurial orientation, the more significant the positive impact of DT on the dynamic capabilities and innovation performance of enterprises (Wang, 2021).

Firms are trying to adapt to market challenges through different strategies and undertaking activities to ensure business continuity. Firms are using digital tools and skills to optimize and improve the efficiency of their processes due to the turbulent environment (Zhen et al., 2021). The existing literature has no consensus on the link between digital capabilities and firm growth (Martínez-Caro et al., 2020). In a study by Drnevich and Croson (2013), digital capabilities positively affect a firm through lower costs and higher flexibility. Moreover, Soto-Acosta (2020) concluded that there is an increase in digital technology in this "new normality," which contributes to cost reductions and firm performance. A competitive firm strategy can be achieved when firms possess digital resources. Nevertheless, there is little or no effect that digital capabilities have on firm performance; instead, organizational creativity and R&D activities play a central role (Usai et al., 2021). This shows insufficient studies on the relationship between digital capabilities and firm performance, particularly in terms of new products and services.

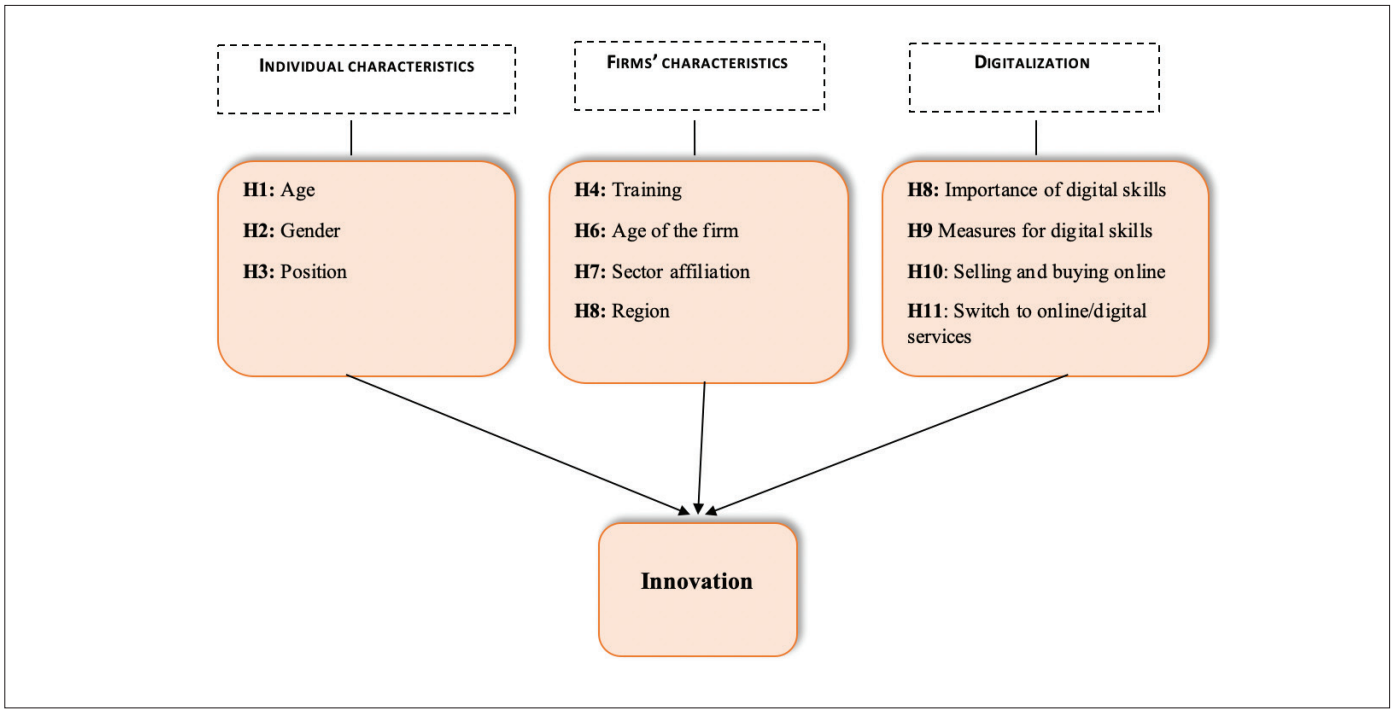
Based on the existing literature, there is an opportunity to conduct a more extensive empirical analysis of how DS affects the innovative behavior of SMEs. This analysis could investigate the impact of DS on SMEs' innovation propensity while also exploring their connection to other individual and firm factors.

