

# INFLUENCING FACTORS OF DIGITAL TRANSFORMATION IN SMEs – LITERATURE REVIEW

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**Abstract** Digital transformation refers to the process of redefining the way enterprises do business using digital technology. It changes existing organizational processes within and between organizations. The transformation affects all organizations, but poses a particular challenge for small and medium-sized enterprises. To begin a digital transformation process, enterprises must first be aware of the factors influencing the transformation, so they can further develop their digital maturity roadmap and continue the digital transformation process. In this paper, we aim to identify the most important internal and external factors that guide the digital transformation process and the dominant theories behind them. The findings suggest that organizational factors, together with technology and environment, may provide a comprehensive view of digital transformation. The results also showed that data and its quality are increasingly attracting attention in professional circles and data science communities, but are not yet sufficiently considered in the context of digital transformation.

**Keywords:**

digital  
transformation,  
digital  
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factors,  
SMEs,  
literature  
review.

## 1 Introduction

Digital transformation (DT) has been an important issue in recent years, both in business and research. It refers to changes in the way organizations operate and create value (new business models, products, and services) and communicate, using digital technologies (Morakanyane, Grace, & O'Reilly, 2017; Vial, 2019). When it comes to digitalization and transformation of processes, products, services, and business models, large organizations are prepared to take more risks than small and medium-sized (SMEs) (Kane, Palmer, Phillips, Kiron, & Buckley, 2015) and are also more digitally mature, as they have sufficient financial and human resources and a clear digital transformation strategy. On the contrary, the SMEs are often lagging behind, due to a less clear digital transformation strategy (Dethine, Enjolras, & Monticolo, 2020), lack of skills (Leifels, 2020) and digital competences (Peillon & Dubruc, 2019). Digital transformation requires from SMEs to fundamentally change their business model (Bouwman, Nikou, & de Reuver, 2019) and thus demand from them the readiness for change. The most important for SMEs is the initial phase of the digital transformation, which refers to the definition of the roadmap of business goals for DT and thus to raising awareness among SMEs (Barann, Hermann, Cordes, Chasin, & Becker, 2019). Research question leading our study is: *"What are the prevalent factors influencing the digital transformation in SMEs?"*. The report from (OECD, 2017, p. 36) shows that the level of digitalization among SMEs is particularly low, related to the uptake of digital technologies. Also, (Eller, Alford, Kallmünzer, & Peters, 2020) found that recent studies on digitalization and digital transformation (DT) are mainly focused on large organizations, where authors focused either on business model innovation perspective (Hänninen, Smedlund, & Mitronen, 2018), case studies of how large, well established organizations approach and drive through the DT (Kaiser & Stummer, 2020; Sebastian et al., 2017) and also on contributing or hindering factors (Steiber, Alänge, Ghosh, & Goncalves, 2020) from innovation diffusion theory perspective. In the context of SMEs, a lot of authors focused their research on the factors behind the digital transformation (Ferreira, Fernandes, & Ferreira, 2019; Tarutė, Duobienė, Klovienė, Vitkauskaitė, & Varaniūtė, 2018; Wilaisakoolyong, 2018). Although, the research in this area is increasing, each author provides its own set of factors influencing the DT process. For this reason, a structured framework summarizing the identified prevalent factors on digital transformation with regard to SMEs is missing. There is also a lack of empirical studies on this topic (El Hilali, El Manouar, & Abdou Janati Idrissi, 2020). To

address this research gap, we identified the factors from previous studies, created a structured framework (based on the TOE framework) and divided them into three groups, namely the Technology, Organization and Environment group, to provide SMEs with a comprehensive and structured overview of the factors influencing the digital transformation.

