

Identifying Factors Affecting Digital Transformation of SMEs

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ABSTRACT

The paper is motivated by a need to encourage a more profound understanding of digital transformation issues in the context of small and medium enterprises (SMEs). This paper aims to identify the essential factors that determine the digital transformation of SMEs. We began by reflecting on the concept and usage of digital transformation in companies of different type and size. With this appreciation, we then elaborated upon the challenges of digital transformation for SMEs. In this context, we overviewed the scientific literature concerning the factors which influence the process of digital transformation and are significant for SMEs. Finally, in the light of our reflections, we suggested the set of factors which should be taken into account moving towards the digitalization of SMEs. By focusing on the key factors of the digital transformation of SMEs, we provided some contributions. First of all, we articulated a categorization regarding internal and external factors in relation to the digital transformation of SMEs. Future research should pay more attention to external factors, and verify empirically the significance of the factors identified.

Keywords: Digital transformation, digitalization, factors, SMEs.

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INTRODUCTION

Increasing use of information communication technologies (ICT) has a major impact on companies' productivity, and their innovation capacity. European Commission (2015) highlighted that the "smart" use of ICT is an important success factor for the competitiveness of European companies, in particular for small and medium enterprises (SMEs). The "smart" use of ICT in companies leads to digital transformation, which refers to the optimization of organizational processes, by using technologies to improve the performance. Companies are confronted by various challenges in the implementation of digital transformation, but they are required to reconfigure the business in line with these challenges to improve performance. Reflecting on this argumentation, digitalization issues in the context of SMEs, factors influencing the digitalization processes and important activities to be managed in SMEs are still significantly under-researched.

Considering that several literature reviews have been made analyzing digital transformation by revealing its concept, this article differs from previous literature reviews as it focuses on the factors for the digital transformation of SMEs. Most often, digital transformation and its aspects are analyzed in relation to large companies, by arguing that it is easier for them to embrace digital transformation due to available / more accessible resources and skills. However, taking into account, that SMEs are essential to maintaining steady economic growth, especially in the European Union, it is relevant to analyze what determines the digital transformation of SMEs. Therefore, this paper aims to identify the essential factors that determine the digital transformation of SMEs. In the light of our reflections and argumentation, we contribute by identifying and suggesting the list of internal and external factors, and also by disclosing the peculiarities of the digital transformation of SMEs.

The paper's structure is as follows: issues concerning the phenomenon of digital transformation and its challenges for SMEs; elaboration of methodology; identification of factors affecting the digital transformation of SMEs; concluding remarks.

THE PHENOMENON OF DIGITAL TRANSFORMATION AND ITS CHALLENGES FOR SMEs

The integration of technological innovations which according to McKinsey & Company experts were structured into four clusters of Industry 4.0 innovations such as 1) data, computational power, and connectivity; 2) analytics and intelligence; 3) human-machine interaction; 4) digital-to-physical conversation (McKinsey & Company, 2015), are a part of digitalization processes and digital transformation and can enable achieving competitive advantages for companies. Reis et al. (2018) support Ebert and Duarte (2016) and state that "the society as a whole is facing a fast and radical change due to the maturation of digital technologies and their ubiquitous penetration of all markets" (Reis et al., 2018, p. 411), companies are facing ever tougher competition due to globalization by the increased demand from customers (Westerman et al., 2011). Due to this, companies are seeking to survive and attain competitive advantages by going to be digital (Bharadwaj, 2000).

Several literature review studies attempted to reveal the phenomenon of digital transformation by revealing its concept. Digital transformation can be understood as “the transformation of socio-technical structures that were previously mediated by non-digital artifacts or relationships into ones that are mediated by digitized artifacts and relationships” (Yoo et al, 2010), which refers to the optimization of organizational processes with the aim of operational excellence by data-based workflows (Lederer, Knapp, & Schott, 2017), and by using the technology to radically improve performance or reach of enterprises (Westerman et al, 2011).

