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USE OF MOBILE TECHNOLOGIES BY BUSINESS COMPANIES IN THE CONTEXT OF DIGITALIZATION OF THE LATVIAN ECONOMY *

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Abstract. The article aims to identify the factors contributing to the development of mobile technologies among Latvian entrepreneurs. The limited spread of mobile technologies can lead to issues in Latvia's economy, like limited access to digital services and resources, a decline in competitiveness between enterprises, limitations in the case of innovation, and unavailability of economic growth. Suppose the use of mobile technologies stays limited in certain areas or between certain groups of people. In that case, it can lead to unequal conditions for information, education, work opportunities and new businesses. With mobile technologies, Latvia can achieve a digital transformation in economics, leading to an advantage in digital economics compared to other countries. With the use of analyzed data from the questionnaire that was given to Latvian entrepreneurs, as well as the analysis of literature sources, the authors emphasize the importance of informative and technological development, IT specialist qualifications and digital literacy for the development of the digital economy, as it can be seen that high digital literacy and availability of IT infrastructure can stimulate economic growth, although, the deficit of qualification can become a big obstacle. The drawn conclusions emphasize the importance of work in terms of information about the advantages of digital technologies among small and average entrepreneurs. Further research can be focused on rating the effectiveness of specific programmes about digital literacy and the availability of IT infrastructure in the context of the Latvian economy.

Keywords: factors affecting the use of mobile technologies; business companies; SMEs; entrepreneurship; digitalization; Latvia

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1. Introduction

The impact of mobile technologies on entrepreneurship cannot be overestimated. Mobile computing devices (smartphones, computers, and tablets) are essential business tools. Mobile devices are connected to the Internet through wireless networks, making them convenient. Today, a network has already been established to support processing vast amounts of information. By the end of 2021, more than 27.1 billion devices were connected to

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the Internet, more than three devices per person on the planet (Cisco, 2021). In the first quarter of 2023, mobile devices (excluding tablets) generated 58.33% of global website traffic. The market share of mobile devices and tablets in Europe in 2023 (Statcounter GlobalStats, 2024a) is 51.89% and 2.48%, respectively. In Latvia in 2023, the market share of mobile devices and tablets is 38.43% and 0.91%, respectively (Statcounter GlobalStats, 2024b).

Today, when digitalization and mobile technologies become integral to business processes, understanding the factors influencing their development is critical for enterprises to adapt to modern market requirements successfully (Berawi et al., 2020; Bernardino & Freitas Santos, 2020; Schlegel & Kraus, 2021; Androniceanu & Georgescu, 2022; Dinu et al., 2022; Musiello-Neto et al., 2022; Rua et al., 2023; Quyet, 2024). Slinger et al., (2024). What factors contribute to the use of mobile devices in entrepreneurship? How to increase the market share of mobile devices in Latvia and the intensity of their usage?

This research aims to assess the factors influencing the use of mobile devices for entrepreneurship in Latvia. Based on a survey of entrepreneurs, the study outcomes emphasize several vital factors influencing the development of the mobile economy in Latvia. These factors include the level of development and quality of IT infrastructure, availability of IT specialists, and ability of enterprises to adapt to new conditions of corporate structures, including the effects of EU sanctions. The importance of technological tools, such as identification systems and electronic digital signatures, in encouraging the use of mobile technologies is also noted. Equally important is to provide enterprise employees with financial and technical means for mobile access to the Internet.

The study also emphasizes the importance of mobile literacy of the population as consumers of mobile technologies, which indicates the need for technical and educational support in this area. It is noted that the lack of skilled labour can harm the development of mobile technology, which makes it essential to pay attention to the training of specialists in this area. Finally, the study points to a reserve of growth in the intensity of mobile technology use in the SME sector, highlighting the need to educate entrepreneurs in this sector about the link between mobile technology use and the success of their businesses.

2. Methodology

Assessing the factors affecting the use of mobile technologies in entrepreneurship in the context of economy digitalization, it is methodologically justified to consider such economic theories and approaches as innovation theory, human capital theory, economic growth theory, theory of institutional change, and theory of technological progress.

