

# Challenges, Issues, Barriers and Problems in Digital Transformation – Systematic Literature Review

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**Abstract.** *Digital Transformation (DT), an inevitable and necessary part of today's organizations lifecycle, is a relevant topic in business circles. Well strategically designed, it provides opportunities for organizations to achieve momentum in their business, thereby increasing organizational efficiency. Digital technologies enable digital transformation with full involvement of all organizational resources, working together to transform processes, business models and achieve new value for end-users and organization. Because of DT process complexity, this research presents systematic literature review to systemise challenges, issues, barriers and problems that influence digital transformation and presents a challenge for every company that carry out the DT process.*

**Keywords.** Digital transformation, challenges, issues, barriers, problems, systematic literature review.

## 1 Introduction

In the conditions of growing competition and changing market demands, organizations create a variety of ways to attract their customers and add new value to their products or services. In this regard, DT becomes one of the key areas of innovation in business.

*"DT is the transformation of an organization driven by digital technology, and it directly affects the change of organization's core, that is, the change of its business model"* (Kutnjak, Pihir & Tomičić Furjan, 2019). It is based on the support of all organizational resources, and one of its goals is to influence organizational culture and its rooted change. At the same time, DT is a strategic process that uses the features offered by current digital technologies for the purpose of affecting user experience or bring it closer to customers' expectations.

*"DT is the deliberate and ongoing digital evolution of a company, business model, idea process, or methodology, both strategically and tactically"* (Mazzone, 2014).

It can be said freely that digital transformation is a turning point that rapidly changes the world and affects all spheres of human life. Can we ask what DT drivers are? The answer to that question is – customers; technology, competitors and ongoing economic environment (Hrustek, Tomičić Furjan & Pihir, 2019). Customer is the one with which the transformation begins, and which is in its centre and other drivers influence the process of change and results for the individual company. DT affects the constant innovation of organization and its core of business by shifting the emphasis from traditional strategies, whose core focus is on product, to the strategy that has a customer-centric approach. Such a strategy, when adopted by an organization, adapts all its business processes to the needs and wishes of customers. Innovative actions are then aimed at meeting the needs of users, even those that the user has not yet found to exist, with the aim of creating a long-term and personalized relationship.

In view of the radical changes that must take place in the organization during its digital transformation, it itself represents a complex process. It is a misconception that only the technology is important at DT. Organizations are also faced with the design of new business models, new ways of appearance on market and securing competitive advantage.

Precisely because of the importance of the theme of DT in today's world and its complexity, in this paper a research question has been set: **What are the challenges, issues, barriers and problems that organizations are facing with when trying to digitally transform?** It should be noted that the currently available literature does not offer systematic literature review in matter of challenges, issues, barriers and problems in DT or in any of these terms. However, other authors rather address only one or two of DT's "problems" (be it challenges, issues, barriers or problems) in certain industry or case study. Also, other papers does not make a distinction between these four terms, but some of them make a distinction of word in use in dependence of weight (the severity of the "problem") or time dimension (the time required to resolve the "problem").

Paper is structured as follows. At the beginning, the methodological framework is set followed by results based on literature review. Literature review is made in several phases presented in subsections: Defining goals, keywords and concepts of research; Search and literature analysis (additionally amended with brief review of the literature concerning identification of problems related to the process of DT in the enterprise with concrete examples of authors dealing with transformation problems is given); Classifying into categories: two phases and ending by Systematization of results. At the end, discussion and conclusion was made to summarize the results and give suggestions for further research directions.

## 2 Methodological framework

In order to gain insight into relevant research on the topic of digital transformation challenges, a review of published articles in journals and conference papers available in two scientific databases Web of Science (WoS) and Scopus, as the most relevant scientific databases for the topic, was conducted. The search in databases was made on the basis of the following complex query: "digital transformation" AND ("problems" OR "issue" OR "barriers" OR "challenges") in the title of articles without limitation of the year of publication. The search resulted with 37 articles in Scopus and 28 in WOS. The basic

