

Digitalization Process as a Factor Increasing Austrian Competitiveness

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Abstract—The article examines the issues arising from active implementation of digital technologies in the modern business environment. Companies, nonprofit organizations, state authorities, and individuals get increasingly involved in the digital activities. Technological development in the context of new industrialization associated with the digital economy accelerates the process of advancing knowledge and expertise in various areas. It reduces the time needed to develop, produce and launch innovative goods and services. However, even the leading economies of the world have not exploited the potential benefits of the digital evolution to a full degree. The authors analyze the digitalization of the business processes in Austria. The country is selected for the case study as one of the European Union (EU) leading economies that is intensifying the efforts in the implementation of digital technologies. The authors identify and analyze different technologies used in various sectors of the Austrian economy and give recommendations concerning the possible ways to facilitate and promote digitalization.

Keywords — *digitalization, digital economy, digital technologies, innovation management*

I. INTRODUCTION

Intensification of competition has become a peculiar characteristic of the modern global economy and global markets. Enterprises and companies, as well national economies are involved it and experience its influence. One of the possible ways to increase competitiveness relies on the introduction of innovative technologies, including those in the scope of informatics.

Digitalization has significant impact on productivity, profitability and sales revenues of a business. Due to the resulting higher efficiency of all the business activities, companies benefit from using big data and predictive analytics for both foreign and domestic markets operations [1]. The digital economy development will depend in the future on a

number of breakthrough technologies and the success of their implementation. Five technologies that have major impact on the new industrialization include 5G-communication, 3D printing, blockchain, artificial intelligence, and virtual reality. According to the Digital Economy and Society Index (DESI), the countries of Scandinavia, Benelux, Great Britain and Ireland are the most advanced digital economies in 2018. In general, about 98% of the EU population have access to the Internet, 84% have access to 4G networks. However, at the same time it is reported that 44% of the population are among those who do not have basic digital skills – which shows that there is much room for further development [2].

II. LITERATURE REVIEW

In modern literature, there is a focus on the processes of active digitalization and its impact on the economic development. The interest in this process can be traced back to 1995, when Tapscott, a Canadian expert in business and consulting, proposed a new term to characterize the trends occurring in the global economy - digital economy.

From the scientific point of view, this research aims to contribute to understanding of the effects of digitalization on country's competitiveness. Many studies explore the effects of specific technologies underlying digital transformation e.g. analysis of the modern customer-relationship management systems by Torggler. Similarly, there are papers by Moussiegt, Sorama, Neubert and Simonelli for each of the underlying technologies that describe potential effects, provide a strategic view or identify barriers for adoption. This academic research differs from the approach mentioned above because it does not focus any particular technology, its performance and effect, but rather aims to summarize the effect of digitalization on a specific country.

III. RESEARCH METHODS

Methodological aspects of the digital economy studies are closely related to such sciences as psychology, economic and mathematical modeling, and information technology. The methodology of the research is based on the principles of the dialectical approach. It allows the authors to identify the patterns and contradictions, the logic of economic systems development. In this framework, the following techniques are used to achieve the aim of the study: market research methods, extrapolation, expert estimates.

The authors apply the case study method to test and prove the assumptions. Austria has been selected for the case study as one of the leading EU countries. It is considered a country of advanced technological development. However, in the scope of the new industrialization, considerable intensification of the efforts may be required to exploit the benefits of digital economy. The choice of the object of the study allows the authors to identify and generalize the trends both underlying and resulting from industrialization.

IV. RESULTS

The sectors related to the digital technologies show a greater increase in the labor productivity than the world economy as a whole; therefore, it is necessary to stimulate the use of digital technologies in various economic sectors. In this article, we aim to analyze the current state and trends of the economy digitalization in Austria as one of the advanced countries of the EU.

Austria has a developed market economy, skilled labor and a high standard of living. As a member of the EU, the Republic of Austria is closely linked to the other EU economies, especially Germany. In recent years, economic growth has been relatively weak, approaching 1.1% in 2015, but in 2016, it rose to 1.5%, almost doubled in 2017 to 2.9%. The budget deficit made up 1.2% of GDP in 2017, and public debt reached 78.8% of GDP.

