

Digitalization Trends and Their Possible Implications to SME Performance: Comparative Study Between Hungary and Azerbaijan

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Abstract. This comparative research intends to find similarities and differences in the digitalization level of Hungary and Azerbaijan. Following the state of art in digitalization, further focus is on the digitalization of small and medium enterprises in both countries. The secondary research is done through several international reports and databases collected for years 2018-2022, depending on the availability. The comparison is performed based on four subcategories of digitalization areas defined by the European Commission. The study holds its uniqueness due to the absence of comparative research between the mentioned two countries and the used indicators. The results contribute to the awareness, existing knowledge and provide future research insights in digitalization trends of both countries.

Keywords: Digitalization of SMEs, Basic technical skills, Overall fixed broadband take-up, B2C e-commerce index and E-government development index

Introduction

The digitalization of small and medium enterprises (SMEs) has become increasingly important in recent years, with many businesses recognizing the benefits of adopting digital technologies. According to O'Brien and Marakas [19], SMEs that adopt digital technologies can improve their competitiveness, increase efficiency, and enhance customer experience. Digitalization can also help SMEs enter new markets and improve their supply chain management [18].

The benefits of digitalization for SMEs have been further highlighted during the COVID-19 pandemic. The COVID-19 epidemic has hastened the trend toward digitalization, forcing many SMEs to rethink their business strategies in order to handle the move to remote employment and online sales. A survey by the European Union found that SMEs that have adopted digital technologies have been more resilient during the pandemic than those that have not [4].

A study by Rupeika-Apoga et al. [27] found that SMEs that had adopted digital technologies were more resilient during the pandemic than those that had not. Klein and Todesco [16] suggest that digitalization can help SMEs respond more effectively to the crisis by enabling remote work, online sales, and virtual collaboration.

European Commission in the Digital Economy and Society Index (DESI) report classifies digital technologies as below [7].

Electronic information sharing through enterprise resource planning (ERP) software: ERP helps SMEs manage customer interactions and improve customer experience [3].

Social media: Adoption of social media has a significant impact on SME performance in terms of improved stakeholder relationships and communication, decreased expenses in marketing activities, and increased customer loyalty and retention; it additionally boosts information accessibility about rivals and customers [6].

E-commerce: E-commerce involves a variety of activities including the exchange of products and services, money e-transfer, digital demands for immediate delivery, e-bill of lading, stock e-exchange, direct marketing, business plans, and post-sales services [28].

Cloud services: Cloud computing allows SMEs to store and access data and applications online, reducing the need for on-premise servers and IT infrastructure [2].

AI: The main argument in favor of AI adoption is that human cognition is limited to a certain level, most noticeably in terms of time and processing power. Software instruments can enhance decision-making through reduced expenses and accelerated computation [33].

Big data: Big Data provides transparency in information, enables digital maintenance of transactional data, and facilitates accurate auditing of client performance, leading to the development of precisely tailored goods and services. Organizations can utilize Big Data and advanced analytics to improve decision making, reduce risks, and uncover valuable insights, resulting in the creation of optimized and innovative products and services [14].

Digitalization has become increasingly important for Small and Medium-sized Enterprises (SMEs) in today's rapidly changing business environment. However, there are also challenges associated with digitalization for SMEs. Iliescu [8] suggests that SMEs face challenges in terms of financial resources, technical expertise, and cybersecurity. According to Zhang et al. [35] SMEs frequently lack the skills and understanding required to fully embrace digital technology. The following are some additional challenges:

- [1] Lack of digital skills and expertise: Many SMEs lack the digital skills and knowledge required to adopt and use digital technology successfully. Understanding how to use digital tools, evaluating data, and building digital marketing strategies are all part of this.
- [2] Limited financial resources: Since SMEs frequently have smaller budgets and resources than larger enterprises, they may lack the financial means to invest in digital technologies and infrastructure.
- [3] Data privacy and cybersecurity concerns: Because of data privacy and cybersecurity concerns, SMEs may be hesitant to adopt digital technology. Concerns regarding data breaches, hacking, and other cyber risks are included.