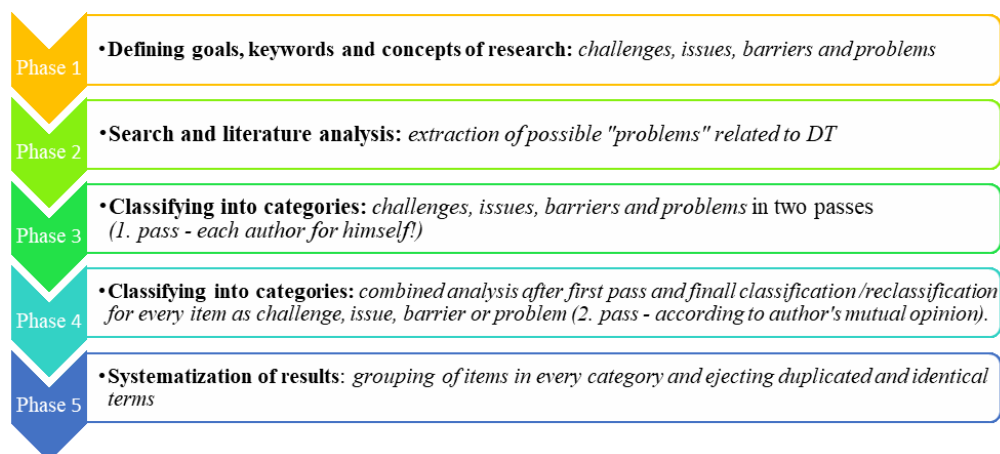
comparison of data sets showed that some results were found in both platforms, what results with 47 papers, of which 22 are directly related to the research topic, while other papers are excluded from the research due to lack of connection with the topic.

The terms "digital transformation barriers" and "digital transformation challenges" are additionally searched through Google Scholar. That added 3 new papers into analysis.

Search was limited to paper titles because the search in broader fields of databases; such as abstract, keywords, etc. have find more than 1000 results mainly out of research scope (341 WoS and 853 Scopus) since the DT is quite popular research topic these days.

All of these papers, at the end 25 papers, were analysed in detail to determine the answer to the above-mentioned research question about digital transformation challenges, issues, barriers and problems.

With growth and adaptation to the market, organizations are facing key issues in how to successfully complete digital transformation and achieve the best results in their business. Since DT is not just about adopting a new technology, but it involves a wide range of resources, it is important to clearly define a digital strategy, taking into account realistic organizational capabilities. Taking that into account, authors research strategy in this article was research driven and divided into five stages or phases represented and described in Fig. 1.



**Figure 1.** Literature review research phases on challenges, issues, barriers and problems in digital transformation

## 3 Results based on literature review

The aim of this research was to find problems or other barriers in general, that affect the proper realisation of DT. At the beginning, research showed that different authors in the literature differently define "problems" and use more words to describe them, such as challenges, issues, barriers and problems. Additionally, they differentiate "problems" depending

on the use of terms such as: complexity and speed of their solutions. In this research, it was decided to investigate these phenomena in the context of DT.

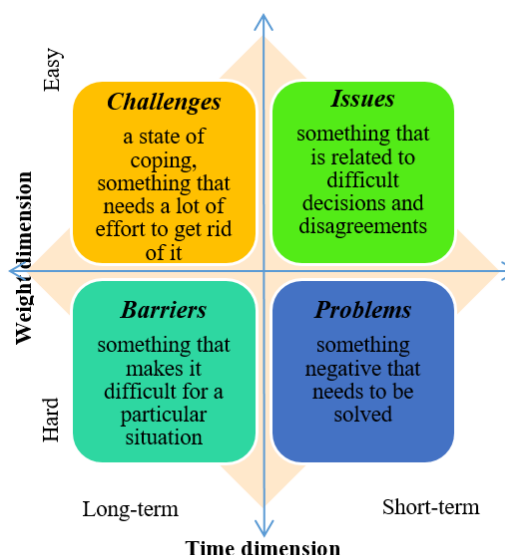
### 3.1. Defining goals, keywords and concepts of research

At the very beginning, we will define the main difference between used words that define "problems" in DT and those can be classified into challenges, issues, barriers and problems (summarized in Fig. 2).

