## Statistical Indicators for Measuring and Reporting the Digitalization of Small Enterprises

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**Abstract**

*The digitalization of enterprises is a process that enables them to adapt to the modern technological world. For small businesses, digital technologies are more difficult to implement and this makes them uncompetitive. The use of statistical indicators to measure and report digital transformation allows to assess the degree of digitalization at the national level and to reveal the factors that have a favorable and unfavorable influence on this process. The application of uniform criteria when conducting the sample survey in the European countries guarantees the comparability of the data. The article examines the unified indicators for measuring the digitization of small enterprises and, based on the information collected through the questionnaire, suggests other indicators that can provide more detailed information about the digital technologies used.*

*Keywords: statistical indicators, digitalization of enterprises, small enterprises, digital transformation*

*JEL Code: C0, O3*

### Introduction

More and more often, our daily life, including our working and free time, passes into a digital environment. This necessitates a change in the way of communication and implementation of various professional commitments. While the creation of digital skills and the digitalization of personal space, necessary for communication in free time, still depends mostly on desire and is not associated with large financial investments, the digitalization of business is now perceived as a necessity and a condition for increasing efficiency , which, however, is associated with the availability of greater resources. Digitalization can be seen as a process in which, through the use of digital technologies, existing activities in the work environment are changed, upgraded and improved, as well as new ones are created. Some of the advantages of enterprise digitalization are:

• optimization of existing activities;
• increasing the efficiency of employees;
• easier presentation of products and communication with customers;
• possibility of remote work;
• creation of new activities;
• flexible allocation of resources;
• cost reduction.

The continuous development of the digitization process also includes the use of newer technologies such as mobile applications, large database processing, cloud technologies, artificial intelligence, virtual reality and others that require greater investment. This is the reason why digitization remains beyond the reach of small businesses and this process is under-researched.

The object of the present study is small enterprises, and the subject of research is the process of digitization and its measurement and reporting through statistical indicators. Based on the survey of the National Statistical Institute, an attempt is made to construct new indicators for measuring the digitalization process in small enterprises, which will reveal its development in more detail.

### 1. Thesis statement and literature review

Companies are classified according to their size into four groups:

• micro-enterprises - with up to 10 employees;
• small enterprises - with 19 to 49 employees;
• medium enterprises – between 50 and 249 employees;
• large enterprises - with 250 and more employees.

In Bulgarian legislation, the definition of small enterprises is given in the Law onSmall and Medium Enterprises. According to Art. 3 of this law, small enterprises are those that have 1) an average number of employees less than 50, and 2) an annual turnover that does not exceed BGN 19,500,000 and/or an asset value that does not exceed BGN 19,500 BGN 000. When researching the digitization processes of small businesses, it is necessary to point out the main problem they face, which is the difficulty in financing. This problem is expressed through a lack of own funds and difficulties in obtaining loans due to the reluctance of banks to take risks. As a result, both Bulgarian and European statistics report that the uptake of digital technologies remains particularly low among small businesses. In order to speed up this process and ensure the competitiveness of small businesses, various programs are implemented that aim to stimulate the use of digital technologies in small businesses. More and more researchers are turning their interests to studying and measuring the relationship between digitization and the realization of better business results in order to support small businesses in making a digital transformation decision. In his research, Eller (Eller et al., 2020) concluded that digitization boosts the financial performance of small and medium-sized enterprises. Isensee (Isensee et al., 2020) examines the relationship between digitization and ecologically sustainable development, sharing the understanding that the desired end state of a fully sustainable, digitized business is unlikely to be achieved. Kilimis (Kilimis et al.,2019) investigates the impact of digitalization on enterprise resource planning (ERP) based on a survey of 50 small and medium-sized enterprises in Germany and on this basis analyzes the factors that influence the decision-making process for effective implementation of digital technologies. Lazarova (Lazarova, 2019) reveals the specifics of the digitization of accounting and the changes it leads to in this activity, but although this process in accounting began a long time ago through the use of software accounting products, the application of more modern digital technologies is still in initial phase. Guo (Guo et al., 2020) argues that digitization has the potential to help SMEs respond effectively to societal crises through the dynamic systems it creates. Any study of digitization implies its measurement through appropriate indicators. Kotarba (Kotarba, 2017) made an attempt to systematize indicators for measuring digitalization activities, but his interest was mainly focused on leading public and commercial indicators used to evaluate a digital process. Brodny (Brodny et al., 2022) researched and measured using statistical methods the level of digitization of small, medium and large enterprises in Central and Eastern Europe. Based on the measured level, it groups the observed countries into 4 groups – advanced level, medium level, weak level and very weak level. Bulgaria falls into the group of countries with a very low level of digitization, and this applies not only to small businesses, but also to medium and large ones.