The innovation theory studies new technologies' creation, diffusion, and application. According to the innovation theory, the extent to which mobile technology offers advantages over existing alternatives is the critical factor influencing mobile technology use in entrepreneurship (Liu et al., 2022; Lesebo et al., 2023). It may include improved operational efficiency, increased accessibility to information, or new opportunities to communicate with customers (Bassano et al., 2017; Heavin & Power, 2018; Warner & Wäger, 2019; Hazzam et al., 2022). If mobile technologies are considered difficult to use or require significant effort to master, their adoption by entrepreneurs may slow. However, its adoption may increase as technology becomes simpler and more sophisticated. Such social factors as peer opinion, public opinion, and influential industry leaders can significantly impact the adoption of mobile technology in the entrepreneurial community. If influential entrepreneurs actively use mobile technology, it may encourage others to adopt it. Channels of communication and information dissemination can also influence the adoption of mobile technologies. For example, if information about the benefits and opportunities of mobile technologies is widely disseminated through professional communities, this may encourage their adoption. At the same time, the process of adopting new technologies takes time. Entrepreneurs may not be ready to move onto mobile technology immediately due to the need for training or financial investments. However, its adoption may increase as technology becomes more widely available and known. These factors may interact and may be more or less significant depending on the context and specific conditions in the entrepreneurial environment.

The innovation adoption process model proposed by Rogers (2003) describes how new ideas, products, or practices diffuse among members of society. He identifies a few key steps in the process. The first innovation stage is characterized by a group of individuals who quickly adopt a new idea. They usually have a large number of connections and access to information. This group is followed by a large part of the population, which also adopts the new idea but slower than the previous group. The next population group adopts an innovation only after the majority have already done so, and it may take them an even longer time to adopt the innovation. The last group, which adopts the innovation with a long delay as compared to other groups, associates itself with traditional ways, and this group may be the most resistant to change. This model helps to understand how innovation diffuses in society and how to encourage this process more effectively.

Davis et al. (1989) investigated the factors influencing user acceptance of computer technology. Two theoretical models were compared: the Technology Acceptance Model (TAM) and the Theory of Reasoned Action and Decision Making (TRA). According to the Technology Acceptance Model (TAM), the main factors influencing the acceptance of computer technology include Perceived Usefulness, where users rate how useful they find the technology to their business process or tasks and Perceived Ease of Use, i.e., how easy it is for them to use the technology. The Theory of Action and Decision Making (TRA) also considers other factors, such as the user's expected behaviour (Behavioural Intention) and the user's general attitude towards using the technology (Attitude Toward Using), including their belief in its usefulness and ease of use. These factors together form a model explaining why and how users accept or reject computer technology in their entrepreneurship.

Ramaswamy and Nayak (2014) conducted a systematic review of factors influencing mobile commerce adoption among small businesses. They determined the influence of Perceived Usefulness, Perceived Ease of Use, Perceived Risks, Access to Technology, and socio-demographic factors such as age, education, and experience of using technology, as well as Social Influence.

Human capital theory focuses on the role of knowledge, skills and education in economic development, as well as adaptability to technology and its impact on the use and performance of entrepreneurial activities. In the context of entrepreneurs' use of mobile technologies, human capital theory can help assess how trained and skilled employees contribute to the successful adoption and use of new technologies.

The technological progress theory studies technological change's impact on economic growth and production structure. In assessing the use of mobile technology in entrepreneurship in Latvia, the theory of technological progress helps to understand how new technology changes business models and the competitive advantages of enterprises.

Lee and Larsen (2016), having investigated the impact of mobile technology on productivity and innovation in the workplace, determined how mobile technology affects ways of working in the office and remote workplaces, how the use of mobile devices and applications affects the productivity of workers and organizations as a whole, how mobile technology contributes to workplace innovation including improved communication, collaboration, and access to information. The article also discusses the challenges of adopting mobile technology in the workplace and potential opportunities to improve business processes and achieve competitive advantage. The authors determined that mobile technology provides flexibility and mobility, allowing workers to perform tasks from anywhere and at any time; remote working becomes more common and mobile devices play a crucial role in keeping remote workers connected to the office; mobile technology makes it easier to access work information and tools, which results in more efficient and flexible working process; mobile devices allow workers to respond quickly to requests and tasks, which can increase productivity; mobile applications provide real-time access to tools and data, which speeds up decision-making and task completion. Organizations that actively use mobile technology can benefit from increased productivity and competitiveness. Mobile technology has also improved employee communication and collaboration, which can encourage ideas and innovation. In contrast, mobile device access to information and tools allows employees to quickly and easily share ideas and find new solutions. Innovation in mobile applications and technology can lead to new ways of working and business models, contributing to the growth and development of an organization.

Haldar et al. (2023) argue that Internet usage and technological innovation promote economic growth. Using data from 16 developing economies from 2000 to 2018, the authors investigated the impact of ICT, innovation, electricity consumption, and renewable energy generation on the economic growth of developing economies. It is established that ICT not only monotonically increases economic growth but also increases the efficiency of financial development through growth.