Thus, the following hypotheses have been developed, which form a conceptual model, as shown in Figure 1.

*H1: Age of the business representative is negatively associated with firm innovations.*
*H2: Gender of the business representative is associated with firm innovations.*
*H3: Work position is associated with firm innovations.*
*H4: Offering staff individual training is positively associated with firm innovations.*
H5: The age *of the firm is positively associated with firm innovations.*
*H6: The type of industry is associated with firm innovations.*
*H7: Region, particularly within WB countries, is positively asso*ciated with firm innovations.
*H8: The importance* of digital skills is positively associated with firm innovations.
*H9: The concrete measures for digital skills is positively associated with firm innovations.*
*H10: Selling and buying online is positively associated with firm innovations.*
*H11: Switching to online/digital services is positively associated with firm innovations.*

For companies to identify potential opportunities and capitalize on them to facilitate their growth in the digital landscape, possessing sensing and seizing capabilities is crucial. Additionally, transformation capabilities are fundamental for implementing the changes that growth demands (Cassetta et al., 2020). In line with these concepts, the conceptual model presented in this paper is a valuable tool for managers seeking to guide their companies toward growth opportunities brought about by digitization and introducing new products and services. Figure 1 shows a conceptual research model.

**Figure 1** Conceptual Research Model




*Source:* Self-devised

**Research Methodology**

This study used a Balkan Business Barometer 2021 sample comprising interviews of 998 business owners, managers, or executives from Albania, Bosnia and Herzegovina, Kosovo, the Republic of North Macedonia, Montenegro, and Serbia. The 2021 Balkan Barometer surveys were conducted between December 2020 and February 2021. The Business Opinion Survey employed a quantitative research approach and utilized the CAPI (Computer-Assisted Personal Interviewing) data collection method. The survey took place in December 2020 and February 2021, where trained interviewers conducted personal household interviews on behalf of the Data Centrum Research Institute. Due to COVID measures, the CATI (Computer-Assisted Telephone Interviewing) methodology was utilized in Serbia. RCC provided the survey questionnaire, which a responsible person in each economy reviewed. Experienced interviewers in all economies were surveyed with comprehensive training, including written and verbal instructions on the questionnaire, company selection method, and respondent criteria (typically members of a company's management board or team). Project coordinators conducted joint reviews with the interviewers to ensure quality and consistency. The Business Opinion Survey targeted 1200 respondents from the Western Balkans, with 200 from each economy selected based on the latest data from the National Business Centre (RCC, 2021).

## Measures

### Dependent variable

The introduction of innovation within the organization is the dependent variable. Although the literature study employed a range of metrics, there needs to be more papers that used the introduction of innovation as the dependent variable. Respondents were questioned in the questionnaire whether their companies had implemented innovation in the previous 12 months or 3 years.

### Independent and control variables

According to the literature (Miller & Friesen, 1984; Wiklund et al., 2009; Krasniqi, 2012), evaluating many independent factors helps provide a more accurate representation of the growth phenomena. A literature review found that the selection of factors in the available empirical models on small business growth could be more open, implying the need for a broader selection of variables. As a result, they are divided into three categories in this study: digitalization, individual, and firm characteristics. Individual and organizational components are control variables. A full explanation of a set of explanatory factors is provided in Table 1.

### Independent variables

The first group of variables includes the most important explanatory variables related to digitalization. It includes the importance of DS, concrete measures to improve digital skills, selling and buying online, and switching to more online/digital services. In the empirical analysis, the importance of DS indicates whether the firm considers DS essential (Yes=1, No=1). Also, empirical analysis measures whether taking concrete measures to improve DS impacts the firms' innovation (Yes=1, No=1). Similarly, it measures whether selling and buying online and switching to more online/digital services influences firms' innovation (Yes=1, No=1).