- Challenge** means a new state of affairs that requires a great effort (mental or physical) and determination in its overcoming. Challenges test the ability of a person, ie strengths, skills and abilities to deal with certain situations that a person is encountering (Cambridge Dictionary, 2019).  
Example: how to attract existing clients to new internet banking app;
- Barriers** signify something that prevents or makes it difficult for certain situations to occur. It is a natural formation or structure that interferes with the action of individuals and achievement of some goals set. For example, it may be a rule that makes or restricts something to be achieved (Cambridge Dictionary, 2019).  
Example: existing employees do not have adequate knowledge to work with new internet banking app;
- Issues** represent the subject or problem that people are thinking or trying to solve. It is related to making difficult decisions, and it can also be the subject of discussion in order to prove agreement or disagreement with a particular topic (PhraseMix, 2017).  
Example: new internet banking does not have the functionality of old digital banking, some missing functionality was not essential but it made life easier for the users;
- Problems** point to something negative that needs to be resolved as soon as possible. The problem is closely related to the solution - it's a question or a task awaiting a solution (PhraseMix, 2017).  
Example: the new internet banking does not work on older versions of Android.

At Fig.2. Challenge (positioned: long-term, easy) is solvable although it requires a lot of effort and strains resources. Its solution is easy but requires innovation. Issue (positioned: short-term, easy) hampers work, but does not interrupt it, with his existence business can normally be performed. Barriers (positioned: long-term, hard) are often caused by external factors (eg state regulations, client attitudes), it may be possible to bypass it, while their solution is not easy and requires a longer period of time.

Problems (positioned: short-term, hard) endanger the process and work and are harder to deal with. They take more time, and its existence endangers business survival. See Fig. 2.



**Figure 2.** Differences between challenges, issues, barriers and problems

### 3.2. Search and literature analysis

Some organizations have managed to catch up with digital transformation but this does not mean that their digital path was “easy”, or that in their efforts for a more personalized approach to clients (which is one of the key digital transformation focuses), the organizations did not had to overcome at least one obstacle. Because of that, in this second phase of research, literature analysis was made, based on detail analysis of every discovered article (N=25) and resulting with the extraction of possible “problems” related to DT (See Table 1). These “potential problems” could be classified into the challenges, issues, barriers or just problems depending on weight and time dimension, what was made in further steps. At this phase, 100 of potential “problems” related to DT were found.

**Table 1.** Search and literature analysis: extraction of possible "problems" related to DT

No	Paper	Challenges, issues, barriers and problems related to digital transformation
1.	Digital Transformation of Society: Problems Entering in the Digital Economy (Khitskov et. al., 2017)	misunderstanding of the processes; misunderstanding of the need to increase the number of IT-specialists; impossibility of synchronization between digital devices to each other; managing operations in the digital environment; partial awareness of the respondents of the need to respect digital reputation, digital ethics and digital organizational culture
2.	Digital transformation of libraries in Brunei Darussalam: addressing the sustainability issues of VILIS Brunei (Karim, 2004)	high costs; limited budgets; insufficient budgets allocated to libraries; „undigital“ organizational culture
3.	Challenges for digital transformation – towards a conceptual decision support guide for managers (Heavin & Power, 2018)	defining the right priorities; aggregate data or personalise; providing more resources to IT staff vs. more self-service analytics; storing all data vs. selecting data to store that serves a specific purpose; work performed by people vs. computing machines; security vs. accessibility; privacy of individuals vs. understanding of an individual
...	...	...
25.	Commercial banks and Fintech companies in the digital transformation: challenges for the future (Vasiljeva & Lukanova, 2016)	effective implementation of the DT strategy

The following is an overview of the literature, which resulted with 100 found "problems" in DT and will be classified in the following phase in some of the recognized forms.

In the literature, there are a few authors (Tumbas, Berente & Brocke (2017), Horlacher & Hess (2016), Kutnjak, Križanić & Pihir (2019), Catarino, Rosa & Mira da Silva, (2018)) who speak about this topic - the challenges that organizations face, ie the challenges that digital transformation leaders face - known as Chief Digital Officers (CDOs).