The economic growth theory examines the factors that contribute to long-term economic growth. Mobile technologies affect entrepreneurship in the context of their contribution to productivity, innovation, and economic competitiveness. Mobile devices are used on the Internet to expand the dissemination of knowledge, which is in line with neoclassical models of economic growth regarding sources of innovation (Kwan & Chiu, 2015). The creation and dissemination of knowledge complement each other in innovative production (Kwan & Chiu, 2015). Rehman and Nunziantie (2023) stated that the digital economy positively and significantly impacts total factor productivity in European regions. Public policy should support investment in digital infrastructure and increase digital literacy in lagging regions of Europe.

Exploring the impact of the theory of institutional change on the use of mobile technology in entrepreneurship is also an essential area for research. The institutional change theory analyses institutions and rules' role in economic development. In the context of mobile technology use in entrepreneurship, it may be important to research such institutional factors as legal and regulatory frameworks, intellectual property protection, and access to finance. Brown and Magill (2019) investigated the influence of institutional and organizational factors on small businesses' adoption of digital marketing. The authors found that such institutional factors as legal regulations, cultural values, and consumer expectations have a significant impact on the decision made by small businesses to adopt digital marketing. For example, an appropriate legal and regulatory environment can encourage or inhibit digital marketing development in small businesses. It was determined that organizational characteristics such as enterprise size, access to resources, and enterprise culture significantly influence digital marketing adoption. For example, small businesses with limited resources or lacking the understanding of the value of digital marketing can face great difficulty implementing it. The authors emphasize the need for small businesses to adapt to the rapidly changing digital environment and actively learn new digital skills. They highlight the importance of creating a supportive environment that encourages learning and competence development in digital marketing. The article thus highlights the complexity of small businesses' digital marketing adoption process. It shows that the successful adoption of digital strategies requires consideration of institutional and organizational factors as well as continuous learning and adaptation.

The Internet has enabled new digital business models for selling products and/or services such as subscription, on-demand, partnerships, direct delivery, consulting, advertising, blogging, etc., as well as new venture capital opportunities in the field of Internet technology (Antonizzi & Smuts, 2020).

The continuing research on the contribution of various factors influencing the use of mobile technology in entrepreneurship in a digitized economy cannot be overestimated (Ling et al., 2024; Fadhil-Ondoy et al., 2024).

To achieve the research goal, the authors surveyed Latvian entrepreneurs in May – June 2023. A total of 252 entrepreneurs were surveyed. The survey was conducted in the primary languages of communication in the regions: Latvian and Russian. The planned sampling design is as follows: the sampling method is combined, the method is non-repeated, and the sampling method is stratified based on the main research directions. To conduct the survey, the method of interviewing was applied, as well as telephone interviews and a questionnaire available for completion on the Internet. The authors applied the following methods for data processing: frequency analysis, correlation analysis, and factor analysis.

The largest number of enterprises under survey are engaged in agriculture, accounting for 16.7%, followed by 13.1% involved in wholesale and retail trade; automotive and motorcycle repair; 8.3% in the arts, entertainment, and recreation sector; 7.1% in education; and another 7.1% in accommodation and catering services. The survey covered all types of entrepreneurial activity in Latvia.

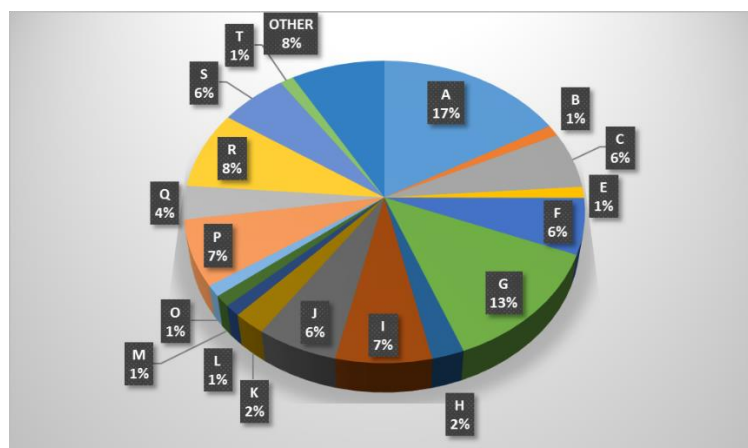


Figure 1. Types of activities of the enterprises under survey.

