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## **EDUCATION AND EMPLOYEE DIGITAL SKILLS IN DIGITIZED SOCIETY - SMES CASE**

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**Abstract:** *At the time of digitization of business processes, education becomes very important. It does not only mean acquiring skills in programming and using computers but also acquiring manager skills to do business in a new environment. These skills are very important potential for gaining competitive advantage. Related to education SMEs can find themselves as users or as service providers. Much more often is the first case and it is analyzed in detail as a basis for the progress of SMEs. 226 SMEs from Serbia, Slovakia, and Russia were analyzed. Their ability to take advantage of IT was evaluated. As the first criterion for the digital skills dimension, the number of SMEs in the sample with employees with university education in the field of technical or economic sciences has been adopted. The results have shown that about three-quarters of SMEs have at least one employee who has completed technical or faculty in economic sciences. Less than one half have at least one employed STEM graduate. As expected, the largest percentage was achieved by medium-sized companies, and the share of SMEs with IT experts corresponded to the size of SME. As indicators were considered the share of employees who completed high school in IT, the share of engaged in programming, whether SMEs have organized IT trainings in the last three years and whether they plan them in the next year. Different types of education for SMEs needs were analyzed.*

### **INTRODUCTION**

In modern society, created under the influence of the Information Revolution, the massive use of computers and telecommunications has led to and leads to turbulent and hardly foreseeable changes in all areas. Globalization affects the increased flow of information and goods. While there are virtually no borders in the area of information flow, boundaries are obstacles in the physical transport of goods and the tendency is to abolish or reduce them.

Transport infrastructure is mainly within the competence of a state that independently or in cooperation with other investors builds and maintains roads and railroads. However, SMEs can be engaged in the transport of goods in domestic and international transport where there are many jobs that are offered to subcontractors and partners, primarily SMEs. SMEs

can also be involved in the transportation of people in urban, suburban, intercity and international traffic.

In the digitalization of business processes, SMEs should, first, identify the category of their business process. In distribution and logistics, transport and delivery, warehousing and order processing are the most important.

The announcement of 5G mobile communications will strongly stimulate IoT and IIoT in the area of smart services and logistics (smart supply chains, transport including air transport, telecommunication networks, drones, financial services and the like). These SMEs will undoubtedly take over many functions.

Based on the analysis of a survey conducted on a sample of 600 company managers involved in supply chains [1], 41% have already used IoT solutions, and 87% are looking for ways to extend the use of IoT. 69% of respondents expected the return of the investment within two years, 21% in the third year, and 10% for more than three years. From the same surveyed group, 59% of respondents used IoT for real-time alarm and control purposes, and 41% for business optimization and prediction. The same research showed that 61% of the respondents analyzed less than one-half of the data collected. This unambiguously shows that companies are not yet ready for the efficient use of IoT. Some due to high data management costs (31%), and others because of hardware prices (26%). [2].

According to the research of Infosys and the Institute of Industrial Management of the University of Aachen, 85% of the world manufacturing companies are aware that different ways of using fixed assets are not equally effective, but only 15% of the group applies adequate measures systemically. [3] Only large companies such as IBM, Bosch, General Electric, or Intel, carried out activities to collect information in real-time on asset efficiency and simultaneously dealt with the analytics. The goal of monitoring the fixed assets is that the company can in real time maintain them, optimize logistics, maintenance quality and detect possible thefts' attempts. Such example, applied in one Serbian SME, designed to protect against theft of fuel, is presented in [4]. IoT and block models allow companies to be pro-active and to implement maintenance and supply in the same way as in aviation. In this way, the company can reduce the costs of maintaining machines and transportation means, including supply, reducing the number of spare parts in the warehouses and planning the maintenance capacities. The use of RFID sensors in warehouses (and large stores) makes the inventory easy and even gives the stock status in real time, as shown in [5].