Digital transformation is now critical for almost all companies. However, a lack of clarity can be highlighted concerning the notion of digital transformation especially among different stakeholders involved. Perspectives on digital transformation vary from a focus on technology to digital customer engagement and new digital business models. Reis et al. (2018) categorized digital transformation into three distinct elements: 1) technological – digital transformation based on the use of new digital technologies such as social media, mobile, analytics or embedded devices; 2) organizational – digital transformation requiring a change in organizational processes or the creation of new business models; 3) social – digital transformation is a phenomenon that is influencing all aspects of human life by, e.g., enhancing customer experience. Hence, the main advantage of digital transformation can be seen as a transformation in processes, activities, competencies, models of a company. Businesses are undertaking their digital transformations, rethinking what customers value most, and creating operating models that take advantage of what’s newly possible for competitive differentiation (Berman, 2012). Hagberg Sundstrom, and Egels-Zandén (2016) outlined the more all-encompassing digital transformation of retailing by discussing how it influences four elements of the retailer-consumer interface. The authors analyzed how exchanges are transformed through changes in communication, transactions, and distribution; how actors are transformed through the intermixing of humans and digital technologies, the increased blurring of boundaries, and new actors, roles and relationships; how settings are transformed to include traditional and new settings as well as their intermixing; and how offerings are transformed through changes of products and services, extensions of offerings and new forms of pricing.

Regarding the issue of the application of digital transformation, scientific experts, such as Nadeem et al. (2018), highlighted that digital transformation is widely affecting various industries particularly healthcare, telecommunications, automotive, banking and manufacturing sectors. Depending on the sector in which the company operates, the level of its digital transformation varies. It is noticeable that the level of digital transformation is also influenced by the changing needs of consumers, by the level of application of high technologies, by the position of company’s leadership, by the size of a company. According to Hess et al. (2016), digital transformation has become a high priority on the leadership agenda of many companies, but it is facing more difficulties than it has been expected (Zinder & Yunatova, 2016). Expanding the example of Aalto University (Collin et al., 2015), both challenges and opportunities of digital transformation within business companies are located (1) externally, i.e. related with the market, (2) internally, i.e. representing organizational and technical fields within the company, or (3) at the core of the company, i.e. activities and changes, addressed to core business (Collin et al., 2015). Hence it could be stated that application of digital transformations could be found at the micro (organizational) level but consequences could be seen at the mezzo and macro levels. On the other hand, mezzo and macro levels have economic, normative or coercive institutional pressures (DiMaggio & Powell, 1991; Burns & Scapens, 2000) which could create and stimulate challenges for the application of digital transformation at the micro level. According to multidirectional relation between different levels of digital transformation application and on the basis of the previous studies, it was disclosed that companies could face both external and internal challenges by implementing the digital transformation.

The wider use of ICT in the industry can address external challenges such as fast-changing customer needs, international competition, or technological change (Lederer, Knapp, & Schott, 2017). As Biahmou et al. (2016) stated a major challenge consists of constantly adjusting products and services to changing conditions and continuously optimizing supply chains by means of modern technologies. Furthermore, an industry itself can be a challenge for implementing the digital transformation in companies considering industry's specificity and maturity. On the other hand, Imran and Kantola (2019) stated that for optimal performance outcomes, significant operational changes in the external environment (i.e., changes in technologies and markets) must be matched with compatible inter-organizational changes. Contrary to sensing and reconfiguring dynamic capabilities, low levels of seizing are necessary for success in the context of new digital channels.