Source: authors' calculations based on survey data

Note: (A) Agriculture, forestry, fish industry, (B) Mining industry and quarrying, (C) Manufacturing industry, (D) Electric energy, gas industry, heat supply and air conditioning, (E) Water supply; upkeep and rehabilitation of wastewater and waste, (F) Construction, (G) Wholesaling and retailing; automobile and motorbikes repair, (H) Transport and storage, (I) Accommodation and catering services(hotels, etc.), (J) Information and communication services, (K) Finance and insurance activity, (L) Real estate, (M) Professional, scientific and technical services, (N) Administration and servicing offices, (O) Public administration and security; mandatory social insurance, (P) Education, (Q) Health and social care, (R) Arts, entertainment, and recreation, (S) Other services, (T) Household activities as employers; production of goods for own use and provision of services in individual households.

The authors found that among the enterprises under survey, 29.8% have been operating for 1-5 years, 22.6% have been operating for less than 1 year, 20.2% have been in operation for more than 20 years, 14.3% have been operating for 6 - 10 years, and 13.1% have been in business for 11 - 20 years. Among the surveyed enterprises, 54.8% have fewer than 10 employees, 26.2% have 10 – 49 employees, 9.5% have 50 - 249 employees, and 9.5% have more than 250 employees.

The median annual turnover of the enterprises under survey is 17,500 euros, and the mean annual turnover is 1,700,742 euros. In the past year, the revenue of the enterprises under the survey changed as follows: 46.4% experienced a decrease, 31% remained unchanged, and 22.6% saw an increase. The change in the profitability of the enterprises under the survey is as follows: 40.5% experienced a decrease, 36.9% remained unchanged, and 22.7% saw an increase. The change in the volume of products sold and services provided by the enterprises under the survey is as follows: 22.1% experienced a decrease, 32.1% remained unchanged, and 35.7% saw an increase. The change in the volume of exported products/services is as follows: 29.8% experienced a decrease, 45.2% remained unchanged, and 25% saw an increase. The change in market share for the enterprises under the survey is as follows: 36.9% experienced a decrease, 39.3% remained unchanged, and 23.9% saw an increase.

3. Results and discussion

91.7% of respondents use email for conducting business from mobile devices. 82.1% of entrepreneurs use the ability to purchase (order, pay, select delivery options) goods and services through mobile devices, and 84.5% have and use a mobile version of their website. Payments for bills from mobile phones are made by 86.9% of entrepreneurs. Most entrepreneurs, specifically 91.7%, use messaging groups to solve business tasks, and 86.9% use SMS marketing. Therefore, the methods described for using mobile technologies are among the most popular among entrepreneurs.

Table1. Use of mobile technologies and devices (smartphones, tablets, etc.) in business in the context of digitization in the last few years (%).

	never	rarely	medium	often	always
Mobile access to e-mail	8.3	25	17.9	10.7	38.1
Mobile version of the website	15.5	17.9	19	19	28.6
Messenger groups for solving business tasks	8.3	26.2	19.1	20.2	26.2
SMS marketing	13.1	21.4	22.7	19	23.8
Mobile access to company resources (databases, etc.)	13.1	25	14.3	23.8	23.8
Company has developed its own mobile applications	31	22.6	16.6	17.9	11.9
Advertising targeted for use on mobile devices	23.8	19	23.8	17.9	15.5
Mobile devices for managing production processes	17.9	27.4	20.1	17.9	16.7
Payments of a company bills from a mobile phone	13.1	17.9	23.7	16.7	28.6
Equipment of a company transport system with location data transmission systems	16.7	21.4	17.8	26.2	17.9
Own mobile application	26.2	21.4	19	16.7	16.7
Augmented reality technologies	38.1	13.1	20.3	20.2	8.3
Possibility to purchase (order, pay, choose a delivery method) your products or services through mobile	17.9	14.3	25	10.7	32.1

Source: authors' calculations based on survey data

29.8% of entrepreneurs consider the availability of IT infrastructure to be a factor that strongly or very strongly influences the development of the mobile economy. 27.3% of entrepreneurs believe that the level and quality of IT infrastructure strongly or very strongly influence the use of mobile devices. It has been established that, according to entrepreneurs, the most significant impact on the development of the mobile economy in Latvia is attributed to the consequences of EU sanctions related to the military actions in Ukraine: 25% of entrepreneurs assess the impact of this factor as strong or very strong. For 23.8% of entrepreneurs, the direct military actions taking place in Ukraine have a similar level of impact. According to 26.2% of entrepreneurs, the level of digital literacy among the population has a strong or very strong influence on the development of the mobile economy in Latvia. A total of 25% of entrepreneurs believe that the ability to adapt to new conditions of corporate structures and the restructuring of business models and management paradigms for new conditions (21.4%) are strong or very strong factors in the development of the mobile economy. The quality and quantity of IT specialists also have a strong or very strong influence on the development of Latvia's mobile economy, according to 25% and 21.3% of entrepreneurs, respectively. Only 14.3% of the respondents believe that public awareness has a strong influence on the development of the mobile economy.