- [4] Resistance to change: Some SMEs may be resistant to change and reluctant to adopt digital technologies due to a fear of disrupting their established business practices. This can result in a reluctance to invest in new technologies and an aversion to the risks associated with digital transformation.
- [5] Lack of access to digital infrastructure: In some cases, SMEs may lack access to the necessary digital infrastructure, such as high-speed internet and cloud computing services, which can make it difficult to adopt and use digital technologies effectively [1].

1. Methodology

This research paper is built on a systematic comparison of digitalization level of SMEs in an developed EU member country – Hungary and developing non - EU member – Azerbaijan. In order to conduct the secondary research databases of World Bank, OECD, ITU, UN, as well as two main reports have been referred to: “Digital Economy and Society Index (DESI), 2022” by European Commission for the data in Hungary and “Promoting Enterprise Digitalization in Azerbaijan, 2022” by OECD for the data in Azerbaijan. The purpose of this research is to analyse and compare the similarities and differences in the digitalization process of these two countries. The motive behind the selection of these countries is due to relative analogy in size of the territories, population and their situation in their regions in terms of digital development. There will be four main categories which have been chosen based on the Digital Economy and Society Index and four sub-categories with which the indicators will be compared. Four main areas will be: Human Capital, Connectivity, Integration of digital technologies and Digital public services. The following categories are one of the several units of the respective main categories: Basic technical skills, Overall fixed broadband take-up, B2C e-commerce index and E-government development index. The mentioned sub-categories were selected due to the availability of information for those categories for both countries.

2. Analysis and comparison of digitalization of SMEs in Azerbaijan and Hungary

2.1. Hungary background

Hungary is in Central Europe, in an area of 93,030 square kilometres. During 1955 -1991 it was a member of the Warsaw Pact in connection with the Soviet Union. Hungary has been a member of the European Union since 2003.

The GDP of Hungary is 181.8 billion USD, GDP per capita is 18,728 USD and population 9.7 million [5].

Hungary classifies SMEs in accordance with the guidelines given by the European Commission. A firm is defined as a SME if it has less than 250 employees and an annual revenue of up to 50

million euros. Law No. XXXIV of 2004 on Small and Medium-sized Enterprises and Support of Their Development specifies the definition [29].

According to the statistics of the Hungarian Central Statistics Office there are 41,721 SMEs in Hungary. SMEs have a share of 29.5% in the added value and 3.4% in the employment level of the economy [17].

Hungarian enterprises are frequently in the low-value-added stage of global supply chains, concentrated on “midstream operations”, which justifies their poor productivity performance and makes them particularly prone to value chain fluctuations. Furthermore, they experience labour shortages: 33% of enterprises have difficulty obtaining a suitable workforce, compared to 14% in the EU. Despite the fact that one-third of businesses confront labor shortages, Hungary ranks high in regards to enterprises employing individuals with information and communications technology (ICT) specialist skills, with 27.32% opposed to the EU average of 17.63% [30].

The digitalization of SMEs in Hungary has gained prominence in recent years, particularly in light of the Fourth Industrial Revolution (Industry 4.0) and the COVID-19 epidemic. The integration of modern technologies such as artificial intelligence, robotics, cloud computing, big data, and the Internet of Things into manufacturing processes and value chains is referred to as Industry 4.0. COVID-19 has presented SMEs with new problems in terms of operations, adjusting to changing consumer needs, and assuring resilience and competitiveness [4].

Hungary ranks 22nd among EU member states in terms of digital performance, with a score of 43.8 out of 100, lower than the EU average of 52.6, according to the Digital Economy and Society Index (DESI) 2022 [7]. Connectivity, human capital, internet service utilization, digital technology integration, and digital public services are all measured in the index. Hungary does well in connectivity and digital public services, but falls short in human capital, internet service utilization, and digital technology integration, with the last attribute placing last.

