

The importance of Industry 4.0 and digital transformation for SMEs

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Abstract: The paper provides insight in the state of digital transformation (DT) and Industry 4.0 (I4.0), as well as in the current levels of digital maturity of the Slovenian small and medium enterprises (SMEs). An overview is given of existing digital tools and approaches available for SMEs globally. A special attention is paid to challenges that companies are coping with in DT planning and implementation stage. For this paper, 15 international peer-reviewed papers were analyzed describing studies of DT and Industry 4.0. An online survey was conducted comprising 19 questions about DT and Industry 4.0. To gain a more extensive understanding about the state of the DT an interview was performed with four companies, making an analysis of the current DT situation and expectations of the Slovenian SMEs. The results show a considerable lack of DT knowledge, skills and competences. Based on the analysis of the literature and results of the research, approaches are presented towards effective DT in the implementation in the Slovenian SMEs by using adequate digital tools/ technologies.

Keywords: Digital transformation, Digital strategy, Industry 4.0, SMEs, IoT

Pomen Industrije 4.0 in digitalne transformacije za mikro, mala in srednje velika podjetja

Namen članka je vpogled v stanje digitalne transformacije (DT) / Industrije 4.0 (I4.0) in trenutne stopnje digitalizacije poslovanja v slovenskih MSP-jih (mikro, mala in srednje velika podjetja). Prispevek predstavlja pregled obstoječih digitalnih orodij in pristopov, ki so na voljo MSP po vsem svetu. Poleg tega posveča posebno pozornost izzivom, s katerimi se podjetja soočajo v fazi načrtovanja in izvajanja digitalne preobrazbe. Analizirali smo 15 recenziranih člankov, ki opisujejo študije o digitalni preobrazbi in I4.0. Izvedli smo tudi dve raziskavi, prva je vključevala spletno anketo, ki je obsegala 19 vprašanj o DT in I4.0, in druga, poglobljeni intervjuji s štirimi podjetji o temah digitalizacije. Cilj raziskave je bil analizirati trenutno stanje in pričakovanja slovenskih MSP glede digitalne preobrazbe. Rezultati so pokazali znatno pomanjkanje znanja MSP-jev in kompetenc na tem področju. Na podlagi rezultatov raziskav in analize literature predstavljamo pristope in digitalna orodja / tehnologije za učinkovito izvajanje digitalne transformacije v slovenskih MSP-jih.

Ključne besede: Digitalna transformacija, Digitalna strategija, Industrija 4.0, MSP, Internet stvari (IoT)

1 INTRODUCTION

In recent decades, the speed of the technological progress has increased greatly, with direct impacts on all spheres of the everyday life. Information technology (IT) is no longer simply a support tool for carrying out business activities; rather, it is a center business operation of SMEs from which all functions and the realization of the company's business strategy are carried out. A Digital

business strategy (DBS) is defined as a fusion of business ideas with the IT strategy of an organization, and an incorporation of digital technologies into business strategies [1].

DT represents the latest phase of the current industrial revolution. A DT characteristic occurring within SME operations is the functional use of the Internet and digital solutions in the fields of production, marketing, promotion, sales, and design [2]. It is a personalized approach throughout the value chain that allows companies to adapt promptly to customer needs, with the phases between product planning and product delivery shorter, more technologically advanced, and more cost-effective. DT is not tied to an individual industry or type of company. Rather, it reflects the willingness of management and company owners to take on new innovations [3,4].

A key segments of The Digital Business Transformation report [3] in the field of digitalization are:

- Analytical tools (including “big data”),
- Mobile tools and applications,
- Platforms that enable the sharing of digital capacities, such as cloud solutions and app marketplaces,
- Social media tools and applications, and
- Internet of Things (IoT) including connected devices and “smart” networks [5].

Analysis of the related literature and research show that globally SMEs do not have equal opportunities to implement a DT, given the differences in information,

skills, knowledge, and financial resources. Since SMEs represent more than 99% of all companies in the EU and Slovenia, it is important to develop approaches and models that will enable this target group to accelerate their DT.

2 METHOD

The paper reviews the literature and publications in the field of DT and Industry 4.0. [6]. Analyses the related key definitions, approaches, and findings, with an emphasis on their usage by SMEs [7,8,9].