The internal challenges of digital transformation can be overcome through the perspectives of business models, technology, and knowledge (Moritz, 2016). From the perspective of business models, challenges may refer to the management aspects such as focusing on the end-to-end digitization of all physical assets and integration into digital ecosystems with value chain partners (Lee, Lee, & Chou, 2017), integration of “digital” into business models (Reis et al. 2018), and reshaping customer’s value proposition (Berman, 2012). Also, it may refer to the dealing with critical management issues (Horlacher & Hess, 2016), and dealing with changes of process and operations management (Dremel et al., 2017) to ensure the interoperability between different systems, standards, and formats used for electronic data exchange (especially to SMEs). It is also important to mention that financing the digital transformation is a big challenge especially for SMEs, due to the costs related to the identification, development, purchase, and integration of appropriate ICT solutions, which ensure the implementation of digital transformation. A significant challenge of the digital transformation is to focus on the knowledge and skills required. Knowledge capabilities can be seen as a challenge

which can influence the need for training and education to improve new professional skills and knowledge (European Commission, 2015). From the technological perspective, significant challenges of the digital transformation are related to the technology required. From the business organization point of view, the benefit from digital transformation implementation can be achieved only if the information system of the company is aligned with new technologies.

Another important challenge is a company's view of the technological solutions - most advanced SMEs to be more digitally oriented went through isolated solution instead of going through an integrated solution at the ecosystem level. Also challenges still exist concerning complexity and trying to achieve security and privacy level. Yin et al. (2016) researched secure and effective tele-healthcare services, which are aligned for future improvements as follows: self-learning and self-improvement, use of wearable devices, standardization, privacy and security are still a challenge. Viriyasitavat (2016) stated that dynamicity in real-time service workflow interoperation creates complexity, in which changes of services' attributes is in constant occurrence and need appropriate selection process. Piccinini et al. (2016) indicated that digitalization brings concerns of data security and privacy that can negatively influence users' acceptance of new mobility concepts. Kerravala (2017) confirmed that new digital-enabling technologies such as the Internet of Things (IoT) and the cloud are creating new entry points that hackers are exploiting at a furious pace. Also, the increased complexity of IT has made it significantly more difficult to secure the environment.

By overcoming the main challenges related to the implementation of digital transformation, it is possible for companies to gain not only a competitive advantage in the market but also to improve the performance. It is evident that, regardless of the sector in which the company operates, digital transformation and its processes are more frequent in large enterprises. It could be argued that it is easier for large enterprises to implement digital transformation because they have more resources (for IT infrastructure, skills upgrade). The benefit of digital transformation for large companies can be expressed in aspects such as improved competitiveness of the supply chain; increased innovation capacity through partnering with innovative SMEs; enhanced customer satisfaction through more flexible, personalized services; shorter time-to-market (European Commission, 2015).

However, not only large companies are operating and competing in global business environments. SMEs are essential to maintaining steady economic growth. A number of well-recognized characteristics differentiate SMEs from larger companies (Gilmore, Carson, & Grant, 2001). Constraints, the inherent characteristics of the owner/manager, the norms of the industry in which the firm operates, and the stage of the business life-cycle influence SMEs heavily (Carson & Gilmore, 2000; O'Donnell, 2011). SMEs face three broad types of constraints: limited resources, a lack of specialist expertise, and a limited impact on the marketplace (Carson & Cromie, 1990). Moreno, Pinheiro, and Joia (2012) emphasized that SMEs tend to suffer the most due to the highly turbulent and competitive environment in which they operate. Due to previously discussed challenges such as scarcity of resources (Chen, Jaw, & Wu, 2016), lack of knowledge, the technology required, and dealing with critical management issues, the implementation of digital transformation solutions in SMEs face difficulties and remains limited. The question might arise why digital transformation it is needed for SMEs? Studies have shown that digital transformation processes may enhance organizational performance (Cardona, Kretschmer, & Strobel, 2013; Gu & Jung, 2013) because of the transformations of key business operations, which affect products and processes. Furthermore, SMEs that make use of digital transformation processes may lead to effective use of information in enterprises and drive better business performance (Marchand, Kettinger, & Rollins, 2002), can access new market opportunities, gain new knowledge regarding their customers, and improve new product development processes more effectively (Neirotti, Cantamessa, & Paolucci, 2008; Setia, Venkatesh, & Joglekar, 2013), and may contribute to organizational impacts (Bayo-Moriones, Billon, & Lera-Lopez, 2013; Jean, 2007; Melville, Kraemer, & Gurbaxani, 2004). Moreover, the benefits of digital transformation for SMEs can include improved process efficiency (time and cost savings) and quality (reduced error rates), increased staff productivity, better customer satisfaction, easier access to new markets, strengthened business relations with big companies, ensured business agility, higher return on investments in ICT, reduced administrative overheads and greater focus on core business and wider market opportunities, such as source from a more extensive network of suppliers, and find new customers in new locations (European Commission, 2015).