The integration of digital technology dimension is particularly relevant for SMEs, as it reflects their ability to adopt and exploit digital solutions for e-commerce, e-invoicing, cloud computing and social media. Hungary scores 21.6 out of 100, ranking in 25th place among the other EU member states. Integration of digital technology by the SMEs in an average percentage of 19,3% is still below the EU average of 28,16%. Hungarian SMEs have a low level of basic digital intensity 34% compared to EU average of 55%, low level of 21% electronic information sharing compared to EU average 38%, adoption of cloud computing services, which enable access to scalable computing resources over the internet. In 2019 11% of the SMEs adopted cloud computing services, whilst in 2021 this number increased to 21%, still remaining below the average of EU percentile 34%. Hungarian SMEs have a low level of use of social media for business purposes, which can help them reach new customers, improve their reputation and enhance their innovation capacity. Only 13% of Hungarian SMEs use social media for business

purposes, compared to 29% in the EU on average. **This information demonstrates that Hungarian SMEs have a low level of digitalization and adoption of Industry 4.0 technologies.**

Endrődi-Kovács and Stukovszky [11] in their research discuss that Hungarian SMEs are concentrated in low-tech manufacturing and low-knowledge-intensive services sectors, which have a lower potential for digitalization and innovation than high-tech manufacturing and high-knowledge-intensive services sectors.

2.2. Azerbaijan background

Azerbaijan is a transcontinental country positioned through 86.600 square kilometres of area from Western Asia to Eastern Europe. It is one of the fifteen former members of the Soviet Union which proclaimed its independence in 1991.

Azerbaijan is considered an upper-middle income nation which generates 54.62 billion USD of GDP, 5,388 USD GDP per capita and has 10.14 million population [5].

Classification of SMEs in Azerbaijan is defined by the by Resolution No. 556 of the Cabinet of Ministers of the Republic of Azerbaijan [9]. Small enterprises must have between 11-50 employees and between 200.000 manats (107,077.65 EUR) and 3 million manats (1,6 million EUR) yearly turnover. Medium enterprises must employ between 51-250 people and must have a yearly turnover ranging from 3 million manats (1,6 million EUR) to 30 million manats (16 million EUR).

Role of SMEs in the economy of Azerbaijan is important, however there is still need for improvements. The State Statistical Committee of Azerbaijan reports that SMEs have 9,6 % share in value added to the economy and 37% in employment.

Azerbaijan has considerably improved the operating and regulatory environments for SMEs during the last ten years, while also boosting institutional support for SME development through the establishment of the Small and Medium Business Development Agency and the Innovation and Digital Development Agency.

The COVID-19 situation has heightened the necessity of initiatives in Azerbaijan to encourage the digitalization of SMEs. Challenges for digitalization of SMEs in Azerbaijan is a topic that has received attention in recent years, especially in the context of the COVID-19 pandemic and the need for SMEs to adapt to changing market conditions and consumer preferences. The COVID-19 situation has heightened the necessity of initiatives to assist SMEs in digitalizing. In Azerbaijan, 60% of small and 70% of medium-sized businesses boosted their internet commercial activities. The use of digital technologies and solutions to improve business processes, goods, services, and models is referred to as digitalization. Digitalization can enhance SMEs' productivity, competitiveness, innovation and resilience [23].

Many SMEs, however, lag behind bigger enterprises in the digital revolution due to significant constraints in terms of skills, innovation, infrastructure, regulation, and funding. The SME digital divide hinders productivity growth and widens disparities across people, firms, and geographies.

On the business-to-consumer (B2C) e-commerce index, Azerbaijan is ranked 68th out of 144 nations. This low rating indicates limited e-payment adoption, a scarcity of domestic online retailers, undeveloped logistics, buyer and seller distrust, poor knowledge of digital technologies, and high expenses associated with foreign credit card payment networks [34].

3. Results and discussion

Subsequent to the broad overview of the both countries and their performance in digitalization, specific indicators and trends will be analysed and compared in the following Table 1 and Table 2 based on the availability of data per country and indicators' measurement values.

Indicators	Hungary				
	2018	2019	2020	2021	2022
Basic technical skills (individuals)	-	49%	-	49%	-
Overall fixed broadband take-up (per 100 people)	31.5	32.6	33.5	34.8	-
B2C e-commerce index (1-100 index range)	76.90	78.90	80.50	-	-
E-Government development index (0-1 value range)	0.72650	-	0.77450	-	0.78270

Table 1. Digitalization indicators for Hungary

Source: [7], [6], [31], [24]

Indicators	Azerbaijan				
	2018	2019	2020	2021	2022
Basic technical skills (individuals)	-	42.2 %	-	-	-
Overall fixed broadband take-up (per 100 people)	18.6	19.0	19.4	19.9	-
B2C e-commerce index (1-100 index range)	59.30	61.80	60	-	-
E-Government development index (0-1 value range)	0.65740	-	0.71000	-	0.69370