## **2 Previous literature and leading theories**

Prior studies have focused more on defining the maturity models and less specifically on the factors influencing the digital transformation process (De Carolis, Macchi, Negri, & Terzi, 2017; Schumacher, Erol, & Sihm, 2016; Tarhan, Turetken, & Reijers, 2016). Maturity models represent a discrete maturity level, which indicates the state the organization is currently in (for example, ready, perfect or complete) (Tarhan et al., 2016). Besides maturity models, readiness models were also developed, to test the level of organizations readiness for the digitalization process (Herceg Vuksanović, Kuč, Mijušković, & Herceg, 2020). Karimi & Walter (2015) aimed to review the DT factors from the newspaper industry perspective and the needed capabilities for successful DT. Authors divided identified factors into three groups (Resources, Processes and Values), based on the Resource-Process-Value (RPV) framework. Results showed the need for financial and human resources and senior management support. Next, a company must ensure allocation of resources and autonomous groups with similar interests to reach the goal of digitally transforming the business, which results in the innovative culture, common language and adoption of a new mindset. Next, (Ferreira et al., 2019) focused on the factors influencing the adoption of new digital processes in organizations. They found that sustainability and increase of market share, location and sector of activity are the factors that most influence the adoption of new digital processes. As a barrier, they stress out the older entrepreneurs, which aren't much inclined to the introduction of new digital processes. Finally, they stress the importance of support by policy-makers in this area. Others, (Eller et al., 2020) focused on an assessment of the DT factors and the impact they have on the SMEs performance. Results showed that information technology (IT), employee skills and digital strategy are the key factors that positively affect digital transformation in SMEs. As last, a study recently conducted by (Nadkarni & Prüggl, 2020) reviewed 58 studies between 2001 and 2019 and derived a thematic map from an actor and technology perspective, to help companies identify the dimensions related to digital transformation.

In addition, we must also consider the theories guiding the digital transformation process and influencing factors. According to Molinillo & Japutra (2017), there are three dominating Information Systems (IS) theories, namely diffusion of innovation (DOI) theory, technology-organization-environment (TOE) framework and institutional theory. Others, (Nyandoro, 2016) believes the theory of reasoned actions (TRA) is the one to explain the factors influencing the digital transformation in SMEs.

Digital transformation factors are often hidden inside the maturity models and often derived from them. For example, Deloitte (Deloitte, 2018) and (Azhari, Faraby, Rossmann, Steimel, & Wichmann, 2014) proposed their maturity models to ease the understanding of the factors behind these models. Concerning the factors influencing the digital transformation (DT), an important part presents the process of measuring the DT and its metrics (Kotarba, 2017). Very well known in this field is the Digital Economy and Society (DESI) index, but for SMEs, the Industry Digitalization index (IDI) could be important. Table 1 presents some maturity models with corresponding authors and dimensions, which form the basis for the factors of digital transformation.

**Table 1: List of Maturity models as important element in previous studies**

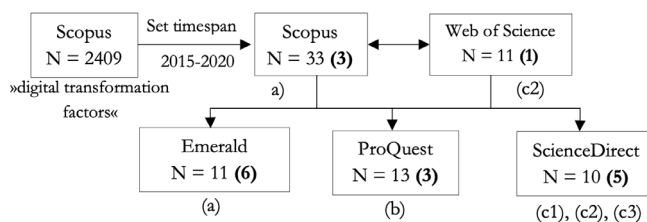
<b>Author(s)</b>	<b>Model</b>	<b>Scope</b>	<b>Dimensions</b>
(Deloitte, 2018)	Deloitte's digital maturity model	digital capability evaluation and a view of a digital maturity	Customer & <b>Strategy</b> Technology & Operations Organization & <b>Culture</b>
(Azhari et al., 2014)	Digital maturity model by Azhari et. al. and Neuland consulting company	digital maturity assessment and basis for digital excellence reference model	<b>Strategy &amp; Leadership</b> Products & Operations <b>Culture &amp; People</b> Governance & Technology
(Kane, Palmer, Phillips, Kiron, & Buckley, 2016)	Model proposed by Kane et. al.	It assumes that (culture, people, structure, tasks) are needed for successful DT	<b>Strategy</b> Tasks <b>Culture &amp; People</b> Structure
(De Carolis et al., 2017)	DREAMY maturity model	Model suitable for production companies	Design & Engineering Production management Quality management Maintenance management Logistics management

source: adapted from (Schwer, Hitz, Wyss, Wirz, & Minonne, 2018)