## 2. Statistical indicators to measure digitization

The National Statistical Institute (NSI) conducts a sample statistical survey on the use of information and communication technologies and electronic commerce in the enterprise and is part of the European statistical program. It is conducted in all EU member states according to a uniform methodology and aims to provide reliable and comparable data.

The statistical indicators used by NSI are classified into three groups:

A. Internet use in enterprises:
- enterprises with Internet access in general and by types of connections;
- persons employed in the enterprise who use computers and who use the Internet;
- enterprises that have a website;
- enterprises that use social media;
- enterprises that use paid cloud computing services;
- enterprises that perform "big data" analysis.

B. E-commerce – businesses that sell goods and services on the Internet.

C. Use of Automated Data Exchange:
- enterprises that use software for resource management (ERP);

- businesses that use customer information management (CRM) software;
- businesses that send electronic invoices suitable for automated processing.

The indicators presented are relative values expressed in percentages. Regarding the indicators from the first group, it can be said that those that refer to the use of the Internet and computers express processes of digitization that started earlier. It is quite expected that the latest published data (10.12.2021) show that almost 100% of enterprises, regardless of their size, use the Internet and computers. The next two types of indicators are related to having a website and using social networks. These meters are associated with newer technologies and their values in small enterprises are almost twice as low as in large enterprises. Digitization processes, which are characterized by the maintenance of a website and the use of social networks, are not associated with the need for excessive resources, and probably the lower relative share in small enterprises is the result of the specificity of their activity, which does not require the use of these technologies. The indicator related to the presence of e-commerce assumes twice a smaller value for small enterprises compared to large ones, which can be related to the magnitude of the indicator for the presence of a website and explain the weaker use of this technology by small enterprises.
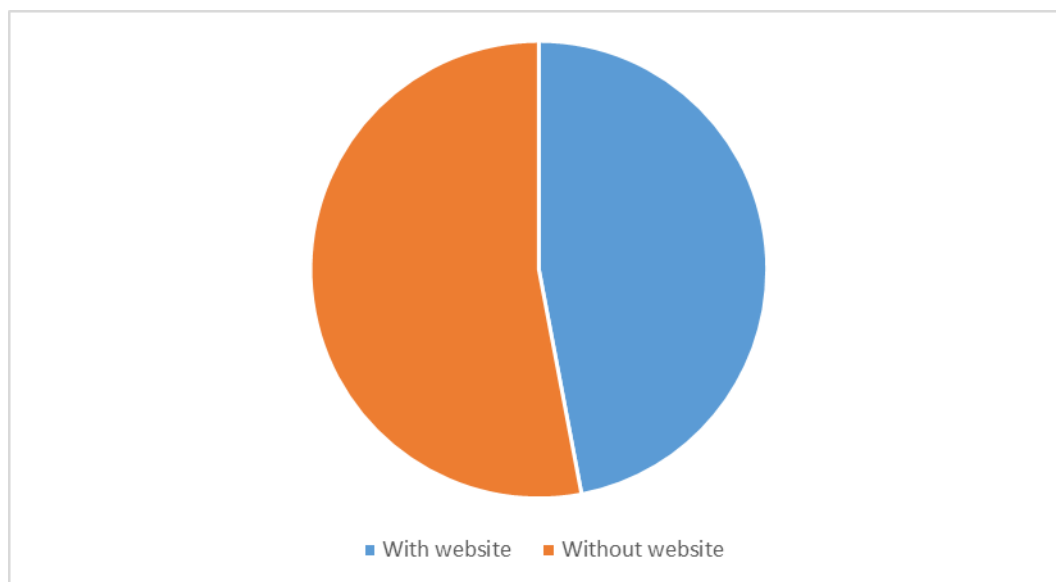