Table 2. Digitalization indicators for Azerbaijan

Source: [15], [6], [31], [24]

3.1. Basic technical skills (individuals)

Definitions for digital skills are different in every literature review. The most multifaceted definitions are suggested by UNESCO and International Telecommunication Union (ITU). According to their definitions, basic functional digital skills are the competency that enable users to access and carry out basic operations. Generic digital skills refer to using digital technologies in meaningful and helpful ways, such creating content and collaborating online. Higher-level skills refer to employing digital technology for software creation or other empowering and transformational purposes [32].

According to the OECD [22] and DESI [7] reports, 49% of the population have basic digital knowledge, slightly lower than 54% of the EU average. This proportion for Azerbaijan is 42.2%. Advanced ICT skills, such as understanding of programming languages and the capacity to create computer programs, are only possessed by 0.7% of the population. This is much less than Hungary and the EU average, which are 3.9% and 4.5%, respectively.

Faced with a shortage of ICT knowledge and specialists, Hungary launched the National Digitalization Strategy 2021-2030, which has three priorities: increasing the number and qualifications of IT professionals and engineers, developing digital competence, and supporting the structural change required to foster the development of digital skills in education and vocational training. Simultaneously, Hungarian National Social Inclusion Strategy 2030 was initiated aiming to reduce online risks (such as cyberbullying, addictions, hate speech, and data security) and enhance the IT systems in schools which will strengthen the digital literacy of students, parents, and teachers.

The Government of Azerbaijan provides support for SMEs in all industries for overcoming the size-related obstacles that prevent them from gaining access to information, financing, training, and high-quality advisory services and advancing their digital transformation agenda. The adoption of digital solutions is particularly boosted by the following sorts of support. Following the introduction of Strategic Roadmaps for the National Economy in 2015, new government organizations were established, such as Small and Medium Business Development Agency (SMBDA) which were solely assigned to offer non-financial services such as specialized advising, consultancy, training in law, management, marketing and ICT.

3.2. Overall fixed broadband take-up

Broadband is defined as the wide-bandwidth data transmission used in fast internet connections in telecommunications that carries many signals at a variety of frequencies and Internet traffic kinds. This allows messages to be transmitted concurrently. The media may be twisted pair, satellite, wireless Internet (radio), optical fiber, coaxial cable, or optical fiber.

Broadband also refers to any high-speed Internet connection that is constantly active, quicker than dial-up access, and via traditional analogue [11].

Ratio of people that subscribed to fixed broadband has been gradually increasing in both Hungary and Azerbaijan. However, there is a substantial gap between the countries. The ratio for Azerbaijan is 19.9 in 2021, which is much less than Hungary 34.8 and EU average 33.7 [6].

Hungary achieved significant strides toward the connectivity goals of the Digital Decade for 2030 in 2021. Consumer take-up increased significantly and was greater than the EU average as a result of the increase in take up by customers. As a next step Hungary intends to encourage the construction of broadband infrastructure in its more rural areas by using the European Regional Development Fund [7].

In Azerbaijan, on the other hand, there is still a visible digital divide between rural and urban areas due to varied internet access. The shortcomings can be attributed to a lack of basic infrastructure as well as lower levels of digital awareness and skill in the country's rural areas. As a result, compared to as few as one-third of businesses in some rural areas, more than half of all firms in Baku had internet access in 2019 [22].

3.3. B2C e-commerce index

E-commerce is defined as the trade of goods or services over computer networks using procedures designed specifically to accept or submit orders. As a result, rather than the attributes of the acquired product, the parties involved, the method of payment, or the delivery route, the ordering procedure determines whether a commercial transaction qualifies as e-commerce. E-commerce occurs across a variety of economic partnerships involving any combination of customers, companies, or governments. These include both traditional B2B transactions and business-to-government (B2G) transactions. E-commerce transactions, particularly business-to-consumer (B2C) sales, are increasingly involving consumers directly. B2C transactions are nowadays expanding faster than other areas. One of the trending platforms of e-commerce which is practiced more frequently is social media networks. Smartphones and mobile applications offer a potent new platform for B2C e-commerce promoting and selling things online in a more personalized manner [20].