### Control variables

The second group represents variables related to individual characteristics, such as age, gender, and job position of the respondent. In the empirical analysis, the job position measures whether they are owners or lower positions (1=owner, 0=others). We control for gender (males=1, female=0), age of the individual.

The third component contains firm-related characteristics such as firm age, training, sector affiliation, and region. These are employed as control factors that may impact firms' innovation. We control sector, which has four primary dummies: manufacturing, trade, construction and services. The training variable measures whether they have attended any training (1=Yes, 0=No). Furthermore, the control variable, firm age, captures the influence on firms' innovation (Storey 1994).

**Table 1** Description of independent variables and their domains

| Research Framework Independent variables | Variables | Definition |
|---|---|---|
| ***Digitalization*** | The importance of digital skills in SMEs | 1 = Yes, 0 = No |
| | Concrete measures to improve digital skills | 1 = Yes, 0 = No |
| | Selling and buying online | 1 = Yes, 0 = No |
| | switch to more online/digital services | 1 = Yes, 0 = No |
| | Selling and buying online | 1 = Yes, 0 = No |
| ***Control variables*** | | |
| ***Individual*** | Age | Exact age of the business representative/respondent in years |
| | Gender | 1 = male, 0 = female |
| | Job position | 1 = managerial position/owner 0 = other position |
| ***Firm*** | Age of the firm | The number of years since a firm was founded |
| | Training | 1 = if the firm provided training for its employees in the past 12 months, 0 = otherwise |
| | Manufacturing | 1 = if the firm operates in the manufacturing sector, 0 = otherwise |
| | Service | 1 = if the firm operates in the service sector, 0 = otherwise |
| | Construction | 1 = if the firm operates in the construction sector, 0 = otherwise |
| | Trade | 1 = if the firm operates in the trade sector, 0 = otherwise |
| | Albania | 1 = if the firm operates in Albania, 0 = otherwise |
| | Kosovo | 1 = if the firm operates in Kosovo, 0 = otherwise |
| | North Macedonia | 1 = if the firm operates in North Macedonia, 0 = otherwise |
| | Montenegro | 1 = if the firm operates in Montenegro, 0 = otherwise |
| | Bosnia-Herzegovina | 1 = if the firm operates in Bosnia-Herzegovina, 0 = otherwise |
| | Serbia | 1 = if the firm operates in Serbia, 0 = otherwise |

*Source:* Self-devised

## Results and Discussion

### Descriptive statistics

Table 2 presents descriptive statistics of selected variables, encompassing various business attributes. Our analysis reveals that a significant proportion of businesses, approximately 61.17%, engage in online sales. Similarly, around 52.84% of firms have recently transitioned to online sales. The adoption of training initiatives is observed in approximately 26.47% of businesses. Meanwhile, the importance of DS is recognized by a substantial majority, with around 82.93% of firms acknowledging their significance. Among the studied nations, each binary variable, such as Albania, Kosovo, North Macedonia, Montenegro, Bosnia and Herzegovina, and Serbia, highlights the presence of businesses operating within their respective jurisdictions. Exploring sectors, the dataset demonstrates a prevalence of firms in the trade sector (around 24.58%), followed by the service sector (approximately 14.50%) and manufacturing sector (about 13%). Businesses established in the post-2001 era constitute a significant portion, with approximately 65.33% categorized. Moreover, around 42.90% of the businesses have introduced new or improved products and services in the past 12 months or 3 years. These variables collectively provide a comprehensive snapshot of various facets of business operations, highlighting key trends and characteristics that will serve as essential inputs for our subsequent regression analyses.

We methodically inspected the Variance Inflation Factor (VIF) values, a measure of multicollinearity among independent variables (Lind et al., 2000). The VIF values, accompanied by their corresponding reciprocals (1/VIF), show the degree to which the variance of a particular variable is affected by its correlation with other variables. Notably, most VIF values indicate moderate to low levels of multicollinearity, with a mean VIF of 6.42 signifying an average measure of multicollinearity across all variables, well below the common threshold for concern (Kleinbaum et al., 2007). Moreover, our exploration of bivariate correlations offers valuable insights into the relationships between variable pairs, providing a deeper understanding of linear associations within the dataset. Thus, it can be confidently stated that the study's robust methodology ensures that multicollinearity is not a confounding factor, contributing to the integrity and reliability of subsequent analyses.