The use of sensors, cameras and data analysis allows managers to predict when a part will become unusable and when it needs to be replaced to avoid failure. In this way, IoT systems can either give warning alerts about the close appearance of malfunction or even define the schedule of maintenance of individual parts of the equipment or machines. Individual maintenance functions can be activated automatically. This approach can generate significant savings, as maintenance activities will come at the right time. The safety of the entire plant will be increased, and the number of accidents will be reduced. [3] In addition to this, there are also cases of application of temperature sensors in the IoT for monitoring the temperature of shipments in cooling chambers, containers for multimodal transport, which can control the correct operation of the container. Other, inert sensors are in use to provide insight into the handling and quality of the transport of sensitive parts of the equipment.

At the strategic level, business digitalization enables the formation of various forms of dynamic capabilities suitable for turbulent environments [6] [7], which are crucial for the survival and growth of each SME. Increasing customer interaction and cooperation and engaging vendors in e-business activities improve procurement, production and sales processes, as well as logistic services that support globally related business.

## **SMEs AND EDUCATION**

In times of rapid change in the business environment, education, and above all education in the digital field, takes a very important place. Digital education does not just involve acquiring skills in programming and using computers, but also acquiring skills to

manage in a digital environment. These skills of SME managers are a very important potential for gaining competitive advantage.

SMEs in relation to education can find themselves in two roles, as users of education system services or as active participants in the education system, as service providers. Much more often is the first case.

Candidates for employment in SMEs and entrepreneurs can acquire their education in various ways, traditionally, through college and university studies, or through various courses and training. What kind of education will be used very often depends on the specific case, but in any case, education should:

1. train managers to develop their managerial role, which would allow them to:
  - a. develop their abilities to animate the community and to master social networks in the animation of the team (digital leadership) [8]. This results in a modification of the leadership style, which was previously based on keeping and providing information, and in the future will aim to create a consensus. Although this looks like a utopia, it is still inevitable, since today an individual cannot follow numerous changes in different areas;
  - b. to integrate into their managerial behavior the speed of accepting change;
  - c. to achieve the autonomy of employees instead of delegating authority;
  - d. to strengthen the role of managers in transformation support;
2. to find the right balance between traditional hierarchical management, cross-functional management, and teaching depending on the nature of the team's activities as a whole and people individually [8].

In a research report by Harland, Straw, Stevens, and Dawson [9], the authors focused on STEM experts and concluded that SMEs had a desire to deal with education for their own needs and for the needs of others, but very often they do not know how to carry it out. That is why they need support and raising awareness about the opportunities they can find in the field of education.

They also concluded that the size of SMEs has a positive impact on engagement in the sphere of education and that smaller companies need more help. Smaller SMEs are inclined to engage in education ad hoc and, as needed, in a narrow area, so their views are narrower. As the main opportunities for involving SMEs in STEM education, the authors saw in:

- ◆ connecting with universities and colleges;
  - ◆ offering jobs for student practice; and
  - ◆ engaging in different programs and practices.
- As the main benefits of education, research has highlighted:
- ◆ improving skills and long-term employment;
  - ◆ professional development of personnel;
  - ◆ promoting a positive image of business;
  - ◆ capitalizing the ideas of young people and their skills and productivity;
  - ◆ possibility of direct employment in SMEs; and
  - ◆ personal pleasure, enjoyment in the work, and motivation of employees.

The main challenges for SMEs are primarily in terms of time, capacity and financial constraints, but also low awareness and poor understanding of how to connect with education. However, SMEs are not always the reason for their small share in education. The lack of commitment and interest of schools and students for engaging in industry, bureaucracy, health and safety constraints, lack of confidence, lack of young people, and many other factors also appear as additional influences.

As a summary, it could be said that SMEs with a higher degree of interaction with education are more stable in business than SMEs that are not connected or are at a low level of integration with education.

Similar conclusions came from Ileana Hamburg [10], who dealt with education for the needs of young entrepreneurs through mentoring. She highlighted mentoring as one of the older ways of training workers in Europe and gave a description of a model that could function within SMEs. However, from our point of view, it is unlikely that employees in SMEs will be able to provide adequate mentoring in conditions where they struggle for survival (or increase) in the market. Therefore, it is more likely that SMEs will accept students as free (or low paid) workforce and that the actual effects of knowledge transfer will be lower than expected.