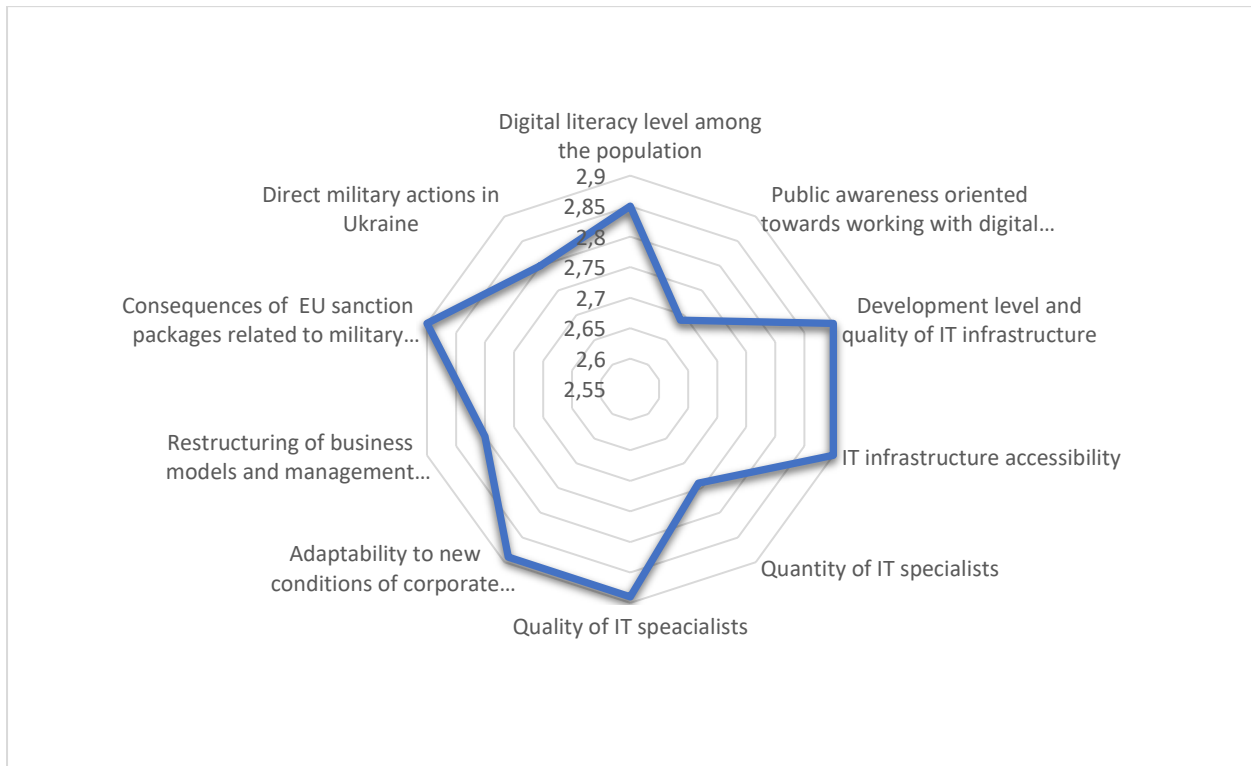


Figure 2. Types of activities of the enterprises under survey. Factors contributing to the development and use of the mobile economy in Latvia

Source: authors' calculations based on survey data

According to the averaged values of the degree of influence of factors contributing to the development of the mobile economy in Latvia, it has been established the following: the factors that have the greatest impact on the mobile economy development in Latvia are the level of development and quality of IT infrastructure, its accessibility, the quality of IT specialists, adaptability to new conditions of corporate structures, and the consequences of EU sanction packages related to military actions in Ukraine. According to entrepreneurs, factors such as public awareness oriented towards working with digital assets rather than physical ones, the quantity of IT specialists, the restructuring of business models and management paradigms for new conditions, and the direct military actions in Ukraine have a much lesser influence on the mobile economy development.