Beside the above results are presented an online survey (designed and conducted within Interreg Europe funded project Digital Regions) and interviews with four Slovenian companies. The aim was to collect and analyze the data on digitalization Slovenian SME companies, the importance of I4.0 for SMEs and the economy, the main challenges SMEs are facing in the implementation of digitalization, and to assess and whether SMEs have viable digital business strategies. The research involved 30 Slovenian companies from the following industries: information technology, chemistry, pharmacy, and mechanical engineering [10]. The survey was conducted in the first half of 2020. The questionnaires were online sent to 400 e-mail addresses of individuals responsible for digitalization or the SME managers. The response rate was 7.5%, which is a satisfactory response rate. The questionnaire consisted of 19 questions covering the areas of knowledge of DT or Industry 4.0, the existence of digital strategies, and the reasons for not carrying out activities in the field of digitization.

3 RESULTS

3.1 Literature analysis

An analysis of 15 international peer-reviewed papers on DT and Industry 4.0 shows an increased SMEs awareness of the DT importance. A number of digital technologies for the DT implementation is available, and is financially viable to SMEs. The main among them are: cloud computing, big data, artificial intelligence, advanced robotics systems, Internet of Things, 3D printing, virtualization, cybersecurity, sensor technologies, automatizations, and mobile applications [2,11].

The key factors for a successful DT implementation are willingness and determination on the part of the person responsible for DT, implementation of a “learning culture”, existence of a simple roadmap of DT goals and milestones, identification of the existing digital solutions in the market, and determine of the financial and implementation terms for introducing DT [3,4,12].

The authors of the analyzed papers emphasize that in SMEs the DT field there is a niche for the plug-in digital solutions and there are no longer substantial differences between B2B and B2C businesses. With the advent of

generation “Z”, information retrieval, shopping and services have been shifted from the physical world to the cyber world [14,15].

3.2 Questionnaire results

Answers to the online questionnaire comprising 19 questions about DT and I4.0, shows that 20% of the Slovenian SMEs are not familiar with DT content and Industry 4.0. 45.8% of them have only a basic knowledge of DT and I4.0, and 85.71% are facing serious challenges at the implementation stage. The main barriers of their taking advantage of digitalization are lack of information, knowledge, time, and financial resources [10].

3.3 Interviews

Four interviews were conducted with managers, owners and personnel responsible for DT in Slovenian SMEs of different industries: online commerce, pharmaceuticals, printing and media monitoring. Besides answering questionnaire, the companies were asked which digitalization activities they planned to perform. in the field of digitization. They all prioritize customer experience, paperless operations, database management and implementation of sensors in production (manufacturing companies).



Figure 1: Companies motivation to start activities in Industry 4.0

4 CONCLUSION

The goal of the paper is to analyze the current state and DT expectations of Slovenian SMEs regarding DT. 15 peer-reviewed papers describing studies on DT and I 4.0 are analyzed. A survey is conducted based on an online questionnaire with companies. 19 questions about DT and Industry I4.0 and interviews are made with four companies focusing on digitalization topics. The analysis shows a considerable lack of knowledge and competence in the field.

DT represents a remarkable opportunity, as well as a necessity, for SMEs in maximizing the advantages of the current digitalization tools for their production and business activities (IoT, AR, big data, apps, Industry 4.0, SMEs, IoT, Cloud, CPS, etc.). With the implementation

of digital tools, SMEs will be able to shorten the life-cycle of their products and to optimize their businesses both technologically and financially, with the ability to respond quickly and efficiently to customer expectations and needs. Developments in digitalization are now occurring at such a pace that if SMEs do not have the mind-set on adopting at least some of the available tools, they are unlikely either to remain competitive or to meet environmental expectations.

The next steps to be taken are the identification of micro needs and logical steps / assistance to SMEs in the areas of digitization, and the use of the existing technologies for DT, to create a platform through which SMEs will be able, in the first phase, to identify the level of digitalization in which they are and then, depending on the type of the business, also to choose the optimal tools and approaches. A program to raise SMEs awareness about the possibilities and benefits of digitalization should be prepared.

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