What are the challenges faced by CDOs? CDO is an organization employee whose challenge is to implement a successful digital transformation of an organization, which means that he/she has to possess a wide range of knowledge, skills and experience. He/she is responsible for transforming the traditional domain of organization into digital (must know how to influence the culture change of organization) and all with the help of digital technologies focusing on generating new value for end-users. CDO must be focused on finding new business opportunities, assessing the existing business model. In addition, one of challenges is promotion of digital technology, experimenting with it for creating new values for organizations or end users. CDO is characterized by a strong focus on the customer with the aim of creating personalized experiences. At the same time, the leaders of digital transformations need to be business-oriented, visionaries, they shouldn't hesitate to assume the risk when necessary. They need to be focused on building strong interpersonal relationships inside and outside their organization since employees, because of their resistance to change, are sometimes one of the biggest challenges CDOs face.

In general, the digital transformation of the society is characterized by the misunderstanding of digital processes and their importance for society as a whole. In addition, society does not recognize the need to increase IT specialists and advocate for digital culture, which is inevitable today (Khitskov et al., 2017), and is also characterized by a deficit of society (Schwanholz & Graham, 2018). High cost and limited budget are challenges for digital transformation of libraries in Brunei Darussalam (Karim, 2004), while digital inequality is challenge for DT in Ukraine (Boronos, 2018). We have already mentioned the leaders of digital transformation whose duty, among other things, is to overcome digital crises and obstacles. Their task, according to Heavin & Power, 2018, is to define DT priorities, enable business data management, and to solve many dilemmas in more detail listed in the table.

Furthermore, cloud computing has been influenced by a number of problems: inadequate financial benefit, immature cloud computing, and lack of awareness of the place where user's important business / private data is kept (Al-Ruithe, Benkhalif & Hameed, 2018). On the other hand, the blockchain challenge is a lack of skills to manage the same, insufficient awareness of the

technology mentioned and its mode of operation (Hossain, 2017), while the problem with DT trade is most concerned with reducing direct, face to face contact with end users (Ianencko et al., 2018). Nonprofit organizations face the challenge of adopting the DT strategy which relates to changes in business models, the adoption of new digital marketing technologies targeting users, members and volunteers with the aim of achieving somewhat different interactions - digital (Nahrkhalaji et al., 2018).

As far as education institutions and their challenges are concerned, they relate to constant innovations and adaptation to market conditions and the need for new knowledge (Panichkina et al., 2018) overcoming technical challenges (Maltese, 2019) and financial constraints (Rodrigues, 2017).

Challenges with information security and privacy are typical when adopting IoT (Internet of Things) technology (Mendhurwar & Mishra, 2019), and the challenge with big data and DT is precisely the right managing of business data (Pereira, Belo & Ravesteijn, 2018). Airline companies, among other things, face the technological challenges of managing airports (Zahariaa & Pietreanub, 2018). The inter-regional difference in Russia is the main obstacle to digitalisation of the economy (Afonas, 2018), while resistance to changes and lack of knowledge, skills and interests is the main obstacle of DT Kosovo (Limani, Stapleton & Groumpos, 2018).

The challenge for DT of production in Berlin is digital networking (Stark, Damera & Lindow, 2018), while inadequate infrastructure and cultural barriers pose problems in Dubai transformation (Salem, 2017). Digital infrastructures are often large, difficult to undergo control (Yli-Huumo & Smolander, 2017), require large financial resources with expected long-term returns (Knop, 2017) and complete business process reorganization (Achatz, 2017).

Apart from the fact that organizations must define the leaders of digital transformation, its capacities must not be out of focus. One of the challenges facing organizations is infrastructure. It implies the existence of adequate space for storing and manipulating the data (which will be known to be used at the right time and in the right place), a secure system and a quality network to be managed by authorized experts (Tiersky, 2017).