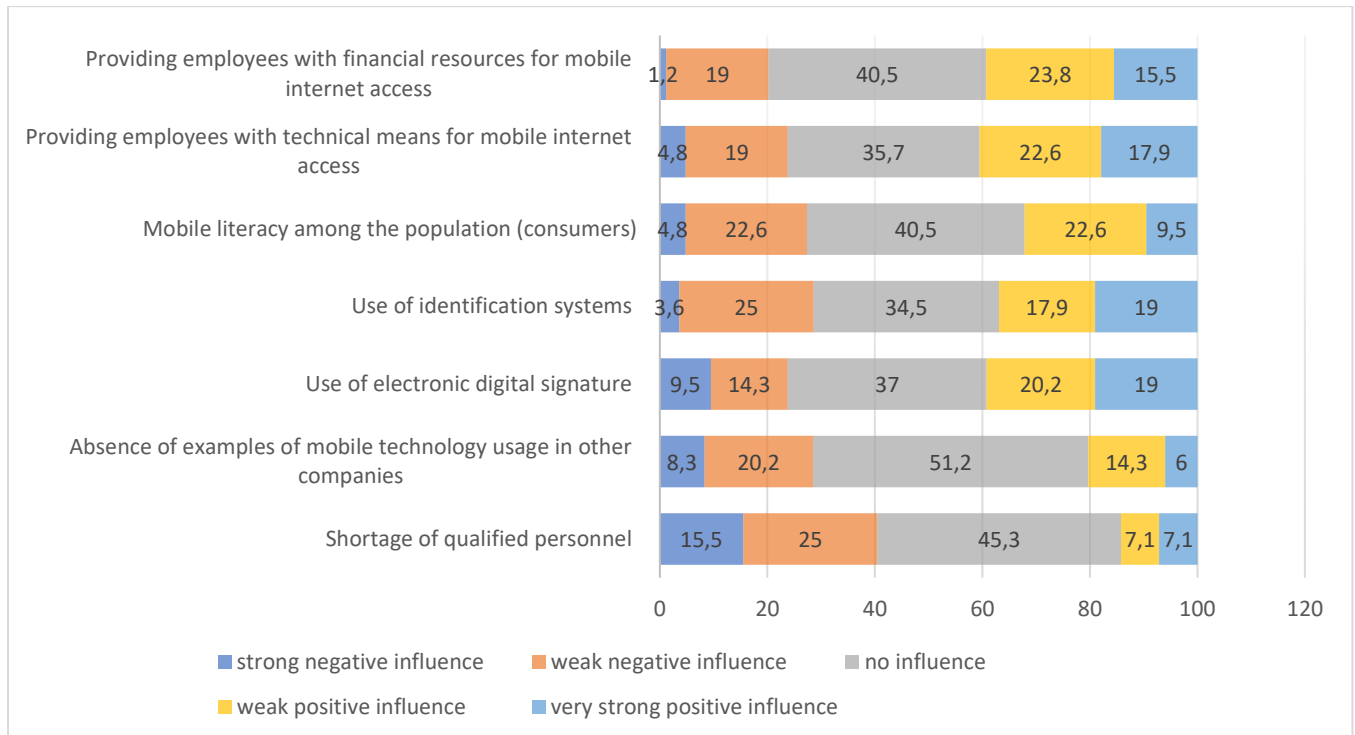


Figure 3. Factors influencing the intensity of mobile technology implementation at surveyed enterprises in the context of digitization in recent years

Source: authors' calculations based on survey data

When assessing the factors influencing the intensity of mobile technology implementation at enterprises in the context of digitization in recent years, it has been found that 19% of respondents believe that the use of identification systems and electronic digital signatures has a very strong influence on the development of mobile technologies; 17.9% consider providing employees with technical means for mobile internet access to be a significant factor; 15.5% of the respondents agree that providing employees with financial resources for mobile internet access contributes to the development of mobile technologies. Certainly, the level of mobile literacy among the population (consumers) has a certain influence according to 9.5% of respondents. However, the most significant negative impact is the shortage of qualified personnel (15.5%) (see Fig.3).

According to the survey results, it has been established that in recent years 53.2% of specialists in mobile platforms, 52.4% of top-level executives, as well as 50% of professionals with various qualifications in the business sector have started using mobile technologies and devices more frequently (see Fig.4).

The usage of mobile technologies has remained the same for 50% of remote monitoring specialists, 56.6% of mobile application developers and testers, and 57% of copywriters. This is likely because these specialists have always been using mobile technologies very intensively. At the same time, 15.8% of web designers, 12.7% of copywriters, 10.7% of accountants, and 10.8% of mobile application security specialists have reduced their usage of mobile technologies.