The implementation of digital transformation leads to the benefits for SMEs, for large enterprises and the entire industry/economy alike. Hence it could be stated that digital transformation should enable innovation, cost-saving, and productivity in companies. Nevertheless, there are many challenges for companies to succeed in achieving these results and the total commitment of all companies (especially SMEs) internally as well as external alignment are needed. Knowing that SMEs have a significant impact on the industry/economy, it is necessary to analyze the factors that determine the implementation of the digital transformation of SMEs.

METHODOLOGY

We selected a systematic literature review to analyze and systemize current knowledge in the field about the factors that determine digital transformation. Systematic literature review contributed to the identification of factors affecting digital transformation.

Some research of digital transformation are already completed using ISI database (Reis et al., 2018); EBSCO Business Source Complete, Science Direct, and Google Scholar (Kiel et al., 2016), or top IS journals (Nadeem et al., 2018). Although the Scopus database has not been included in these research, ISI Web of Science, Google Scholar, and Scopus are recognized as the major bibliometric databases (Harzing & Alakangas, 2016). Furthermore, Harzing and Alakangas (2016) state that Google Scholar ensures the most comprehensive coverage but numbers there are higher in comparison to the ISI Web of Science and Scopus mainly due to the existence of duplicates. Moreover, Scopus has a higher number of articles in Social Sciences which is our area of the research. Therefore, we have limited our research to the Scopus database and were able to compare our results with previously published research on other databases.

Due to the core of our research topic, on the first step, we included “digital transformation” for the search in the title, abstract, and keywords. Secondly, we added “factors” and main keywords related to it that are commonly used as its synonyms for the determination action like “dimensions” and “variables.” We also added the keywords “model” and “framework” that often include factors. On the second step, we calculated articles with factors and its synonyms separately and, on the third step, we calculated articles with all them jointly as some of the synonyms were used together at the same article. No timescale was added.

Table 1: Summary of article inclusion and exclusion for the systematic literature review

Words used in search	Articles found	Articles passed exclusion criteria
“Digital transformation”	975	112
“Digital transformation” and	“factors”	27
	“dimensions”	8
	“variables”	7
	“model”	73
	“framework”	48
“Digital transformation” and (“factors” or “dimensions” or variables” or “model” or framework”)*	627	75

* Query string for the final search in Scopus: (TITLE-ABS-KEY("digital transformation") AND (factors OR dimensions OR variables OR model OR framework)) AND (LIMIT-TO(SRCTYPE, "j ") OR LIMIT-TO (SRCTYPE, "p")) AND (LIMIT-TO(SUBJAREA, "BUSI")) AND (LIMIT-TO(DOCTYPE, "ar") OR LIMIT-TO(DOCTYPE, "cp")) AND (LIMIT-TO(LANGUAGE, "English"))

Source: This study.