The lack of utilization of advanced solutions such as ICT, advanced production methods, modern materials, genetics and the like, including the new models of the organization of SMEs, was observed by a group of researchers who explored the field of food and beverage production and published it in [11]. As a suitable way of educating employees, they suggested grouping the necessary knowledge into small portions which will be presented in a comprehensible way using the local language to a worker who will be able to accept it if it has basic theoretical knowledge. The offer of this type of education must also consider the limited time available to the worker for acquiring new knowledge. This kind of work should be supported by experimental work in cooperation with experienced experts. Two-way cooperation between SMEs and trainers is necessary in order to conduct such training successfully. In these activities, the synergy effects of connecting startups and SMEs can be expected.

Today there is much talk about the dual education system that functions well in Germany, which suffers from labor shortages, but it is unlikely that it can be mapped to less developed and developing countries with job shortages, and labor supply surplus, and where employers have a significantly different view of the business of their SMEs. Moreover, such a system does not function also in the Anglo-Saxon countries, for example, the US and UK, where, as a rule, factory workers are not trained in advance [13].

## DIGITAL SKILLS OF EMPLOYEES

Under the term digital skills of employees, we considered the ability of employees to make use of digital resources for SMEs. Aiming to assess the digital skills of the employees, research was conducted on a sample survey of 226 SMEs from Russia, Serbia, and Slovakia, of which there were 47 medium-, 96 small- and 83 micro-enterprises. Within the research, there were analyzed:

- ◆ employee structure, that is the level of their education either through formal education or through the organization of training in the field of the use of information technologies; the assumption was that those with academic education in IT-related areas can more effectively use them than others;

- ◆ the ability of employees to use the Internet, e-mail services and business software; and

- ◆ the ability of employees to write the necessary computer programs on their own.

The first step was the identification of tasks for which Internet technology and business software were used. The results of the survey are shown in Table 1.

**Table 1**

SMEs	The share of employees			The share of companies		
	Internet	E-mail	Business Software	Internet	E-mail	Business Software
Medium	47.1%	48.6%	51.2%	100.0%	100.0%	100.0%
Small	68.9%	58.8%	70.0%	99.0%	100.0%	97.9%
Micro	72.0%	56.0%	60.2%	94.0%	84.3%	86.7%
Total	53.5%	51.4%	56.3%	97.3%	94.2%	94.2%

Table 1 shows that business software is the most commonly used. Here, under the notion of business software, software tools for browsing the Internet and browsing the e-mail were excluded, and the focus was on software tools used in the main activities of the work process, various "Offices" (MS-, Open- or Libre-office) and software packages for machine programming, SMEs, decision support tools and other software tools. It was realized that all medium-sized companies used one or more kinds of business software as well as almost all small businesses. A couple of small companies did not use business software in the form of a defined survey, because these activities were outsourced to other SMEs, and the same goes for a slightly larger number of micro-companies.

The first important element for evaluating the ability of SMEs to take advantage of IT was the formal education of employees. As a criterion for the assessment of SMEs, there was a number of companies with employees who have completed faculties in the field of technical and/or economic sciences. The results of the analysis have shown that about three-quarters (74.3%) of all SMEs have at least one employee who has completed some of the technical or economic sciences faculties, and that a bit less than one half (49,1%) has at least one employee who has completed an IT college (any faculty where the employee was studying IT as a separate area - orientation). As expected, the largest percentage was achieved by medium-sized companies (91.5% and 87.2% respectively), and the share of SMEs with information technology experts is decreasing with the decrease in the number of employees (to 50.6% and 20.5% respectively in micro companies).

However, the situation is quite different when analyzing the percentage participation in the number of employees that completed faculties in the IT field. The share of IT experts is reversely proportional to SME's size. One of the reasons is that those with completed faculties are increasingly choosing to start alone or in cooperation with their colleagues a micro-business that later can turn into a small business. So micro-companies have in average 23.1% STEM graduated and medium-businesses 12.1%.