However, the larger the enterprise is in terms of the number of employees, the more likely it is that senior executives, professionals of various qualifications in the business sector, mid-level and lower-level managers, financial department specialists, IT specialists (all types), specifically, mobile application developers and testers, mobile platform specialists, back-office support specialists for mobile applications, and remote monitoring specialists have increased their usage of mobile technologies in recent years.

Certainly, at larger enterprises with more employees, the usage of mobile technologies tends to be higher among senior executives (Spearman coefficient 0.193, p-value=0.002), professionals of various qualifications in the business sector (Spearman coefficient 0.183, p-value=0.003), mid-level and lower-level managers (Spearman

coefficient 0.275, p-value=0.000), financial department specialists (Spearman coefficient 0.262, p-value=0.000), IT specialists (all types) (Spearman coefficient 0.262, p-value=0.000), mobile application developers and testers (Spearman coefficient 0.216, p-value=0.001), mobile platform specialists (Spearman coefficient 0.212, p-value=0.001), back-office support specialists for mobile applications (Spearman coefficient 0.159, p-value=0.018), and remote monitoring specialists (Spearman coefficient 0.181, p-value=0.006).

The annual turnover only correlates with changes in the intensity of mobile technology usage among senior executives (Spearman coefficient 0.209, p-value=0.001), professionals of various qualifications in the business sector (Spearman coefficient 0.209, p-value=0.001), financial department specialists (Spearman coefficient 0.168, p-value=0.000), and equipment maintenance specialists (Spearman coefficient -0.143, p-value=0.028). Therefore, the number of employees is indeed a factor that promotes the usage of mobile technologies.