As exclusion criteria, we limited our research to business and management area (“business, management and accounting”) to exclude a considerable amount of articles that are related to IT but not with business and management. We also excluded articles that were written in different than English language avoiding misleading interpretation on terms and their meaning (Reis et al., 2018). The last criteria of exclusion were based on publication type and article type. 75 articles, that were published in journals and conference proceedings, excluding such document types as book chapters, conference reviews, and reviews, as well as such publication types like books, book series, and trade publications, were selected for the further quantitative and qualitative analysis to explore the tendencies in the field and ensure the match of content to exploration of digital transformation and factors affecting it (see Table 1). The search was completed on June 13, 2018.

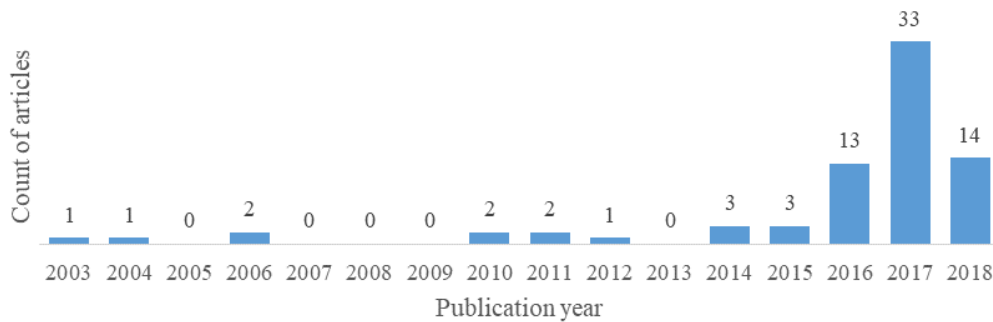
MAIN FINDINGS OF THE RESEARCH

Tendencies of the Digital Transformation Research Field

Quantitative analysis results showed the growing field of interest in digital transformation (see Figure 1). First researched article in Scopus appeared in 2003 with the next article in 2004. Some gaps were identified in the following flow of articles in years of 2005, 2007-2009 and 2013 with several papers in between. The breaking point was reached in 2016 when a total number of papers in the researched field was four times higher than in 2015. In 2017 it was almost three times higher than in the previous year. The lower number of 2018 reflects its current status.

The majority of articles were published in journals (50). Four articles were published in the Academy of Strategic Management Journal (3 in 2016 and 1 in 2017). Only Publishing Research Quarterly published articles in 2010 and 2014, and one article in the Journal of Cases on Information Technology was published in 2006. Other journals that published 2 or 3 articles did this between 2016 and 2018. Fewer articles were published in conference proceedings. Due to small numbers, no tendencies are visible.

However, it is worth to mention that as a conference topic the research field is developing since 2011 with research on a macro level and grows continuously without any gaps (see Figure 2).



