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INTEGRATION OF DIGITAL TECHNOLOGIES vs SMALL AND MEDIUM-SIZED ENTERPRISES' SIZE

This paper presents an overview of a part of the research performed in order to define the possible interconnection between the integration of digital technologies and the size of small and medium-sized enterprises. The research covered 226 enterprises of different sizes and different areas of doing business. The businesses are located in three countries, Russia, Serbia, and Slovakia. After presenting the methodology of the research, there are shown the results of the research obtained using this methodology. One research question supported by appropriate hypotheses, null and alternative, is discussed. Based on the research, it was established that there is a correlation between the size of SMEs and the level of integration of digital technologies. This work can usefully serve anyone involved in the digitization of SMEs and/or in the re-engineering of SMEs' business processes.

Keywords: digitalization; SME; Internet; IDSME index; business process; reengineering.

1 INTRODUCTION

In the last decade of the XX century, and at the beginning of this century, the entrepreneurship and the micro, small and medium-sized enterprises (SMEs) have appeared as possible ways of survival for many people. The small, legal entities with precisely defined goals can be established with small investments. They can successfully operate, but in case of their failure, there will be no major earthquakes. The next good fact is that SMEs can quickly adapt to new business conditions. But, their size often can cause problems because of their limited resources, both, the material and human resources. SMEs are discussed in a number of literary sources, such as, for example, [1], [2], [3], etc, and we will not deal with this topic here.

Considering available data, the current level of technology and trends in development, and the importance of SMEs, and bearing in mind the ubiquity of information technologies, digitization is imposed as an undeniable influence on the functioning of SMEs. To make it easier to see the impact the digitalization has on economies, many indexes have been created such as DESI - Digital Economy and Society Index [4], I-DESI International Digital Economy Index [5], EDI - Enabling Digitalization Index [6], GCI - Global Connectivity Index [7], but the area of SMEs remained neglected. There was no indicator focused on SMEs. In order to alleviate this deficiency, we created a new index, the Index of Digitization of SMEs (IDSME).

2 INDEX OF DIGITIZATION OF SMES (IDSME)

The IDSME index represents a contribution to the exploration of the impact of digitalization on individual SMEs and allows SMEs to carry out self-evaluation and determine to what level it is digitalized and on what SME needs to pay attention to its development plans. IDSME can measure the progress of SMEs in the digitalization

process. As such, it brings a combination of relevant indicators weighted within sub-dimensions and dimensions.

The IDSME index allows four main types of analyses [8]:

- Overall Impact Assessment: to achieve the general performance characteristics of individual SMEs by observing their overall index and results of the main dimensions of the index.
- Zooming: to identify areas where the performance of SMEs could be improved by analyzing the results of the sub-dimensions of the index and the individual indicators.
- Tracking: to assess if there is progress over time.
- Comparative analysis: to compare the successes of SMEs according to index results, comparing SMEs in similar activities to identify the need to improve the business environment.

The structure of the IDSME index is explained in detail in [8] and [9], so only the part that relates to this research will be presented here, in Table 1.

Table 1

The structure of IDSME dimension Integration of digital technologies

Sub-dimension	Indicator	Criterion	min	max
3a. Use of digital technologies (w=50%)	3a1. Possession of an own website	Possession of an active website	0	1
	3a2. Possession of an or more accounts on social networks	Possession of an or more active accounts on social networks	0	1
	3a3. Keeping records electronically	Possession of dedicated software	0	1
	3a4. Using of B2B e-business models	Internet activities in the last three months	0	1
	3a5. Using of B2G e-business models	Internet activities in the last year	0	1
	3a6. Using cloud computing	Possession of an active Cloud account	0	1
	3a7. Using some decision support tool	Possession of dedicated software	0	1
	3a8. Using automation	Possession of equipment	0	1
3b. Electronic commerce (w=50%)	3b1. Online selling	Sales made online	0	1
	3b2. E-commerce turnover	% of the total turnover	0	33
	3b3. Cross-border online sales	% of the total turnover	0	25

Source: [9]

3 RESEARCH

This research was conducted on SMEs in Russia, Slovakia, and Serbia. The aim was to measure the significance of the digitization of business processes to SMEs individually and globally. In this paper, the accent is placed on the dimension of the *Integration of digital technologies in SMEs*.

3.1 Methodology

This research is exploratory with elements of explanatory and descriptive. The research used an empirical method as an analytical method that enables reliable conclusions on the interdependence of certain observed elements and trends in individual phenomena. The statistical analysis covered the relevant data that enabled the detection of the rules in mass events covered by this analysis. In doing so, one should be aware that the statistics are not almighty and that the results obtained should always be accepted with the reserve. The statistically obtained results give a quantitative determination of some phenomenon, but not qualitative. The qualitative determination is obtained by the induction method. The conclusions were obtained from the individual to the general. We tried to be objective in the conclusions, but we are sure they can depend on the one who performs the analysis.