Based on the list provided in Table 1, we can observe that the most emphasized dimensions are related to Strategy, Culture and People. But we must not forget that Customer and Leadership are also important factors to consider, influencing the digital transformation in SMEs. In the further chapters, we present the methodology and literature review findings.

### 3 Methodology

To review the influencing digital transformation (DT) factors in SMEs, we selected a literature review as a research approach. We followed five steps, adapted from (Vial, 2019): 1) define the scope of the review, 2) search the literature, 3) select the final sample, 4) analyze the selected sample and 5) present the findings. The search process was conducted as shown in Figure 1.



**Figure 1: Search process**

In relation to the corresponding database (Figure 1), characters (a), (b), and (c) were used, representing the phrases used in the search process: a) relates to “digital transformation factors AND SMEs”, b) “success factors of digital transformation AND SMEs” and c) relates to 3 phrases (“digital transformation literature review” (c1), “digital transformation AND SMEs” (c2) and “digital transformation factors” (c3)). N represents the number of relevant papers found in the corresponding database, and the number written in brackets, papers selected for further analysis and presentation of results. This resulted in 42 papers selected for the final analysis, where we reviewed each paper and identified factors related to digital transformation and SMEs. To finalize the selection, we excluded the papers, where the full texts weren’t available, weren’t written in English and didn’t apply to the DT factors and SMEs topic. Some of the papers weren’t accessible through databases, thus we tried to obtain them through other repositories (such as ResearchGate portal (one article

obtained) or Semantic Scholar (one article obtained)). Next, we analyzed the references cited in the selected papers. Among those, we did a snowball literature review (one additional paper selected for the review). Altogether, 19 papers were selected for further analysis. We summarized our findings in the form of a structured Technology-Organization-Environment (TOE) framework. Each factor was assigned to the corresponding group (Table 2). In the last step, we presented the identified research gaps and findings.

#### 4 Literature review findings

Literature review analysis of 19 selected papers showed that authors focused on different research areas, when addressing the influencing DT factors in SMEs, as shown in Figure 2. Research area labeled as »Other« refers to the papers (Bordonaba-Juste, Lucia-Palacios, & Polo-Redondo, 2012; Gamache, Abdul-Nour, & Baril, 2019; Loon Hoe, 2020; Martinez, 2019; Štemberger, Erjavec, Manfreda, & Jaklič, 2019) that weren't directly addressing this topic, still they revealed some of the important factors for SMEs to consider, like the creation of awareness and importance to focus on business model changes.

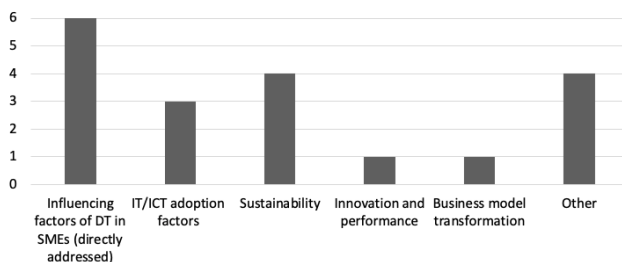


Figure 2: Research areas by authors

Table 2 shows identified influencing factors of digital transformation in SMEs of 19 selected papers. Factors are divided into three groups (Technological, Organizational and Environmental), based on the TOE framework. Results of the conducted analysis showed that organizational factors are the most prevalent to influence the digital transformation in SMEs, following by environmental factors. Interestingly, technological factors have the least influence and are not the main driver for digital transformation (DT). This also indicates the number of authors