Analyzing the share of experts engaged in programming in SMEs, it is seen the trend of increasing the relative share of the programmers with the decrease in the size of SMEs, and this share is even more pronounced than in the previous case (13.5% versus 2.2% respectively). The needs of many SMEs are very similar, and only the number of users is different. Thus, for example, to create and maintain a website, the same number of developers is needed in (practically) all SMEs. The same is the case in creating and maintaining accounting software. In micro-companies, the share of developers is more pronounced, as many micro-companies are basing their business and survival on the application of IT and the creation of new products and services. Also, it is increasingly common that instead of being employed in other companies, developers run their micro-businesses and offer their services in this way.

One way that SMEs can meet their needs for IT professionals is to organize appropriate training within the SME itself, especially when they do not need top IT professionals, and when it is enough to train existing employees. When employee's tasks are more specific, the training can be shorter and more effective. The survey showed that 72% of middle- and 52% of small companies had organized some types of training in the last three years. The number of those who plan to organize some kind of training in the next year is fully in line with the number of those who already have experience in this field. This can point to the positive experience of SMEs in relation to the training. In micro-companies, the situation is different. Approximately one quarter (27%) of micro-companies organized some kind of training in the previous three years and about the same (24%) planned some kind of training in the next year. Within micro-companies the results are less comparable since some of them were younger than three years old, there were many developers and IT professionals who are improving themselves during everyday work, and they do not have the need for some

additional training. Nevertheless, organizing training in micro-companies has also shown good results.

## CONCLUSIONS

Education is becoming a very important factor in the business of SMEs, whether SMEs are engaged in education as an activity, either to educate their staff or to employ new highly educated and trained personnel. Increasing the level of education positively influences the effects of SMEs by providing them with a competitive advantage primarily in innovation. The conducted research indicated that the examined SMEs use the Internet, e-mail, and business software massively, and that, for the time being, they rarely use decision-making software and AI. The introduction of 5G mobile communications will significantly improve the conditions for the application of IT in SMEs and open new jobs in the field of IoT. Consequently, the need for new highly educated staff grows. In doing so, the value of the initial investment in equipment will not significantly increase, and the main focus will be on know-how. The first, and probably the best results can be expected in the field of transportation.

**Note:** This paper is based on the doctoral dissertation of Milanka Bogavac whose co-mentors were Zoran Čekerevac and Lydmila Prigoda

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## **ОБРАЗОВАТЕЛНИ И ПРОФЕСИОНАЛНИ ЦИФРОВИ УМЕНИЯ ПРИ ДИГИТАЛНОТО ОБЩЕСТВО – ПО ПРИМЕРА НА МАЛКИТЕ И СРЕДНИ ПРЕДПРИЯТИЯ**

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**Ключови думи:** образование, дигитализация, транспорт, логистика, МСП, дигитални умения, интернет на нещата.

**Резюме:** Във време на дигитализация на икономическите процеси, ролята на образованието е от изключителна важност. Това не само означава да се придобият знания за работа с компютър, а да се получат управленски умения, които да позволяват извършването на икономически дейности в една нова среда. Тези умения са от изключителна важност за спечелването на конкурентно предимство. В процеса на обучение малките и средни предприятия (МСП) могат да бъдат доставчици или потребители на услугата. В практиката се среща повече първия случай, който е анализиран в детайли с цел МСП да се развият. За целите на изследването са проучени 226 МСП от Сърбия, Словакия и Русия, като е оценена тяхната икономическа дейност от гл. т. на интернет технологиите. Като първи критерий за изследване на цифровите умения е избран брой на МСП от извадката, чиито служители притежават висше икономическо или техническо образование. Резултатите показват, че около три-четвърти от МСП имат по един служител, който е завършил икономическа или техническа специалност. По-малко от половината МСП имат поне един служител, завършил STEM. Както се очаква най-голям процент се наблюдава при компаниите със среден размер, като дялът на МСП с най-много наети IT специалисти съответства на размера на предприятията. Като други показатели са взети също така дялът на служителите, завършили средно образование по интернет технологии, дялът на завършилите програмиране, дали МСП са организирали IT обучителни курсове през последните три години. Анализирани са различни форми на обучение при МСП.