Figure 1. Structure of small businesses according to the presence of their own website in 2020
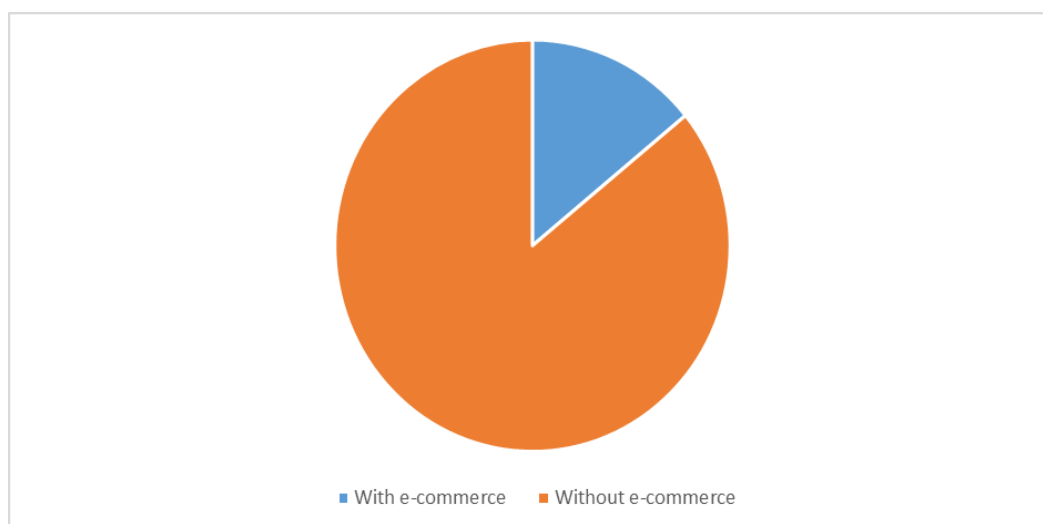


Figure 2. Structure of e-commerce small businesses in 2020

To measure the relationship between having one's own website and conducting e-commerce, the association correlation coefficient (Lambova et al., 2012) can be used, which is appropriate in cases where the observed signs are measured on the dichotomous scale.

Table 1. Number of small businesses by having a website and doing e-commerce in 2020

(Number)

| Availability and maintenance of own website | Conducting electronic commerce | |
|---|---|---|
| | Yes | No |
| Yes | 2084 | 12695 |
| No | 2350 | 14311 |

The correlation coefficient of the association is calculated using the formula:

$$r_{as.} = \frac{ad - bc}{ad + bc} = -0{,}12$$

The obtained value shows the existence of a weak dependence between the presence of one's own website and the performance of e-commerce among small enterprises.

Table 2. Relative share of businesses by having a website and using social media in 2021

(Percentages)

| | **Enterprises** | **Having a website** | **Use of social media** | **Conducting electronic commerce** |
|---|---|---|---|---|
| | **Total** | **51,9** | **38,9** | **11,8** |
| | **Enterprise size groups** | | | |
| **1** | 10-49 employed persons | 47,0 | 36,3 | 10,7 |
| **2** | 50-249 employed persons | 73,0 | 49,0 | 15,8 |
| **3** | 250 and more employed persons | 87,7 | 63,3 | 23,3 |

The last two indicators of the first group - relative share of enterprises that use a cloud service and that analyze "big data" are associated with the use of modern technologies, for which it is necessary to make greater costs. According to these two indicators, small enterprises are characterized by a four times lower relative share compared to large ones. The reason for the different degree of use of modern technologies by small and large enterprises is both the need for more resources and the smaller volume of work that does not imply the use of large data sets.

Table 3. Relative share of enterprises by using paid cloud computing services and performing big data analytics in 2021

(Percentages)

| | **Enterprises** | **Use of paid cloud computing services** | **Perform "big data" analysis** |
|---|---|---|---|
| | **Total** | **12,8** | **6,3** |

| | Enterprise size groups | | |
|---|---|---|---|
| 1 | 10-49 employed persons | 10,0 | 5,0 |
| 2 | 50-249 employed persons | 22,6 | 10,7 |
| 3 | 250 and more employed persons | 44,6 | 21,4 |

Indicators included in the last group are usually associated with a larger volume of actvity and a larger staff. Quite naturally, their values in small enterprises are significantly smaller than those in large, even medium-sized enterprises.

Table 4. Relative share of enterprises according to the use of automated data exchange for 2021

(Percentages)

| | Enterprises | Use of ERP software | Use of CRM software | Sending electronic invoices for automated processing |
|---|---|---|---|---|
| | **Total** | **21,8** | **16,9** | **10,0** |
| | **Enterprise size groups** | | | |
| 1 | 10-49 employed persons | 17,1 | 14,3 | 8,9 |
| 2 | 50-249 employed persons | 40,1 | 27,9 | 13,8 |
| 3 | 250 and more employed persons | 65,2 | 34,8 | 24,2 |