**Table 2** Descriptive statistics

| Variable | Description of Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|---|
| innovate | Introduced new or significantly improved products and/or services in the past 12 months, 3 years, or both | 1084 | 0 | 1 | 0.428967 | 0.495157 |
| age | Age of business representative | 1200 | 23 | 99 | 44.2025 | 10.48291 |
| age2 | Age of business representative squared | 1200 | 529 | 9801 | 2063.661 | 962.0499 |
| gender | Gender of general director/executive director of the business | 1200 | 0 | 1 | 0.654167 | 0.4758375 |
| job position | Position/Role of business representative/respondent | 1200 | 0 | 1 | 0.931667 | 0.2524222 |
| training | whether the business provides training | 1141 | 0 | 1 | 0.26468 | 0.4413562 |
| Albania | Binary for firms located in Albania | 1200 | 0 | 1 | 0.166667 | 0.3728334 |
| Kosovo | Binary for firms located in Kosovo | 1200 | 0 | 1 | 0.166667 | 0.3728334 |
| North Macedonia | Binary for firms located in North Macedonia | 1200 | 0 | 1 | 0.166667 | 0.3728334 |
| Montenegro | Binary for firms located in Montenegro | 1200 | 0 | 1 | 0.166667 | 0.3728334 |
| Bosnia and Herzegovina | Binary for firms located in Bosnia and Herzegovina | 1200 | 0 | 1 | 0.166667 | 0.3728334 |
| Serbia | Binary for firms located in Serbia | 1200 | 0 | 1 | 0.166667 | 0.3728334 |
| trade | Binary for firms in the trade sector | 1200 | 0 | 1 | 0.245833 | 0.4307597 |
| service | Binary for firms in the service sector | 1200 | 0 | 1 | 0.145 | 0.3522476 |
| manufacturing | Binary for firms in the manufacturing sector | 1200 | 0 | 1 | 0.13 | 0.3364436 |
| construction | Binary for firms in the construction sector | 1200 | 0 | 1 | 0.119167 | 0.3241196 |
| firmage | Binary for age of the firm, 1=firms created in 2001-2021, 0=firms created prior to 2001 | 1200 | 0 | 1 | 0.653333 | 0.4761069 |
| importanceDS | Whether the business considers digital skills important or not | 1107 | 0 | 1 | 0.829268 | 0.3764444 |
| measuresDS | Whether the business has taken measures to improve digital skills | 1200 | 0 | 1 | 0.176667 | 0.3815454 |
| onlinetrade | Whether the business sells online | 1200 | 0 | 1 | 0.611667 | 0.4875743 |
| onlineswitch | Whether the business switched to online sales last year | 1198 | 0 | 1 | 0.528381 | 0.4994024 |

Source: Balkan Business Barometer 2021
Self-devised

## Probit Model

From predictor variables, the probit regression model was applied to predict a dichotomous variable of company growth. A dichotomous variable is the introduction of innovation, coded 1 if new or significantly improved products/services were introduced during the last three years and 0 if not. Individual, firm, and digitalization are among the independent variables. The econometric probit model determines which factors lead to the introduction of innovation. Table 3 shows the findings of probit estimations.

The McFadden R-squared, with a value of 13.5%, serves as an indicator of the explanatory power of the independent variables in the probit model. However, it is important to acknowledge that this pseudo-R-squared exhibits certain limitations. Notably, it offers a different perspective on the proportion of variance accounted for compared to conventional R-squared in linear models, rendering it somewhat challenging for assessing overall model fit.

Conversely, the model's robustness is evident in its capability to accurately classify 68.64% of the cases, indicating its proficiency in effectively predicting and categorizing outcomes. This metric, often denoted as the "percent correctly classified," underscores the pragmatic applicability of the model in practical scenarios. Despite the constraints associated with the McFadden R-squared, the notably high rate of correctly classified cases underscores the model's reliability and aptness in predicting the likelihood of the specific outcomes under scrutiny.