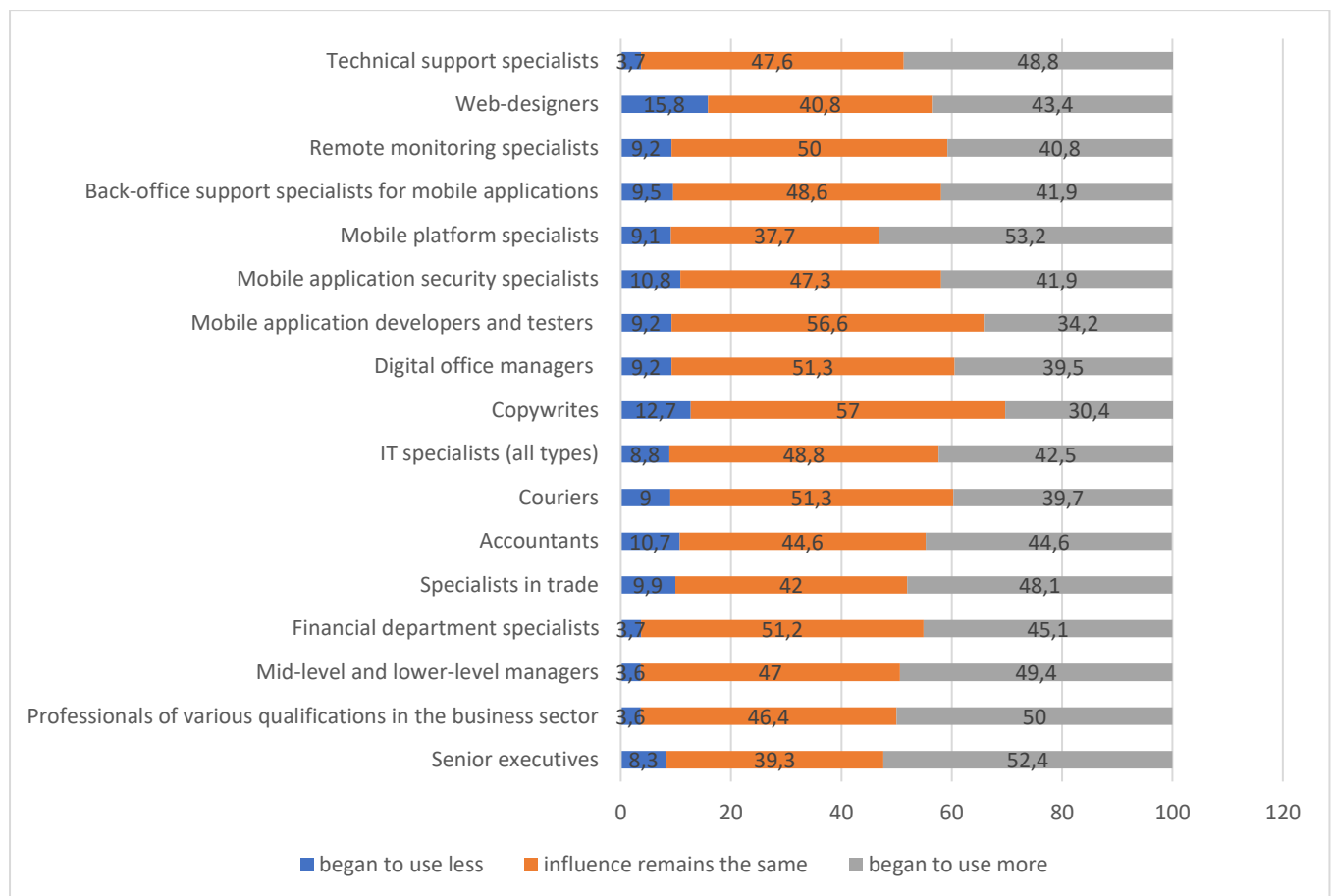


Figure 4. Has the usage of mobile technologies by employees changed in the context of digitization in recent years?

Source: authors' calculations based on survey data

The authors have also determined a positive linear relationship between the annual turnover of the enterprise and certain factors influencing the use of mobile technologies. The larger the turnover of the enterprise is, the more companies tend to experience a shortage of qualified personnel (Spearman coefficient 0.199, p-value=0.002) and the lack of examples of mobile technology usage at other companies (Spearman coefficient 0.278, p-value=0.000). The larger the annual turnover is, the more often electronic digital signatures (Spearman coefficient 0.350, p-value=0.000) and identification systems (Spearman coefficient 0.140, p-value=0.031) are used, as well as the provision of technical means for mobile internet access (Spearman coefficient 0.225, p-value=0.000) and financial resources for mobile internet access (Spearman coefficient 0.255, p-value=0.000).

Conclusions

The level and quality of informative and technological infrastructure in Latvia are important factors that show a positive impact on the development of the digital economy, since the country attempts to develop digitalization and make acceptable conditions in the IT sector.

The availability of IT infrastructure plays a key role, especially in terms of making access to the Internet and digital services available for a wide range of citizens. Qualification of IT specialists has an important role for the development of the digital economy in Latvia, since highly qualified specialists can stimulate the growth of innovation in the IT sector. The higher use of digital technologies among the entrepreneurs in the country, especially in the age of digitalization, adds to the accessibility of digital signatures, the availability of the technologies to access the Internet for the employers and employees and the availability of financial resources for the use of mobile Internet. The flexibility of corporate structures is also an important aspect, in order to quickly develop technology and to notice the changes on the market. The consequences of the sanctions made by the EU, due to the military actions taking place in Ukraine, have a limited impact on the digital economics of the country, yet it is important to mark the possible consequences for the economic stability and investment.

The level of digital literacy among the citizens is an important aspect, especially if we analyze it in the context of development of small and average enterprises in the country, since it showcases the ability to use digital technologies efficiently in their daily and work life. Higher digital literacy can lead to development of digital services and technology, which can lead to development of the digital economy. On the other hand, the deficit of qualified specialists can become a big disadvantage in terms of bringing technology into different economic sectors. Deficit of qualified specialists can slow down the digitalization and the growth of the digital economy. The quantity of employees in the enterprise is also a factor that needs to be looked into in terms of the use of digital technologies. In small and average enterprises, where they usually lack the quantity of employees, the integration of digital technologies can happen smoother and faster, which leads to the growth and effectiveness of the enterprise. The work that can be done in between small and average enterprises about the importance and advantages of the use of digital technologies can lead to active integration of these technologies in the workspace, which can help with the development of the digital economy in Latvia.

From the findings provided, it is evident that various factors influence the development of mobile economy and the use of mobile technology in entrepreneurship in a digitized economy. In the authors' opinion, innovation theory, human capital theory and theory of institutional change best explain these findings. Innovation theory explains the process of introduction and adoption of new technologies in society and business. In the context of this case study, it explains how such factors as the quality of IT infrastructure, availability of IT professionals, and adaptability to new enterprise environments can encourage or inhibit the adoption of mobile technologies at enterprises. Human capital theory focuses on the role of education, training, and employee competencies in the development and use of technology. In this context, employee skills and mobile literacy have an impact on the effective use of mobile technology at enterprises. The theory of institutional change helps to understand how laws and other institutional factors shape the context for the use of technology in business.

Therefore, based on the aspects studied in the research, innovation theory probably has a greater influence on the use of mobile technologies in entrepreneurship under the digitization of the Latvian economy, as it takes into account the process of adopting new technologies and the factors facilitating or hindering this process. However, human capital theory and institutional change theory also play an important role as they take into account resources and context required for successful adoption and use of mobile technologies.

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