related to each technological factor. The most prevalent factors in this group are the use of digital technologies and its infrastructure (in both factors 3 cases detected). Even though, the technology could force SMEs into complete re-design of their current offer (Peillon & Dubruc, 2019), it is still only an instrument (Martinez, 2019), which helps SMEs to achieve a successful digital transformation. The most prevalent among organizational factors in the second group are strategy, executive and management support (also leadership), organization characteristics, collaboration and organizational culture. Organization characteristics are important as it relates to the sector, where SME is operating, size and location, but we can observe the most prevalent is the human capital as it relates to education, age of employees and skills, required to drive the digital transformation. The analysis revealed that gender has a very small influence, when guiding the digital transformation process (one case detected relating to (Ferreira et al., 2019)). Interestingly, business model changes, the maturity of the industry and innovation seem to be less important factors to follow, when relating to digital transformation in SMEs, even though the previous literature revealed, that most digital transformation factors are based and derived from maturity models. Therefore, it should be given more emphasis on the measurement of digital maturity level as well. The least important factor is also discovery-driven decision making (only one case detected in (Savic, Ograjensek, & Rejc Buhovac, 2016)), where the emphasis is on decision making. Here, an SME is trying to develop new modes of operation and gains new experience and information through testing and experimentation.

The last group (Environmental factors) represents the external influence on the digital transformation process in SMEs. The two factors that are strongly evident, are the support from the government and institutions such as the competence centers and research institutions. The second factor is the pressure created by the customers, business partners and government. The creation of marketing opportunities does not seem to be the prevalent factor in small and medium-sized enterprises (SMEs), and also not the customer (or consumer) readiness (for example, its readiness for the new technology)(Chatzoglou & Chatzoudes, 2016) or the customer behavior (Wilaisakoolyong, 2018). Although, these factors appeared to be less prevalent, executives in SMEs must know the customer behavior and their needs, to provide them the more customized solutions. Results in this group indicate the supportive environment as the most important one.

Based on the findings, we can observe that most of the authors, like (Nair, Chellasamy, & Singh, 2019; Nyandoro, 2016; Tarute et al., 2018; Wilaisakoolyong, 2018) found similar influencing digital transformation factors related to SMEs. It could also be observed, that the most prevalent factors are already well known (like strategy, executive and management support, leadership, skills,...).