**Table 3** Probit Estimates

| | (1) |
|---|---|
| **VARIABLES** | **Innovate** |
| Age | -0.0283 |
| | (0.0279) |
| age2 | 0.000293 |
| | (0.000302) |
| Gender | -0.00633 |
| | (0.0937) |
| job position | 0.0325 |
| | (0.175) |
| Training | 0.372*** |
| | (0.105) |
| ALB | 0.358** |
| | (0.167) |
| KOS | 0.700*** |
| | (0.174) |
| MKN | 0.904*** |
| | (0.164) |
| MNE | 0.567*** |
| | (0.172) |
| BiH | 1.088*** |
| | (0.168) |
| SRB | - |
| Trade | -0.0857 |
| | (0.113) |
| service | -0.0654 |
| | (0.135) |
| manufacturing | 0.300** |
| | (0.141) |
| construction | -0.185 |
| | (0.158) |
| firmage | -0.138 |
| | (0.0975) |
| importanceDS | 0.315** |
| | (0.124) |
| measuresDS | 0.302** |
| | (0.120) |
| online trade | 0.377*** |
| | (0.108) |
| onlineswitch | 0.253** |
| | (0.0998) |
| Constant | -0.879 |
| | (0.685) |
| Observations | 998 |
| McFadden R-squared | 13.65% |
| Percent correctly classified | 68.64% |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

**Individual and firm-related variables**

In this research model, the individuals' characteristics represent the first group of independent variables that influence the introduction of innovation. The first hypothesis related to the age of the individual is not supported. Nevertheless, individual age was squared to find out better the turning point, which shows until what age an individual (i.e. business representative, in the majority of cases manager/owner) can positively affect firm growth. The standard errors for age and age^2 are relatively large, indicating that their effects may not be statistically significant. The second hypothesis related to the gender of individuals, where the coefficient is -0.00633, but the standard error is quite large (0.0937). This suggests that the effect of gender on innovation may not be statistically significant. Similarly, for the job position of individuals, the coefficient is 0.0325 with a standard error of 0.175. Like the previous variables, the effect may not be statistically significant due to the large standard error. However, the fourth hypothesis related to training has a significant value of 0.372, suggesting that training is positively associated with introducing innovation.

The second group of independent variables represents firms' related variables. The fifth hypothesis related to the firm age has a non-significant value. Calantone et al. (2002) suggest that firm age positively influences performance. However, contrary to this, other studies, such as Krasniqi (2012) and Colombelli (2015), find a negative and significant correlation between firm age and growth. Hypothesis 6 is related to the industry type, such as trade, service, manufacturing, and construction. Only the manufacturing sector is statistically significant, meaning it is positively associated with introducing innovation. In the case of the region (hypothesis 7), each has a significant value, indicating that being from these countries or regions is associated with a higher probability of innovation than being from Serbia (reference category). All of them have been supported.

**Digitalization related variables**

The eighth variable is related to the importance of DS, which is statistically significant, indicating a positive association with introducing innovation. Similarly, the concrete measures for DS are supported, with a p-value of 0.302. The Digital Skills and Jobs Coalition is one of the ten specific initiatives within the New Skills Agenda for Europe, which primarily focuses on DS across all its policymaking endeavors (Bejakovic & Mrnjavac, 2020). Moreover, hypotheses 9 and 10 represent online trade and online switching, and both have positive coefficients, indicating that they have statistically significant positive effects on innovation.

Employee DS has a favorable impact on a firm's innovations. This indicates that the success of DT is reliant on employees possessing DS. Digital technology does not operate in isolation. To effectively adopt and utilize these digital tools, SMEs require a substantial number of proficient employees handling digital technologies. People are as vital as technology in successfully implementing DT for SMEs, and this encompasses everything from corporate vision and strategy to execution. Employee DS plays a pivotal role in the process of DT (Zhang et al., 2022). For SMEs, a successful DT strategy should be driven by value innovation and a return to the essence of the business. By focusing on these aspects, SMEs can carry out DT efficiently and comprehensively (Teng et al., 2022).