Economic activities considered being subject to digitization imply the inclusion of a significant proportion of digital technologies in goods, services or work processes. These activities are associated with significant changes to the cost structure and competitive environment. It should be noted that, unlike traditional manufacturing and services with high fixed and significant marginal costs, lower marginal costs for digital goods and services allow businesses to grow faster. Pioneers in this area are rapidly gaining a dominant position in national and international markets, especially in the economies and markets that the network effect. The rapid dissemination of information in social media accelerates the emergence of such "superstar" companies, with a rapid increase in reputation and priority access to financial markets, which further accelerates their growth. However, the resulting variations generate sharper fluctuations than in the past with employment at the firm level and the demand for skills; they may contradict the expectations of stability - the time of employment at workplaces, investors' profits and the predictability of aggregate activity in local communities [11].

Digitization is not related to the transformation of existing processes into digital versions, but the rethinking of current operations from new points of view provided by digital technology [3]. The scope and scale of digitalization requires

the formation of an integrated policy for the correct use of opportunities and solutions to the problems caused by the phenomenon. Austria is not among the most developed OECD countries in the digitalization process, but it is intensifying its efforts in this area. Both companies and state authorities in Austria are aware of the benefits of large-scale digitalization, as well as the factors that may interfere with it and, therefore, limit and slow down its spread in the business environment, the public sector and the households. There are also certain concerns that speeding up the digitalization process can lead to problems in the labor market, undermining social support for the process. Austrian business is well aware of the benefits associated with the economy digitalization. It paves the way for the digital future and position Austria among the leaders in digital innovations. In January 2017, the Austrian government presented the Digital Roadmap. The strategy aims to integrate various sectoral strategies and coordinate the actions of the stakeholders (the government, business, social institutions, universities and citizens). The goal is to turn Austria into a leading country in the digital business environment. The Roadmap sets out the main tasks in 12 sectors (Table 1). The annual digital summit will ensure ongoing monitoring of the strategy implementation. The responsibility for the various measures will rest with different sectorial ministries. The experience of the OECD suggests that this roadmap can be further strengthened with specific goals and deadlines for implementation. The Roadmap establishes action framework and give way to changes in competition, the labor market and fundamental tax reforms.

TABLE I. OBJECTIVES OF THE AUSTRIAN DIGITAL ROADMAP

Area of improvements	Tasks
Education	Strengthening the digital competence of teachers and professors Using innovative tools and open-source software in education
Infrastructure	Creating advanced broadband and mobile digital infrastructure (5G) Eliminating infrastructure gaps between urban and rural areas
Research and innovation	Becoming a leader in digital technology Supporting research and development in the private sector with particular emphasis on digital technology
Business environment	Improving conditions for the startups development Providing assistance to small and medium businesses involved in the digitalization processes
Employment	Training highly skilled workers in new professions Adapting the legal framework and sources of financing the social security system
Health care	Using digital technology to assist and care
Environment	Increasing energy efficiency with digital applications
Transport	Promoting intelligent traffic systems Developing security systems and legal framework for unmanned vehicles
Media and culture	Countering malicious uses of new media Fighting the digital spread of hate rhetoric
Integration and inclusion	Providing general education and training in ICT Implementing service platforms in several languages
Security	Strengthening cybersecurity, enhancing international cooperation in cybersecurity Ensuring compliance with high standards of privacy and protection standards
Politics	Expanding public services that can be obtained online

