Research into the use of digital technologies in business organisations across the North Eastern Region (NER)

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Abstract. The present paper attempts to provide a valuable insight into the introduction and implementation of digital technologies in the business organisations within the North Eastern Region (NER) of the Republic of Bulgaria. In view of this, the study was carefully structured around the following indicators and baselines: provision of a strategy for the use of digital technologies in the surveyed enterprises; the completed phase or stage of introduction of digital technologies within the respective enterprise; planned levels of investment and technology; evaluation of the potential effects of their efficient deployment. Drawn, accordingly, are several useful generalizations about the application of digital technologies in NER business organizations and devised is a set of possible alternative solutions as to their successful application and full implementation.

1. Introduction
Economic conditions, nowadays, are highly conducive to establishing digital technologies as one of the most crucial factors in the construction of an increasingly competitive regional and national economy. It should be, undoubtedly, acknowledged that they act as a powerful driving force behind the enhancement of entrepreneurship, innovations, economic growth and competitiveness of the business organisations. Digital economy presupposes a wide range of diverse activities, business models and technological solutions. Interconnecting technological development with the policies and models for digital economy development is of utmost importance as it affects all areas of the economy and public life [6]. The purpose of the proposed paper, therefore, is to examine the benefits that digital technologies bring to the business organisations in the North Eastern Region (NER) of the Republic of Bulgaria. Formulated, accordingly, will be various opportunities to encourage widespread use of digital technologies in NER business organizations.

An extensive survey was undertaken into the use of digital technologies in the business organizations across the region being examined. The survey covered 87 NER-based enterprises operating in different economic sectors. The majority of the companies contributing to the survey are small and medium-sized enterprises with about 12% falling under the category of large-sized companies. The vast inclusion of various branches of industry in the research study aims to build up the most complete picture of the level of digitalization, future expectations and the major challenges business in Bulgaria confronts in connection with the successful implementation of digital technologies.
2. Digital technologies in Bulgaria’s economy

As part of the European space, the digital transformation in Bulgaria is driven primarily by the exceedingly rapid growth of new technologies leading to unprecedented automation and digitisation of real production and business processes, as well as the emergence of qualitatively new market relationships to create added value. The preparation and construction of human, institutional and organisational capacities in the economy and society have a pivotal role in the careful planning and efficient management of that complex technological, economic and social process called digital transformation [9,10].

European Commission study conducted in 2019 into the integration of digital technology by enterprises ranked Bulgaria 28th, last among all member countries in its Digital Economy and Society Index (DESI) report [5,8]. This, undoubtedly, is attributable to the slow adoption of digital technologies by the businesses in the country. Despite the emergence of a gradually developing ecosystem formed by the interactions of digital and technological entrepreneurs in the past few years, the investments in the digitalisation of the economy remain relatively low and limited in scope. The insufficient investment size, along with the shortage of information and communication technology (ICT) specialists result in a much slower pace of the digitalization process in Bulgaria compared to other EU member states. Another reason is that Bulgarian enterprises are indeed experiencing difficulties in implementing digital technologies due to various other factors. The percentage of the Bulgarian population with basic digital skills amounts to 29 %, as against the average EU share of 57 %. Only 11% of the labour force has above-basic digital skills, representing less than one third of the EU average. Bulgaria is also well below the average level in the implementation of digital technologies in the management of the business processes [1,2]. According to the DESI Index, only 6% of all the enterprises in the country conduct sales through online commerce. Compared to Bulgaria, 17% of the enterprises in other EU Member States take advantage of the opportunity to provide online trading. Cross-border sales represent 3% of all the enterprises and only 2% of their turnover comes from online trading. Although the population intensively uses social media for personal use, only 9% of the enterprises benefit from them to promote their business activities. In the other EU member states, the average level of the use of digital technologies to promote products or services is 21%. Only 7.81% of the Bulgarian enterprises cored higher-level of digital intensity. Businesses that fall under this category build upon the use of social media for sharing electronic data interchange within the supply chain management arena; integrate enterprise resource planning (ERP) software packages; implement customer relationship management (CRM); online e-commerce sales that account for more than 1% of the total turnover and business-to-consumer online transactions (B2C) that are more than 10% of the total online sales [3,11].

3. Research into the integration of digital technologies in the business organisations within the Northeastern region

The North East region covers the Northern part of the Bulgarian Black Sea coast, part of the eastern part of the Stara Planina mountain range and stretching over the plain regions of Ludogorie and Dobrudja. The region consists of the districts of Varna, Dobrich, Shumen and Targovishte. It occupies 13.05% of the territory and comprises 13.1% of the population of the country. Located in its territory are 13.8 % of the enterprises in the country's non-financial sector, provides job opportunities to 11.7% of the employees, has acquired 12.6 % of the tangible fixed assets and realizes 10.8% of the country's non-financial sector revenues. The region has significant economic potential for business development and for attracting substantial foreign investments - a strategic geographical location, well-developed transport infrastructure and excellent natural conditions [4].

Bulgarian business strives to keep pace with the global trends and latest developments in the field of digital transformation and the opportunities it offers. The results of the study clearly show that the digitilisation is not an altogether new concept for the companies in Bulgaria, including those within NER.
A survey conducted among the managers of enterprises in NER reveals that 44.83% of them are fully aware, 26.44% - well aware, 21.84% - aware, 5.75% - partly aware and 1.14% - not aware with the concept of digital technologies. The high relative share of the manager’s greater awareness of the digital concept is ascribed mainly to public information sources. The social networking sites and media spaces constantly inform the society about the forthcoming processes of digitalization (fig. 1).