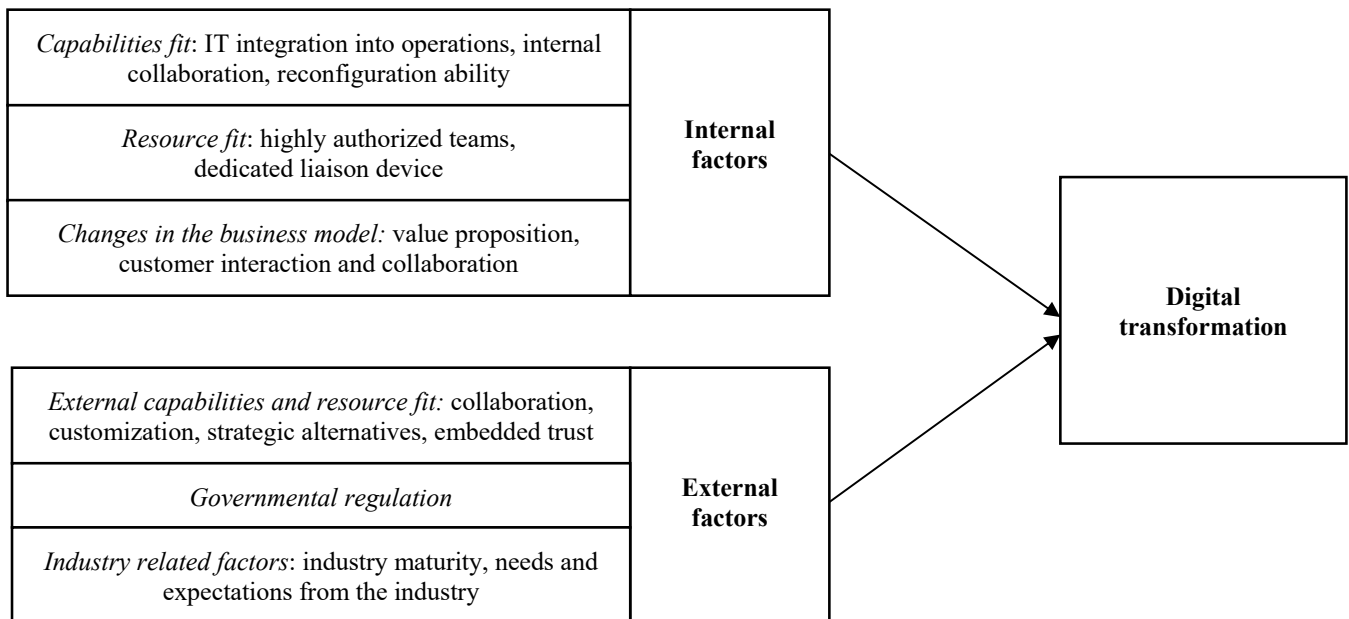
Source: This study.

Figure 2. Development of the research field on digital transformation and factors affecting it

The first step of qualitative analysis was on eliminating articles without available full-text files, research not about digital transformation in general, research about the internal structure of digital transformation instead of factors that determine it or individual factors. Further analysis of factors of digital transformation included 13 articles. The results are presented in the next section.

Factors Affecting Digital Transformation of SMEs

Summarizing the main results of qualitative research performed seeking to identify factors potentially affecting the digital transformation of SMEs we were able to list a set of main factors and to categorize them into internal and external factors (see Figure 3).



Source: This study.

Figure 3. Internal and external factors affecting digital transformation

Research results revealed **three groups of internal factors** that we identified as capabilities fit, resources fit and factors related to changes in the business model.

Capabilities fit. As Reis et al. (2018) observed, successful digital transformation requires a company to develop a wide range of capabilities, which will vary in importance depending on the business context and the specific company’s needs. According to Liu, Chen, and Chou (2011), for a successful formation of capability fit an ability to integrate information technology into operations and collaboration between enterprise’s departments as well as reconfiguration agility are critical aspects. Moreover, research

results revealed that information technology integration requires both - technological and strategic development (Bondar et al., 2017; Gölzer & Fritzsche, 2017; Kettunen & Laanti, 2017; Liu, Chen, & Chou, 2011; Remane et al., 2017). Therefore, reconfiguration agility based on Liu, Chen, and Chou (2011, p. 1738) “refers to a firm’s flexible capability to embrace organizational structures, information systems and mindsets” signifying the importance of organizational changes during the process of digital transformation.

Resources fit. Internal resources fit mainly refers to a dedicated liaison device and highly authorized team. Importance of dedicated liaison device is signified in the context of coordination and promotion regarding new structures of enterprise (Liu, Chen, & Chou, 2011). Remane et al. (2017) also emphasize the importance of the complex ecosystem of multiple actors. In other words, guaranteeing communication and sustainable relations among enterprise’s interface, existing service platforms and organizing model. Nonetheless, internal resources fit a highly authorized team is crucial (Bierwolf, 2016; Krüger & Teuteberg, 2016; Liu, Chen, & Chou, 2011). Moreover, Weber, Butschan, and Heidenreich (2017) explain the role of the highly authorized team by identifying the necessary competencies of human resources – cognitive, social and processual competencies - seeking successful digital transformation.

