Digital competitiveness of Bulgarian enterprises – 2019

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Abstract. This paper examines the position of Bulgaria with respect to the Digital Economy and Society Index by analysing the following indicators: connectivity, human capital, use of Internet services, integration of digital technology and digital public services. Digital competitiveness of European Union member states has been measured by the Digital Economy and Society Index (DESI). The main barriers to the use of digital technologies and processes in Bulgarian enterprises have been identified on the basis of research.

1. Introduction

Essential characteristics of the industries of the future are human spirit, ingenuity and enterprise. Facing new dynamic business models and increasing competition in the respective market sectors, many industrial enterprises encounter the need of thorough reconsideration of their current strategies. Entrepreneurs are confronted with the challenge of building and developing digital enterprises to make their businesses sustainable and efficient in the forthcoming decades. Digitisation holds a key position in this scenario. Digital technologies and the opportunities they provide will be a key driver for development in an ever-increasingly digital future.

The term "digitisation" derives from the English word "digital" (which means "based on digits") and is referred to as the process of converting information from analogue source material (text, sound, videosignal, telephone and pulses) into a numerical format by means of electronic devices, i.e. converting analogue information into digital. This allows for digital environment processing, storage and transmission of information to users regardless of their location via computer networks, satellites, the Internet, social networks, etc.

Digitisation provides greater possibilities for integration, processing, structuring, categorization, usage and transmission of heterogeneous information flows and access to information on the global network to many users simultaneously without time limits.

Below is a summary of the current technological trends in digital transformation of business models [1]:

- Internet of Things (IoT);
- Blockchains;
- "Internet of Things (IoT)");
- "Blockchains;
• Big Data Calculations;
• Machine Learning.

The main goals of digitisation [2, 3] are:
• preservation of analogue information resources and their long-term storage in the form of
digital copies;
• provision of access to these digital copies through digital devices and networks;
• collection of digital copies in digital libraries.

The pillars of digital transformation are:
• thinking outside the box, i.e a digital way of thinking;
• a digital transformation company roadmap, i.e. a digital strategy;
• appropriate skills;
• technologies;
• evolution.

The impact of new technologies on production and business processes in Bulgarian industry
(Industry 4.0) [4] can be summarized as follows:
• Creation of new products and services with built-in intelligence, innovative business models and
opportunities to personalise and adapt them to customer needs.
• Digitisation of the entire production cycle; research and development acceleration through
digital prototyping and virtual production; flexible organisation of the manufacturing process.
• Miniaturisation as a trend in production of microchips, electronic devices, implants, etc.

2. Exposition

The study on the degree of digital competitiveness of Bulgarian enterprises has been carried out by
analysing and summarising data and information gathered by ICAP Agency for Market Research, the
European Commission, the German-Bulgarian Chamber of Commerce and Industry, EUROSTAT, etc.
The research is also based on data derived from a number of surveys, strategies, conclusions and work
guidelines from national and regional programmes.

The Digital Economy and Society Index (DESI) [5] tracks the evolution of EU member states in
digital competitiveness.

Although for the year 2017 Bulgaria has made progress in expanding its broadband infrastructure
and in developments with freely available data relevant to the previous year, it ranks 27th in the
Digital Economy and Society (DESI) Index Ranking for 2017. What is worse, in 2019 Bulgaria ranks
last (28th) among EU member states overall in the European Commission Index Ranking (Figure 1)
[5].

![Figure 1. Digital Economy and Society Index (DESI) 2019 ranking](image)
The DESI Index comprises five indicators: connectivity, human capital, use of Internet services, integration of digital technology and digital public services. Scoring one hundred points is the highest rating which means that a particular country takes utmost advantage of digital technologies for business and public development. The total score of Bulgaria is 36.2 compared to 35.5 for the previous year. The EU average is 52.5 compared to 49.8 for 2018. Bulgaria’s ranking is lower both due to the limited results in some of the reported DESI dimensions and the better performance of the other member states by some of DESI dimensions (Figure 2). In terms of the human capital dimension (with a score of 28.5 relevant to an EU average of 59.3) and the integration of digital technology dimension (with a score of 18.1 relevant to an EU average of 41.1), Bulgaria ranked 28th in 2019. Regarding the use of Internet services dimension the country ranked 27th (with a score of 32.5 relevant to an EU average of 53.4) and with respect to the connectivity dimension – 25th (with a score of 51.6 relevant to an EU average of 59.3). Bulgaria’s poor performance regarding digital skills, digitization of business and public services appears to be a hindrance to the further development of its digital economy and society. Thus, the country falls into the cluster of poor performing countries.

The connectivity profile of Bulgaria (Figure 3) shows that it lags behind among EU member states overall by the following indicators: fixed broadband take-up, 4G network coverage, fixed broadband coverage, broadband price index, ultrafast broadband take-up and fast broadband (NGA) coverage and that the country nearly reaches the EU average in terms of the fast broadband take-up, mobile broadband take-up and ultrafast broadband coverage indicators.
The human capital dimension (Figure 4) shows that by the Female ICT Specialists indicator only Bulgaria ranks 15th, thus reaching the EU average, while by the other indicators the country falls behind among the other EU member states, with an overall level of digital skills being among the lowest in the EU. The share of people having at least basic digital skills is approximately 29% relevant to an EU average of 57%. Only 54% of the young people aged between 16 and 24 have at least basic skills, while the EU average is 81%. The share of people with above basic digital skills amounts to 11% of the total number, which is less than one-third of the EU average of 31%.