![Figure 1. Degree of managers’ awareness.](image)

Most managers agree that digitalisation can lead to significant benefits only when it is based on a long-term digital strategy as part of an overall business strategy, rather than a series of uncoordinated experiments. According to the survey responses, almost 2/3 of the businesses investigated claimed that they had a full (9%) or at least partial (53.9%) digital strategy. At the same time, one third of respondents admit that they do not have such a strategy (Fig.2).

![Figure 2. Relative share of the enterprises with a developed strategy for integration of digital technologies](image)
The results of the study also indicate that only 5% of NER enterprises pursue a long-term fully-fledged digital strategy exceeding a 10-year period. The majority of the companies tend to plan their actions strategically with regard to digitilization in the short and medium term – i.e. from 1 to 5 years or from 6 to 10 years, respectively.

![Figure 3. Stage of implementation of digital technologies in NER enterprises](image)

As illustrated by the data from Fig. 3, NER companies are at different stages of the deployment of digital technologies in their business operations. On the whole, the enterprises in the region have taken or are taking steps in that direction, with the vast majority of them still being in their initial or intermediate phase. In Fig. 3 the initial and intermediate phases range from 1 to 6 of the scale measuring the stages of digital technology implementation. A quarter or 25% of the surveyed indicated that they were at an advanced stage of implementation (stages 7, 8 and 9). None of the respondents indicated that they were at stage 10 of the process of digital technology implementation in the respective enterprise, i.e. at a very advanced stage.

![Figure 4. Planned investments in digital technologies over the next 5 years](image)
With regard to investments in digital technologies, a substantial proportion of the surveyed companies (40%) plan to invest on average between 2% and 3% of their turnover in such technologies. Slightly more than 15% are the enterprises planning investments in digital technologies within the scope of 7%-10% of their turnover, and less than 5% are the companies that intend to surpass that percentage (Fig. 4).

All in all, NER enterprises are becoming increasingly aware of the potential of digital technologies to support their businesses and are taking steps to their successful and timely implementation (Fig. 5).

The most represented technologies are the mobile applications and the Internet of Things where over one third of the respondents, 37% and 34%, respectively, stated they were in a relatively advanced or very advanced phase of technology integration. The results are also similar to cloud computing (30%). Yet, it should be emphasized that some of the available technologies such as blockchain and cyberphysical systems remain largely outside the scope of NER companies' interest in terms of their potential implementation.

As for the demand for new personnel and different skills, the survey shows that NER companies have considered the need for IT professionals in areas such as Industry 4.0/automation of production (43,4%), mobile application development (32,9%), large data set analysis and big data processing (32,9%), fig. 6.
Accordingly, such an extent of attention seems to be specifically devoted to strategic competencies related to the development and implementation of new business strategies, including the development of digital business models (40.8%) and digital marketing (46.1%).

The results of the survey imply that NER enterprises have a clear vision of what benefits they can expect from the full implementation digital technologies (fig.7).

The highest are the expectations they have for optimizing resources (78%), improving planning (78%), promoting competitiveness (9%) and enhancing data collection and analysis (76%). Improved service (86%), higher quality (79%), new business models (76%) and transparency of business processes (75%) are also among the main motivating forces steering businesses on their way to profound digital transformation. The lowest are the expectations of the companies in relation to the effects of digital technologies on increasing profits and reducing the overall environmental footprint,
with a significant proportion of respondents expressing considerable doubts as to their far-reaching effectiveness.

The research study conducted among NER enterprises proves that:
- NER enterprises recognize the potential of digital technologies for developing and expanding their businesses, with not more than a third of them admitting they do not have a complete and fully-developed digital strategy. The strategies themselves, as far as there are such, are, primarily, short and medium-term and centrally managed;
- Most of them appreciate the potential of digital technologies for optimised utilisation of the resources, automation of production, improved interaction with customers and suppliers, and greater integration the relevant processes. Meanwhile, the analyzed enterprises do not have very high expectations of increased profitability and reduced environmental footprint as a result of advanced digitilisation;
- They have a clear vision of the specific type of personnel they will demand for the nearest future. In addition to the technical and engineering professionals, additional focus is placed on experts with strategic competences such as the development and implementation of new business strategies, including the development of digital business models and digital marketing;
- The qualification of the employees and the size of the investments are serious impediments to the subsequent implementation of future digital technologies and technological processes.

4. Conclusion
Identified, on the basis of the research findings, are some opportunities, listed below, for increased utilization of digital technologies in NER business organisations:
- Overcoming regional disparities by encouraging investments in ICT infrastructure and technology;
- Implementing a strategically coordinated approach with the active participation of the relevant labour force to ensure proper updating of the programmes for acquisition of required digital skills at all levels and parts of the education system, further training and retraining of the employed and unemployed, the increase in the number of graduates in the field of science, technology, engineering and mathematics, the inclusion of employers in the vocational training, the reduction of the digital environmental impact;
- Promoting ICT application to the activities of the resource management, energy management, conservation and monitoring activities, environmental development, development of green and energy-efficient transport, increased mobility and others, that will bring significant economic opportunities.
- Research and innovation in the field of information and communication technologies should be supported by substantial long-term public financing provided by the National Scientific Research Fund and the National Innovation Fund, establishing dynamic centres of excellence and centres of competence, and encouraging increased participation in EU programmes. This is considered essential for the retention of the high-quality scientific resources in Bulgaria, for attracting and recruiting those who pursue a scientific career, and ensuring the conditions necessary for the scientific centres to keep abreast with the technological advances and cutting-edge research.
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