In addition, organizations need to consider the optimal number of business solutions and information systems that guarantee productivity and comply with the way businesses operate. In addition, they need to be aware of their business models and be prepared for constant changes and modification of the same so as not to lag behind in competition. One of the challenges represents the finances of organizations that are within the scope of digital transformation substantial and require them to be well managed. Organizational culture is in most cases underestimated in the process of digital transformation while employees are often constrained by changes and are hardly moving away

from the established patterns of behavior and action (Tiersky, 2017). A well-defined strategy is also one of the challenges faced by organizations in implementing digital transformation (Henriette, Feki & Boughzala, 2016). For organizations, it represents a well-defined digital path, specification of goals aimed at improving business processes, adopting new business models with multiplication of communication channels for the purpose of expanding the market and personalized end-user relationships. The digital strategy needs to be implemented in the organization processes, which is another challenge for organizations (Vasiljeva & Lukanova, 2016).

### 3.3. Classifying into categories: two phases

After content analysis and review of all 25 papers in detail more than 100 potential challenges, issues, barriers and problems in DT were identified and extracted from every paper (See Table 1).

To classify them into one of previous mentioned four categories (C – challenges; I – issues; B – barriers; P – problems) iterative process of evaluation and classification was conducted in two separate phases or passes. Firstly, authors separately classified every potential “problem” as could be seen in Fig. 3. (1st pass) and after that, execute 2<sup>nd</sup> pass together.

No	“Problems in DT – Author A” – 1st pass				C	I	B	P
1.	misunderstanding of the DT processes;							x
2.	misunderstanding of the processes;							x
3.	misunderstanding of the need to increase the number of IT-specialists;				x			
4.	impossibility of synchronization between digital devices to each other;						x	
5.	managing operations in the digital environment;				x			
6.	partial awareness of the respondents of the need to respect digital reputation, digital ethics and digital culture					x		
7.	high costs;							x
8.	limited budgets;							x
9.	insufficient budgets allocated to libraries;						x	
10.	„undigital“ culture				x			
11.	defining the right priorities;				x			
12.	aggregate data or personalise;				x			
13.	providing more resources to IT staff vs. more self-service analytics;				x			
14.	storing all data vs. selecting data to store that serves a specific purpose;				x			
15.	work performed by people vs. computing machines;							x
16.	security vs. accessibility;							x
17.	privacy of individuals vs. understanding of an individual							x
18.	technical issues;							x
19.	legal issues;							x
...	loss control;				x			
100.	effective implementation of the DT strategy				x			

Figure 3. Classifying “problems” into categories: challenges; issues; barriers and problems - 1st pass

Secondly, authors have combined two lists of 100 items classified by each author for himself or herself into second pass to get final classification and harmonize author’s opinions (Fig. 4).

No	“Problems in DT – Author A and B” – 2st pass				C	I	B	P
1.	misunderstanding of the DT processes;							x
2.	misunderstanding of the need to increase the number of IT-specialists;				x			
3.	impossibility of synchronization between digital devices to each other						x	
4.	managing operations in the digital environment;				x			
5.	partial awareness of the respondents of the need to respect digital reputation, digital ethics and digital culture					x		
6.	high costs;							x
7.	limited budgets;							x
8.	insufficient budgets allocated to libraries;							x
9.	„undigital“ culture						x	
10.	defining the right priorities;				x			
11.	aggregate data or personalise;				x			
12.	providing more resources to IT staff vs. more self-service analytics;				x			
13.	storing all data vs. selecting data to store that serves a specific purpose;				x			
14.	work performed by people vs. computing machines;				x			
15.	security vs. accessibility;							x
16.	privacy of individuals vs. understanding of an individual							x
17.	technical issues;					x		
18.	legal issues;					x		
19.	loss control;							x
...	...							
100.	effective implementation of the DT strategy				x			

Figure 4. Classifying “problems” into categories: challenges; issues; barriers and problems - 2nd pass

### 3.4. Systematization of results

After classifying 100 potential "problems" into categories: challenge, issues, barriers and problems, systematization of results was conducted in terms of reducing the number of "items" to eliminate duplicate

or identical terms. By reviewing the literature and the detailed analysis of the articles taken into account in this research, a concise list of the most significant and most common challenges, issues, barriers and problems occurring during digital transformation and its implementation in the processes has been made and it is presented in Table 2.