![Figure 4. Human capital profile of Bulgaria](image)

Regarding the use of Internet services dimension Bulgaria has improved its performance, reaching a score of 32.5 compared to 29.9 for the previous year, but still falls below the EU average by this indicator. (Figure 5). The country stands well above the EU average in terms of video chatting, however. Bulgarian Internet users make the largest number of video calls and thus rank 1st among all EU Internet users. In terms of activity on social networks Bulgaria ranks 7th which is above the EU average as well. The percentage of Internet users reading news online (79%) is also close to the EU average (65%). On the other hand, Bulgarian Internet users are less interested in e-banking, shopping and selling online, doing online courses, video on demand, online consultations and voting.

![Figure 5. Use of Internet services](image)

With respect to the integration of digital technology dimension, Bulgaria scores 18.1, thus being well below the EU average score which is 41.1 for 2019. The country nearly reaches the EU average (Figure 6) in terms of big data sets (7% relevant to an EU average of 12%) and electronic information sharing (23% relevant to EU average of 34%), but it falls below the EU average by the rest of the
indicators. Bulgarian enterprises encounter significant difficulties in realising the potential of e-Commerce. Only 6% of all SMEs sell online; 3% of them realise cross-border sales and their e-Commerce turnover only amounts to 2%. Isolated 9% of Bulgarian enterprises use social media to promote their business relevant to an EU average of 21%.

According to data provided by Siemens and the German-Bulgarian Chamber of Commerce [6] the low level of digital maturity can be accounted for by certain key barriers encountered by Bulgarian enterprises which are as follows: inadequate personnel qualification (50%), amount of investment (46%), insufficient technology maturity (31.6%), other priorities (27.6%) and unclear economic benefits (23.7%) (Figure 7).

The analysis results show that digital transformation streamlines business processes, decision-making and interaction with value chain partners and end customers.

Digitization is not an unfamiliar concept for Bulgarian companies. However, while most enterprises in Bulgaria are aware of the digitization potential for development and expansion of their businesses, nearly a third of them admit that they do not have a comprehensive digital strategy.

Bulgarian enterprises haven’t yet reached an adequate level of digital maturity.

Bulgaria considerably lags behind relevant to the overall EU trend toward evolving digital society, and it is therefore necessary for the country to adopt specific measures and invest efforts to overcome the lag [7] and increase digital competitiveness of Bulgarian enterprises.

Digital transformation is a many-sided process that can bring benefits to enterprises in the following respects:

- Users – service improvement and creation of unique user experience.
- Operations – optimisation of business processes, improvement of work efficiency and decision-making process.
• Products – renovation of existing products and services, creation of new products and services and introduction of innovations.

Bulgaria lags behind the other EU member states in terms of fixed broadband take-up, ultrafast broadband take-up and 4G network coverage.

Bulgarian Internet users fall below the EU average in using Internet services, doing online courses, using professional social networks, e-banking, online professional consultations and voting, and have the lowest overall level of digital skills.

Bulgarian businesses encounter serious difficulties in realizing e-Commerce potential and do not exploit the social media potential to promote their business.

Inadequate personnel qualification, small amount of investment and insufficient technology maturity appear to be the key barriers faced by Bulgarian business to further integration of digital technology and processes.

3. Conclusion

Technological development is a natural reaction to the business pursuit of optimisation, i.e. growing more efficient, more productive, and more flexible. Digital transformation will have a positive impact on the efficiency and formation of competitive advantages for Bulgarian industrial enterprises. Digitisation is a prerequisite for gaining strategic advantages over competitors, opening up new markets and enabling businesses to become proactive.

Acknowledgements

The authors would like to thank the Research and Development Sector at the Technical University of Sofia for the financial support.

References

[1] Mihova T and Chukalov K 2019 *Digital business models in industrial enterprises* IOP Conference Series: Materials Science and Engineering, Volume 618, 2019 IOP Conf. Ser.: Mater. Sci. Eng. 618 012074 https://doi.org/10.1088/1757-899X/618/1/012074

[2] Zlatanova - Pazheva E and Shatarova D 2017 *Internet Marketing – Certain Types and New Trends*, In: Conference proceedings, Vol. I, of XV International Scientific Conference „Management and Engineering ‘17“, June 25-28 2017, Sozopol, pp. 275 – 284. ISSN 1310-3946, ISSN 1314-6327.

[3] Nikolova-Alexieva V and Angelova A 2018 *Opportunities For Raising The Entrepreneurial Culture A Factor For Competitiveness Of The Bulgarian Economy*, In: International Journal of Entrepreneurship and Small Business, Vol. 1, Issue 1, 2018, pp. 196 – 245. [online]. doi.org/10.1504/ijesb.2019.10014160.

[4] Gigova T and Nikolova-Alexieva V and Valeva K 2019 *Digital Transformation of Bulgarian Enterprises in the Conditions of Industry 4.0*, 2019 International Conference on Creative Business for Smart and Sustainable Growth (CREBUS), Sandanski, Bulgaria, 18-21 March 2019, INSPEC Accession Number: 18994760, INSPEC Accession Number: 18994760, DOI: 10.1109/CREBUS.2019.8840065

[5] European Commission 2019 *Digital Economy and Society Index (DESI) Country Report Bulgaria*, https://ec.europa.eu/digital-single-market/en/desi

[6] Siemens Bulgaria & Deutsch-Bulgariache Industrie – und Handelskammer 2018 *Study on the level of digitalization in Bulgaria*, Sofia, Bulgariach, https://bulgarien.ahk.de/fileadmin/AHK_Bulgarien/News/Digitalization_Survey_Bulgaria-BG.pdf

[7] Topleva S 2016 *Economic aspects of GM-foods: consumer perceptions of welfare*, 1901 – In: Scientific Journal L’Association ,,SEPIKE“, France, 2016, № 11. pp. 244 – 247. ISSN 2196-95312.