From the comparative characterization of the indicators measuring digitization in small and large enterprises, it can be concluded that the most accessible and most used digital technologies by small enterprises are the use of a computer and the Internet. The weak development of the digitization of small enterprises, which is established in other countries, is also characteristic of Bulgaria. Slower development of digital transformation processes in small businesses leads to slower growth and lower efficiency. Considering that the business environment in Bulgaria consists mainly of small and medium-sized enterprises, this gives rise to negative expectations about their ability to respond to new challenges and adapt to the rapidly developing digital world. It is also necessary to pay attention to the relative share of enterprises using a certain digital technology in the country as a whole, regardless of their size. The highest relative share of enterprises owning a website is 51.9%, and the lowest is the relative share of enterprises performing "big data" analysis - only 6.3%. These low levels of use of digital technologies define a lagging role of Bulgaria, which is mainly due to the structure of enterprises according to their size, in which small and medium-sized enterprises predominate. Other factors that can have an impact are the financial security of the enterprises; presence or absence of programs supporting the digitization of SMEs; established regulatory framework; trained specialists to support and use digital technologies and others.

**3. Possibilities for more complete use of the information collected through the survey**
The survey form used by NSI to measure the degree of digitization of enterprises provides larger and more detailed information, which allows to calculate other indicators that can reveal

more characteristics of small enterprises using digital technologies. as well as factors having a positive or negative impact on the digital transformation process.

A. Regarding e-commerce and having a website.

• Relative share of small businesses with their own website or e-commerce application among those that do so.

The proposed indicator reveals the security of small businesses selling over the Internet with an e-commerce website/application. The assumption is that the indicator has a higher value than the one calculated based on the total number of small enterprises. It reveals the use of this digital technology where it is most needed. In this sense, the indicator used by NSI can be considered as a general coefficient, and the one proposed in this article - as a specific one. This meter can be further detailed according to the functionalities that the website has – product description, price lists, online orders or reservations, product design capability, order tracking, status check, personal profile for regular visitors and others.

• Relative share of internet sales in Bulgaria made by small businesses and relative share of internet sales outside Bulgaria made by small businesses. The proposed indicators give an idea of where electronic sales are predominantly carried out - inside or outside the country.

B. Regarding the Use of Artificial Intelligence.

• Relative share of small businesses using artificial intelligence for a relevant purpose compared to the total number of small businesses using artificial intelligence. The calculated relative values reveal the purpose for which artificial intelligence is most often applied. The objectives included in the questionnaire correspond to certain activities carried out in small enterprises. These are:

- marketing or sales;
- production processes;
- organization of business processes;
- enterprise management;
- logistics;
- security of information and communication technologies;
- human resources management or recruitment.

• Relative share of enterprises using artificial intelligence according to the method of its acquisition. The proposed indicator makes it possible to determine the most used way of acquiring the software or systems with artificial intelligence. In this way, it is possible to determine the potential small enterprises that can most easily and quickly implement this digital technology in their activities. The way of acquiring artificial intelligence with the largest relative share can be perceived as a prerequisite favoring the digitalization process. The ways to acquire artificial intelligence included in the questionnaire can generally be classified as:

- software or system developed by employees of the enterprise;
- purchased software or ready-to-use system;
- software or system developed by an external supplier.

• Relative share of small businesses that do not use artificial intelligence according to reasons for doing so. Factors that slow down or hinder the digitization process are determined through these statistical quantities. Recognizing and studying the factors negatively influencing the digital transformation of small businesses can be used in the development of programs and policies aimed at encouraging and supporting the introduction of digital technologies in the activities of small businesses. The questionnaire used in the sample survey includes the following reasons for not using artificial intelligence:

- too high costs;
- lack of appropriate expertise in this area;
- incompatibility with existing systems, equipment or software;
- difficulties with the availability or quality of the necessary data;

- concerns regarding breach of confidentiality and protection of personal data;
- lack of clarity mainly the legal consequences in case of damage;
- ethical considerations;
- artificial intelligence technologies do not benefit the enterprise.

**Conclusion**

Digitization is gradually covering the world around us, entering our daily life and work environment. The use of digital technologies facilitates the life and work of people, provides an opportunity for quick access to information. Over time, the competitiveness of companies is increasingly linked to the degree of digitization and the use of modern digital technologies. Enterprises in Bulgaria lag behind in the development of these processes. The predominant share of small enterprises does not imply the formation of expectations for a rapid digital transformation. Regular research is needed, which, on the one hand, will reveal the factors that have the greatest impact on the digitalization process, and on the other hand, support and help small businesses in the introduction and use of digital technologies.

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