Changes in the business model. Another internal factor related to the success of digital transformation is necessary changes in the current business model (Berman, 2012; Kaltum, Widodo, & Yanuardi, 2016; Krüger & Teuteberg, 2016; Remane et al., 2017). As the core essence of business model is related to its value proposition and relations with customers, reshaping value proposition (Berman, 2012) and improving customer interaction and collaboration (Berman, 2012) through adjustments and changes in existing and potential customer contact points (Remane et al., 2017) are identified as main changes of business model that have an impact on overall business model and on the process of digital transformation.

Based on the results of the literature review we identified **four groups of external factors** potentially having a significant impact on the digital transformation of SMEs: capabilities fit, resources fit, government regulations and industry related factors. Noteworthy, external factors in the context of the digital transformation of SMEs have been significantly less addressed in scientific literature and therefore, identified external factors are reasoned only by a couple of scientific sources that have been included in the systematic analysis of the literature review.

External capabilities fit, and resources fit. Based on the results of a thorough analysis of performed case study, Liu, Chen, and Chou (2011) state that such external capabilities as collaboration and customization are crucial. According to Liu, Chen, and Chou (2011, p. 1736) “collaboration is a recursive process whereby two or more organizations work together toward a common goal.” Moreover, an effect of synergy achieved through the collaboration between different organizations also can be interpreted as a facilitator of digital transformation in SMEs. Factors of customization are directed to the ability to differentiate products or services based on the needs dictated by the market. As for the external resources fit, company’s historical path (existing strategic alternatives) and embedded trust (confidence in the reliability of another organization) may have an impact on the success of the digital transformation (Liu, Chen, & Chou, 2011).

Government regulations. Krüger & Teuteberg (2016) identified government regulations as one of the most important external factors impacting the process of digital transformation in the company. **Industry** related factors such as maturity of the industry (Krüger & Teuteberg, 2016) or specific needs and expectations of the industry (Biahmou et al., 2016) are also significant in the context of digital transformation. Noteworthy, these external factors were least analyzed in the selected papers. Therefore, further analysis and valence of the impact on digital transformation should be identified in the future research.

CONCLUDING REMARKS

Digital transformation is a highly relevant phenomenon though research into it is still rather young. Overview of the literature to date revealed that the implementation of digital transformation leads to multiple benefits for SMEs, large enterprises, and entire industries/economies alike. It can be concluded, that digital transformation could enable innovation, result in cost savings and increased productivity. Nevertheless, the total commitment of companies (especially SMEs) internally, as well as external alignment, are needed to reap those benefits. As SMEs have a significant impact on industry/economy, it is relevant to identify the factors that determine the implementation of the digital transformation of SMEs.

Systematic analysis of research publications on factors affecting digital transformation indicated rapid growth of interests in digital transformation topic over the past few years. Qualitative analysis to identify factors potentially affecting the digital transformation of SMEs enabled us to identify a set of main factors and to categorize them into internal and external factors. Internal capabilities fit, resources fit, and factors related to changes in the business model were identified as three main internal factor groups. As of external, following groups of factors were found: external capabilities fit, resources fit, government regulations, and industry related factors.

It is worth noting that the results of the literature analysis indicate that research to date has significantly less addressed external factors in the context of the digital transformation of SMEs. Therefore, in future research more attention should be dedicated to investigating external factors and their impact on the digital transformation of SMEs.

Main limitations of the research presented in the paper are the use of one term “digital transformation,” and a single database, which might have resulted in missing important, relevant research. A literature analysis additionally covering other academic databases and including synonyms or other terms used instead of “digital transformation” might result in different and more comprehensive outcomes. The factors identified by systematic literature analysis should still be tested and verified by empirical research. Further efforts to identify the main factors affecting the digital transformation of SMEs could also consider the findings of practitioners supporting the digital transformations, especially ones of SMEs.

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