In the process of DT, an increasing number of companies are recognizing the significance of building a talented workforce. Implementing digital strategies requires the support of individuals with a combination of business capabilities, a broad perspective, and digital concepts and skills. Kane (2019) emphasizes that people are crucial in driving DT. As a result, forming self-managed teams becomes instrumental in initiating DT within enterprises (Grab et al., 2019). The swift advancement of employees' cognitive and process capabilities accelerates the DT journey of companies (Butschan et al., 2019). Bessonova and Goryacheva (2020) discuss the readiness of employees in terms of digital literacy for DT. Studies have revealed that employees' digital mindset can influence their active participation in, or disengagement from, a company's DT initiatives (Solberg et al., 2020). Furthermore, the personal digital proficiency of employees has been linked to SMEs' growth and innovation performance (Scuotto et al., 2021). However, specific organizations have yet to embark on DT, mainly due to a lack of human capital and DS among their workforce (Bikse et al., 2021). Consequently, organizations must focus on developing virtual human resource development and leveraging learning resources to prepare for the future (Bennett et al., 2021).

## Conclusions and implications of the study

This study provides insights into the essential resources SMEs must utilize to succeed in their DT efforts. DT and DS of employees play crucial roles in driving the process of DT. As a result, this transformation can lead to enhanced innovations within SMEs. DT and DS interact with organizational processes and are recognized as critical success factors of firms. This research extends the recent stream of empirical research that utilizes the RBV to examine the influence of resources and capabilities on firm performance. Nevertheless, our approach differs from the literature methodologically, as it focuses on the importance of DS in introducing firms' innovation.

Focusing on digitalization at the level of WB SMEs, our analysis confirms the relationship between the importance of DS and the firm's innovation. These findings add value to the ongoing debate about the unclear effects of DT on firm growth. Moreover, taking concrete measures for DS for SMEs is a strategic move that can increase competitiveness, growth, efficiency, and resilience in today's digital-first business environment. Integrating digital technologies into their operations represents opportunities for SMEs to assess their current practices and needs and anticipate their future requirements.

This aligns with the theoretical notion that long-lasting competitive advantages arise when companies utilize DT to develop distinctive abilities and capabilities rather than merely adopting these technologies. As the range of technological options expands, the necessity for simultaneous reconfiguration of current processes and internal organizational adjustments becomes increasingly critical. To effectively integrate DT tools with internal competencies and capabilities, it is vital to thoroughly evaluate how different technological options relate to specific business types, industries, or international supply chain relationships. This assessment will identify the organizational changes needed for successful implementation (Cassetta et al., 2020).

Large enterprises, internet companies, and IT firms are at the forefront of DT, enabling them to attract highly skilled individuals with in-demand DS at lucrative salaries. In contrast, SMEs may need help to compete in attractiveness, resulting in higher recruitment costs that hinder the DT process. Adding to the challenge are the constrained capital of SMEs and many other obstacles that further complicate the journey towards DT. Additionally, the diverse nature of SMEs introduces variations that make DT more challenging. However, addressing these challenges allows SMEs to harness the resulting impact and better navigate competition (Teng et al., 2022).

Although this study offers interesting findings, caution should be taken regarding the generalizability of these results due to several data limitations. Firstly, the research data is cross-sectional, as is common in survey-based studies. Using cross-sectional data provides a snapshot at a specific time, but it may not capture DS and firms' innovation changes over time. Utilizing panel data for further research would be beneficial. Digitalization and other variables have diverse effects on various sectors and economic contexts.

Collaborative efforts among the government, educational institutions, and employers are essential to address the DS assessment and development challenges. They should jointly create innovative assessment methods, update standards to recognize the significance of 21st-century literacy, and establish intervention programs to enhance workforce DS. These demanding endeavors require a strong partnership on both national and European levels, with stakeholders working together to bridge the DS gap (Bejakovic & Mrnjavac, 2020). DS is crucial for SMEs, impacting their success and growth significantly. Embracing digital tools and technologies enables SMEs to stay competitive, streamline operations, and reach a broader customer base. These skills empower SMEs to innovate, adapt to changing market demands, and explore new business models. SMEs with DS can access global markets, ensure cybersecurity, and empower employees. Investing in DS is essential for SMEs to thrive in the digital era and maintain their competitiveness in their industries.

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