Based on the [tcddata360.worldbank.org](https://data360.worldbank.org) data [31], Hungary had a constant growth of **B2C e-commerce index, maintaining 1.8% of yearly growth rate from 2018 till 2020**. E-commerce usage among SMEs increased in 2021 and caught up on the EU average of 18%. Despite the positive indicator on B2C e-commerce, the majority of Hungarian businesses continue to struggle to take use of digital technology despite increases in a number of few indicators in this category [7].

For the same period (2018-2020) Azerbaijan had a notably lower, 0,3% yearly growth rate.

Comparing the state of art of e-commerce in Azerbaijan to EU countries, there are still many noticeable differences. The distinctions are mostly in adoption of payment methods, access to the international payment gateways, practicality of online payments systems etc. These obstacles originate from the lack of digital literacy of both businesses and customers [22].

3.4. E-Government development index

E-government is a field of digital public service. The range of operations that are involved in this service is: *“(1) the major initiatives of management and delivery of information and public services; (2) taken by all levels of governments (including agencies, sectors); (3) on behalf of citizens, business; (4) involving using multi-ways of internet, web site, system integration, and interoperability; (5) to enhance the services (information, communication, policy making), quality and security; and (6) as a new key (main, important) strategy or approach”* [12].

As demonstrated in UN E-government knowledgebase e-government development index for Hungary has steadily been improving in the past five years. Being indexed at 0.78270, Hungary is lagging behind the world leader in e-government Denmark, indexed at 0.9717 and regional average of 0.8305. Approximately 3000 public services were presented online by the end of 2021, of which 439 of them are supplied via built-in online intelligent forms (iFORM) with automatic pre-filling of personal data [24].

The E-government development index for Azerbaijan UN E-government knowledgebase has increased compared to 2018, however a slight decline was observed in 2021, up to 0.69370. This indexing leaves Azerbaijan behind world leader Denmark, Hungary and regional average of 0.6493. Azerbaijan launched an e-government platform (<https://www.e-gov.az/>) in March 2018, giving citizens and businesses access to over 500 government services. These government services include social security, social protection, health, education, online payments, communication, tax, legal, customs and other services [25].

4. Conclusion

The study concludes that there is a great need and potential for strengthening the digitalization and innovation capacities of SMEs both in Hungary and Azerbaijan. It is clear that both countries are inclined to progress and governments maintain their initiatives for continuous improvement.

Hungarian SMEs face several barriers to digitalization and adoption of Industry 4.0 technologies, such as lack of specialists in the field, awareness and trust in digital solutions and infrastructure. To boost the digitalization the Hungarian government has launched several initiatives and programmes to support SMEs' digital transformation, such as the Modern Enterprise Programme, Digital Success Programme, Operational Programme Digital Renewal Plus and Programme your Future as part of e 2021-2030 National Digitalization Strategy. These

initiatives aim to provide financial incentives, training opportunities, consultancy services, infrastructure development and regulatory reforms for SMEs to enhance their digitalization and innovation capacities.

Digitalization of SMEs in Azerbaijan is mostly hindered by low levels of ICT knowledge, poor infrastructure and limited financial resources. The government of Azerbaijan has initiated several projects and programmes to support SMEs digital transformation, such as the National Strategy on Information Society Development (2014-2020), the Strategic Roadmap on Development of Telecommunication and Information Technologies (2016-2020), the State Program on Expansion of Digital Payments (2018-2020), the National Strategy on Information Security (2022-2027) and the Promoting Enterprise Digitalization project (2020-2022) implemented with the support of the OECD [22].

Both governments should continue to support SMEs' digital transformation by addressing the existing barriers and gaps, fostering a conducive ecosystem for digital entrepreneurship ensuring alignment with international standards and best practices. The main focus for Azerbaijan would be to support the IT infrastructure and knowledge in the educational system, and educate the individuals in early stages to fulfil the shortage of professionals in the future, which in turn may help SMEs to perform better.

5. Limitations

There were several limitations while conducting the research. One of the major restraints was application of different methods in the preparations of the international reports which originated from the regional differences. This factor was reflected as unavailability of all the necessary data for both countries in the same indicators, values, and years to be able to provide a full picture and comparison.

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