**Table 2.** Challenges, issues, barriers and problems in Digital Transformation

<i>Challenges</i>	<i>Issues</i>	<i>Barriers</i>	<i>Problems</i>
<ul style="list-style-type: none"> <li>• adapting to market needs, defining new knowledge and skills;</li> <li>• organizational; technical legal and security challenges;</li> <li>• customer-related challenges;</li> <li>• necessary digital literacy of all stakeholders;</li> <li>• the complexity of predicting the DT process and defining new values that are delivered to customers;</li> <li>• new ways of delivering value to customers;</li> <li>• new competition;</li> <li>• lack of clear vision;</li> <li>• inadequate organizational culture;</li> <li>• undigital organizational culture;</li> <li>• development of a new culture;</li> <li>• resistance to change;</li> <li>• digital data and new technologies;</li> <li>• reducing face-to-face contacts;</li> <li>• development of new capabilities and skills;</li> <li>• engagement of employees and constant education of employees;</li> <li>• interdisciplinary approach and needs for new knowledge;</li> <li>• adoption of technology;</li> <li>• collecting large amounts of data and managing with them properly;</li> <li>• planning of information logistics in advance (whole life span);</li> <li>• defining the strategic vision of DT</li> </ul>	<ul style="list-style-type: none"> <li>• inadequate procedures for proper management and control of data;</li> <li>• security issues (viruses, worms, trojans, software bombs);</li> <li>• technical issues;</li> <li>• legal issues;</li> <li>• inflexibility and lack of support;</li> <li>• lagging marketing activities.</li> </ul>	<ul style="list-style-type: none"> <li>• high costs, limited budgets;</li> <li>• misunderstanding of DT Process;</li> <li>• misunderstanding of strategy and true priorities of DT;</li> <li>• DT complexity;</li> <li>• complexity when adapting new business models;</li> <li>• misunderstanding the needs for IT specialists,</li> <li>• lack of skills and inadequate engagement of employees;</li> <li>• mistrust in general;</li> <li>• indifference</li> <li>• lack of awareness of technology and how it works;</li> <li>• weak innovation culture;</li> <li>• unavailability of resources (lack of IT experts on job market);</li> <li>• digital inequality (elimination of jobs, labour market polarization);</li> <li>• cultural barriers in general;</li> <li>• unequal regional development;</li> <li>• lack of standards;</li> <li>• infrastructural and technological barriers;</li> <li>• assertiveness to changes by employees.</li> </ul>	<ul style="list-style-type: none"> <li>• endangering security and privacy;</li> <li>• loss control;</li> <li>• security in the cloud;</li> <li>• prone to attack;</li> <li>• possible downtime;</li> <li>• providing more resources to IT staff vs. more self-service analytics;</li> <li>• storing all data vs. selecting data to store that serves a specific purpose;</li> <li>• work performed by people vs. computing machines;</li> <li>• security vs. accessibility;</li> <li>• lack of security and privacy;</li> <li>• inability to control the data being shared;</li> <li>• digital infrastructure is often global and remote;</li> <li>• lack of infrastructure and data supply framework;</li> <li>• inaccessibility of data.</li> </ul>

## 4 Discussion and Conclusion

Digital transformation is happening now. It is represented in all spheres of human life, pervades the entire business system and is represented in all industries. For organizations, a demand is set on change of business models, innovations of business processes, flexibility due to the complexity of the transformation process, strong focus on end-users with the aim of gaining more market share and gaining advantages over competitors.

Organizational assertiveness, fear of change and scarce resources are the main obstacle to the initial idea of starting a digital path. Though often expressed as synonyms, there are various challenges, issues, barriers, and problems that organizations face when tackling the implementation of the digital strategy. They need to focus enough attention on it, implement adequate procedures for their resolution and analysis so as not to become a permanent obstacle to the organization in its foundational transformation.

This paper provides in detail explanation, classification and systematization of challenges, issues, barriers and problems in Digital Transformation.

It's based on detail literature review, responsive results driven research and analysis of 25 most prominent scientific papers dealing with this topic. Finally, authors made a classification list (Table 1) from more than 100 potential "problems" in DT process discovered.

Literature analysis made here could have implications for further research in this area of challenges, issues, barriers and problems related to digital transformation and their representation. For example, the direction of future research can be focused on identifying the challenges, issues, barriers, and problems faced by educational institutions or some specific industry/ domain in digital transformation.

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