**Table 2: Identified influencing factors, based on TOE framework**

Technological factors	Author
Use of digital approaches (e.g. e-commerce)	(Gamache et al., 2019)
Information communication technology (ICT or IT) infrastructure or digital architecture	(Chatzoglou & Chatzoudes, 2016; Gamache et al., 2019; Nyandoro, 2016)
Costs of ICT equipment	(Nyandoro, 2016)
Access to technology and Internet	(Tarutė et al., 2018)
Acceptance of new technologies and innovations	(Wilaisakoolyong, 2018)
Quality of data	(Gamache et al., 2019)
Raising service quality	(Ferreira et al., 2019)
Use of digital technologies (or tools, or products)	(Isensee et al., 2020; Sandkuhl et al., 2019; Vial, 2019)
Use of different digital (communication) channels	(Sandkuhl, Shilov, & Smirnov, 2019)
Compatibility	(Yoon & George, 2013)
Data	(El Hilali, El Manouar, & Abdou Janati Idrissi, 2020)
Organizational factors	Author
Strategy	(Dilber, 2019; Irimiás & Mitev, 2020; Isensee et al., 2020; Loon Hoe, 2020; Sandkuhl et al., 2019; Savic et al., 2016; Štemberger et al., 2019; Wilaisakoolyong, 2018)
Resources	(Nyandoro, 2016; Tarutė et al., 2018; Wilaisakoolyong, 2018; Yoon & George, 2013)
Executive & management support & leadership	(Dilber, 2019; Gamache et al., 2019; Irimiás & Mitev, 2020; Isensee et al., 2020; Loon Hoe, 2020; Sandkuhl et al., 2019; Savic et al., 2016; Vial, 2019; Wilaisakoolyong, 2018; Yoon & George, 2013)
Organizations characteristics	(Bordonaba-Juste et al., 2012; Chatzoglou & Chatzoudes, 2016; Ferreira et al., 2019; Isensee et al., 2020; Nair et al., 2019; Nyandoro, 2016; Wilaisakoolyong, 2018; Yoon & George, 2013)
Organizational structure	(Štemberger et al., 2019; Vial, 2019)
Age of SME owner/organization	(Ferreira et al., 2019; Nair et al., 2019)
Human capital	(Bordonaba-Juste et al., 2012; Ferreira et al., 2019; Gamache et al., 2019; Isensee et al., 2020; Loon Hoe, 2020; Nair et al., 2019; Nyandoro, 2016; Sandkuhl et al., 2019; Vial, 2019; Yoon & George, 2013)
Policies	(Wilaisakoolyong, 2018)
Capabilities	(Isensee et al., 2020; Tarutė et al., 2018; Vial, 2019)
Attitude toward IT implem.	(Isensee et al., 2020; Nair et al., 2019; Nyandoro, 2016; Vial, 2019)
Creation of awareness	(Dilber, 2019; Isensee et al., 2020; Martinez, 2019)
Collaboration	(Dilber, 2019; Isensee et al., 2020; Loon Hoe, 2020; Sandkuhl et al., 2019; Savic et al., 2016; Štemberger et al., 2019; Tarutė et al., 2018; Vial, 2019)
Communication	(Sandkuhl et al., 2019; Savic et al., 2016)
Organizational culture	(Dilber, 2019; Irimiás & Mitev, 2020; Isensee et al., 2020; Loon Hoe, 2020; Martinez, 2019; Sandkuhl et al., 2019; Vial, 2019)
Business model changes	(Martinez, 2019; Tarutė et al., 2018)
Maturity of the industry	(Irimiás & Mitev, 2020; Tarutė et al., 2018)
Innovation	(El Hilali, El Manouar, & Abdou Janati Idrissi, 2020)
Discovery-driven decision making	(Savic, Ograjensek, & Rejc Buhovac, 2016)
Standards of service providers	(Wilaisakoolyong, 2018)
Regulation (local, government)	(Isensee et al., 2020; Tarutė et al., 2018; Wilaisakoolyong, 2018)
Support (e.g. Government, competence centers, research institutions)	(Chatzoglou & Chatzoudes, 2016; Dilber, 2019; Irimiás & Mitev, 2020; Nyandoro, 2016)
Pressure (competition, business partners, customers, supplier, government)	(Nair et al., 2019; Nyandoro, 2016; Wilaisakoolyong, 2018; Yoon & George, 2013)
Creation of marketing opportunities	(Ferreira et al., 2019; Wilaisakoolyong, 2018)
Customer behaviour	(Wilaisakoolyong, 2018)
Consumer readiness	(Chatzoglou & Chatzoudes, 2016)
Customers	(El Hilali et al., 2020; Savic et al., 2016)

## 5 Conclusion

The aim of this paper was to provide a literature review on the factors influencing digital transformation in small and medium-sized enterprises (SMEs). We also considered and mentioned some of the theories of information systems (IS) that are important for this topic, thus providing a theoretical background. We found that most authors relate their studies to the TOE framework as it provides a technological, organizational and environmental view. As stated by (Ranke et al., 2020), there is still a lack of knowledge about the different types of SMEs and what they need to develop digitally. Despite the large amount of literature available on digital transformation, there is still less research on the factors of digital transformation that correlate with SMEs. We miss more research on the start-up perspective and would like to see more focus on the role of data as an under-researched driver of digital transformation. The results show that data and its quality are not sufficiently considered in the context of digital transformation, which shows its important role as an attractive topic for further research.

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