Austria is a member of Organisation for Economic Co-operation and Development (OECD) that recognizes the principles of democracy and the market economy. Companies in OECD countries make extensive use of the Internet to participate in electronic commerce (e-commerce). Companies in OECD countries use the Internet extensively to participate in electronic commerce. Today, most businesses have a website or home page, and they gain more support through social networks. Many companies start to take orders online and these represent a growing share of their total sales. The transition proceeds at an uneven pace. Even in the most digitized countries, only 20-25% of companies currently release more than 1% of their sales via internet. In certain areas such as tourism and retail, e-commerce has taken root more rapidly. The size of an enterprise also matters: half of large OECD companies achieve more than 1% of their sales via internet, as small firms account for about 20%. At Austrian enterprises, e-commerce tools adapt slowly than in peer OECD countries. In 2016, only 15% of Austrian firms released more than 1% of their turnover online, against 25% in Denmark and Sweden. The lag is typical for small businesses. For example, in tourism, where Austrian firms are internationally competitive, only 30% make more than 1% of their online sales, against 70% of their counterparts in developed OECD countries. In the Austrian retail sector, which has a high degree of loyalty that they have built with the local customer base, only 15% of Austrian retailers attained the threshold of 1% of electronic sales, compared to 30% in peer countries [4].

Broadband internet is the infrastructure of the digital society and economy. Demand for faster broadband access is increasing due to the expansion of the internet traffic, connection of large numbers of smart objects, and access to remotely stored data and software. Given the growing importance of on-the-go connectivity, mobile broadband has become a natural extension of this infrastructure. The share of Austrian organizations with broadband connectivity increased from 82% of all firms with 10 employees and more in 2010 to 98% in 2016. Information on micro firms with fewer than 9 employees, which is a quarter of the total number of people employed in the business sector, is incomplete. Nevertheless, in general, small, medium and large firms have practically caught up with the global limit of full connectivity. However, Austria is clearly lagging behind in connectivity to mobile broadband. While more than 90% of firms are connected in the most advanced peer countries at present, only 75% are in Austria. Austria nonetheless shows better results than Germany and the Netherlands. Large and medium-sized firms are well equipped, and firms producing digital goods and services are even better connected than in other countries. On the other hand, barely half of manufacturing firms are connected to broadband internet, against 90% in the most advanced countries. The gap between large and small enterprises is larger, and there is a possibility of a larger gap in micro firms. Austria lags behind in the area of fast broadband access, which is the infrastructure of the latest generation of information and communications technology (ICT) applications. Only 10% of Austrian firms connected to fast broadband in 2016, against 30% in advanced countries. In

addition, while the rate of access to this type of network increased steeply in the past five years, it has stalled in Austria.

Cloud computing deserves special attention. About 25% of all OECD members' enterprises currently use cloud computing, with large differences between countries. Utilization rates range from above 50% in most advanced countries to below 10% in the rest of the OECD countries. Around 40% of all large OECD firms and 20% of all small businesses are cloud-computing users. In Austria, only 35% of large companies, 30% of firms producing digital goods and services and 15% of small businesses, resorted to the use of cloud computing in 2016. Only 5% of Austrian firms use complex cloud applications of large software packages for accounting, management and marketing. Similar applications in peer OECD countries are used by 25% of the companies.

Companies in OECD countries integrate ICT tools into an ever-expanding set of business functions. They help modernize company's management in all dimensions. Important indicators are the implementation of two key techniques: enterprise resource planning (ERP) and customer relationship management (CRM).

ERP application covers product planning, purchasing, manufacturing, marketing, logistics and financing. It covers unified software for collecting, storing, managing, and interpreting data from these various activities as well. ERP does everything quicker, more in depth and effectively [5]. In the most advanced OECD countries, almost all large firms, almost 80% of medium-sized firms, and nearly 50% of small firms operate ERP systems. In the Austrian business sector, large companies are equipped like international counterparties, and firms producing digital goods and services are even more fully equipped. However, digitalization has a significant effect on small firms operating in the domestic markets [6]. Although in the small business sector, only around 30% of enterprises implement ERP. There is also a gap in manufacturing: 40% of all Austrian manufacturing companies are equipped, compared to 50-60%. Less than 25% of Austrian tourism firms have ERP systems, compared to 50%. This low rate of equipment with ERP applications may reflect their outsourcing to external suppliers, but the low rate of access to cloud computing reduces this probability. In addition, small and manufacturing companies can lag behind in their digital transition due to pressure on investment [7].