The research was carried out by checking hypotheses. Hypotheses have been tested on the basis of relevant data using modern mathematical tools in the following way [9]:

1. Defining the boundary of significance;
2. Writing hypotheses, zero and alternative;
3. Selection of sample or samples, and calculation of parameters;
4. Determination of the limits of rejecting the zero hypotheses;
5. Determining whether the zero hypotheses can be rejected; and
6. Defining and presenting conclusions according to tested hypotheses.

3.2 Normalization, weighting, and aggregation

Based on the structure shown in Table 1, it is seen that IDSME's dimension "Integration of digital technologies" is composed of sub-dimensions and that the sub-dimensions include many indicators. In order to obtain useful results, it is necessary to normalize the indicators and weighting of the indicators and sub-dimensions. To determine the value of the "Integration of digital technologies", we need also to carry out the weighting of sub-dimensions, and the normalization of indicators. The normalization was performed using the min-max method by the linear projection of each indicator and sub-dimension on a scale in the range 0 to 1. The zero corresponds to the minimum value and one to the maximum value. The criteria and limit values of the indicators are shown in Table 1, the last three columns.

The aggregation of indicators in IDSME dimensions was done on the way that the indicators were aggregated into the sub-dimensions (step 1), and then the weighted values of the sub-dimensions were aggregated into dimension (step 2) as follows:

$$C_3 = 0,5 \cdot C'_{3a} + 0,5 \cdot C'_{3b}$$

3.3 Sample

In this research, E-mails with the survey forms were sent to 847 addresses in Serbia, Russia, and Slovakia. E-mail surveys provided the opportunity to fill in the poll online or to return the completed form to the sender's address. Respondents were given the opportunity to fill in the survey anonymously. A total of 236 filled forms with useful answers were obtained. The response rate in the survey was 27.98% which can be considered as an excellent response since the survey was voluntary and unpaid. Nevertheless, it should be noted that the survey was supported by the Institute of Humanities in St. Petersburg, the Maykop State Technological University in Maykop, both from the Russian Federation and the School of Economics and Public Administration in Bratislava, Slovakia. The research in Serbia was conducted with the help of the Serbian Chamber of Commerce in Belgrade.

3.4 Integration of digital technologies

IDSME dimension, the Integration of digital technologies focuses on the degree to which SMEs are ready to use digital technologies in their doing business regardless they are used on the Internet, or they are part of the intranet or even they are used on individual computers. Therefore, the dimension is divided into two sub-dimensions [9]:

- The "Use of Digital Technologies" sub-dimension consists of eight indicators that indicate whether the SME has its own website, social network accounts, whether it keeps its records electronically, and uses B2B and B2G business models, cloud computing, tools for decision support, and automation.
- The "Electronic commerce" sub-dimension includes online selling; e-commerce turnover; and cross-border online sales.

Before calculating the value of the dimension *Integration of digital technologies*, it was established that this dimension is normally distributed.

During the research, a research question was raised: What is the relationship between the size of SMEs and the integration of digital technologies in SMEs expressed through the dimension "Integration of digital technologies" of the IDSME index?

To investigate this relationship in the survey, questions were asked about the indicators shown in Table 1.

The null hypothesis for the research question was set in the form of:

H₀: There is no relationship between the size of SMEs and the integration of digital technologies into their business expressed through the dimension *Integration of digital technologies* of the IDSME index.

The alternative hypothesis for the research question was set in the form of:

H₁: There is a relationship between the size of SMEs and the integration of digital technologies into their business expressed through the dimension *Integration of digital technologies* of the IDSME index.

Based on the results of the survey, the null hypothesis was verified by the MS Excel program's data analysis tool Regression. Results of statistical data processing for the relationship between the size of SMEs and their ability to integrate the digital technologies expressed through the dimension "Connection to the Internet" of the IDSME Index are shown in Table 2.

Table 2

The relationship between the size of SMEs and their ability to integrate the digital technologies

Regression Statistics						
Multiple R	0.1923787					
R Square	0.0370096					
Adjusted R Square	0.0327105					
Standard Error	0.0832528					
Observations	226					
ANOVA						
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	
Regression	1	0.05967	0.05967	8.608745	0.003693516	
Residual	224	1.55255	0.00693			
Total	225	1.61222				
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	0.170254	0.00683	24.94064	0.000000	0.156802	0.183706
X Variable 1	0.000258	0.00009	2.93407	0.003694	0.000085	0.000431

The obtained results for the Pearson coefficient $\rho = 0.192379$ and the p-value less than 0.05, they reject the null hypothesis that there is no correlation between the size of SMEs and the integration of digital technologies into their business expressed through the dimension "Integration of digital technologies" of the IDSME 2018 index. The correlation is at a level of poor correlation.

4 CONCLUSIONS

The research has shown that the digitalization process is in an unstoppable rise and that most of the SMEs follow this trend in the hope that they will be able to exploit its potential. The IDSME index has proven as a tool that allows SMEs to see their achievements in the field of digitalization, as well as the way forward. The size of SME affects the level of integration of digital technologies into the company's business.

The expected introduction of 5G networks will open new opportunities for the business and development of SMEs. Also, it will influence the change of existing

criteria in relation to IDSME index indicators. However, this will not be a limiting factor for the implementation of the IDSME index.

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