CRM applications support the interactions of firms with current and future customers. They use online data from various sources (sales, social media, websites visits etc.) and process this information to create targeted marketing plans [8]. They also help automate customer interactions, usually via e-mail. Certain CRM systems can trigger geographic marketing initiatives based on the physical localization of customers via GPS software. Austria is among the international leaders in this area. Almost 45% of Austrian firms use CRM software, at par with advanced countries, compared to an average European level of 33%. The implementation rate varies from 70% in large companies to 40% in small businesses. In two areas where Austria lags behind in other digital innovations, i. e. retail and tourism, it acts as an international leader in CRM. This indicator can be justified, at least in part, by the

active role of some successful Austrian companies in services in those sectors [9], [10].

The number of the enterprises that entered and left the Austrian market is relatively small; it also applies to the number of start-ups. New firms are more active in using ICT applications, moving to more innovative business models and gaining additional performance advantages. The emergence of a new wave of start-ups in Austria is crucial for enhancing the modernization of the business environment, and the authorities have confirmed their commitment to this goal, e.g. by the initiative to make Austria a “Number One Start-Up Country”.

V. CONCLUSION

The analysis of the digitalization process in the Austrian economy and the results of the study in general allow us to draw the following conclusions. The emergence of the common European digital market is crucial for smaller, open economies, such as Austria. The authors recommend the following actions to the companies, state authorities and other economic agents that can potentially benefit from the digitalization and wider implementation of the ICT in Austria.

- Create a transparent monitoring system for the implementation of Digital Roadmap with timelines and quantitative goals;
- Promote the entry of new companies into the market and stimulate competition in the digitalization;
- Ensure that competition policy responds to changing threats to competition in digital markets, including through the development of international co-operation;
- Promote more effective data protection, cyber security and consumer protection. Increase public awareness that risk management responsibility depends in part on companies and consumers themselves;
- Develop social dialogue on digital transitions;
- Develop programs to promote the use of technology for enterprises, in particular for small and medium-sized businesses, to support venture investment. These programs may include training and consulting events with a demonstration of best practices;
- Encourage the use of government e-services platforms by reducing fees and/or making their use more attractive to both individuals and legal entities;
- Encourage the creation of digital clusters in all regions of Austria.

As a conclusion, it is important to note that the economy digitization changes production processes, the relationship between work and leisure, capital and labor, the rich and the poor, the skilled and the unskilled. It creates opportunities for increasing inclusive growth and wealth by increasing productivity, expanding private and public services and democratizing information.

As study shows enterprises with certain characteristics are more likely to introduce ICT than others. Large companies (with higher investment opportunities) and manufactures of digital goods and services (with a large amount of expertise and human capital in this area) tend to grow rapidly. Effective use of digital technology depends on the scale of organizational change in enterprises, led by good governance and leadership, and this potential can be enhanced in larger organizations. The backlog of large Austrian companies in the

implementation of ICT applications by international standards is really small. The gap in the business environment is mainly due to the lag of small firms. The lack of ICT skills and unwillingness to move to new business models can explain the general gaps in business digitalization compared to other OECD members. The limited availability of equity capital (external financing) seems to impede even more investment in knowledge-based assets, especially by small firms.

VI. DISCUSSION

Digitalization has become an important stimulus for innovation and economic growth in the modern global economy. It leads to the emergence of new methods and techniques that enterprises use to increase the production efficiency. It allows companies to develop and introduce new products and services that potentially increase customer satisfaction. Thus, digitalization contributes to the competitiveness of national economies.

The case study shows that in comparison to other technologies, digitalization has a higher risk of cumulative issues that result from a system lag, or the difference in the productivity and competitiveness of the Austrian firms. The pioneers have distinctive advantages, and the winners enjoy the biggest benefits literally “taking it all” from the market.

It is noted that the state authorities should take an active role promoting and facilitating digitalization. The study identifies two areas of further progress with the highest priority. Firstly, there is significant untapped potential for technological and organizational modernization of existing enterprises that companies should exploit. Secondly, there is an urgent need for the general increase in the business dynamics and overall business revival. The latter is reflected in various indicators of business environment and performance statistics, including the new businesses registered index, success rate, as well as average enterprises’ efficiency indicators. The new industrialization will lead to the increase in the number of enterprises with high productivity and efficiency, while the less efficient companies will be forced out of the market.

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