

Digital Business Transformation Methodologies: A Quasi-systematic Review of Literature

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Abstract— The globalized scenario of great competition in the corporate world and the use of new disruptive technologies, which are associated with a revolutionary innovation process, are leveraging current business models and awakening the latent need for companies to adapt definitively to this historic moment of transformation digital driven by the Pandemic of the new Coronavirus.

In addition to the new commercial relationships using technology as a support base for all business processes, they are also highly dependent on the care with the privacy of the personal data used. Security incidents that occur with this data can drastically compromise the image of companies and also imply serious sanctions provided for in privacy laws such as the Brazilian LGPD - General Data Protection Law.

Thus, this work aims to map state-of-the-art articles that address Digital Business Transformation Methodologies, aiming to understand how these methodologies can be replicated in companies to accelerate the reach of this new industrial revolution. A quasi-systematic review of the literature was carried out, involving the main methodologies created from the year 2011 and 127 studies were analyzed, and which 12 were considered relevant.

The results show that the number of works related to Digital Transformation Methodologies is still very small and that it started to grow from 2017. The COVID-19 is one of the main reasons for last year's research. there is a diversity of countries studying the theme. Few articles refer to adequacy to the requirements of the privacy laws and protection of personal data existing in their countries.

IndexTerms—Business Transformation, Digital Transformation, Process Modeling, Process Management, Agile.

I. INTRODUCTION

The digital transformation is reshaping competition in many well-established industries [1]. Companies are being challenged to adapt to the new wave of digital transformation that the world is experiencing or, otherwise, they will become obsolete.

But what would be the definition of digital transformation and what is its relationship with digitization. Digital transformation describes the changes imposed by information technologies as a means to automatize tasks [2]. In other hand, the digitization is the process of changing from analog to digital form.

According to the World Economic Forum, only 1% of investments in digital transformation in 2018 would have met expectations [3]. It shows the necessity for the existence of a strategy or planning for the adaptation of companies in relation to the ideas and possibilities of the current world,

such as, for example, to have a digital channel in their commercial relations for the sale of products and services.

When the confrontation of the new coronavirus (COVID-19) started mainly with social isolations, these adaptations needed to be accelerated. All sectors of the economy were affected, even companies that were already starting their digital transformation processes. Face-to-face activities from that moment on needed to be virtual, papers became emails and documents that were physically stored, needed to become digital. Organizations that have failed to adapt have been left behind.

With this information in mind, this systematic mapping aims to find studies that present methodologies or models that can be adopted by companies that need to enter the world of digital transformation.

Thus, the mapping is divided as follows: Section 2 is presented the methodology used for this mapping. In section 3, the analysis of the results obtained is presented. In section 4 the completion of the mapping that is followed by the references.

II. METHODOLOGY

This article aims to map studies that present models of strategies in which companies use technology to improve their performance, expand their reach and optimize their results, this process is what we call digital transformation. For this, the article was adopted the method of systematic literature mapping (SLM) which, according to Petersen [4], consists of defining research questions, conducting the search and selection of relevant studies, extracting data and mapping the results.

This Section describes how the process of searching and selecting the studies was performed.

A. Research Questions

Reaching the objective proposed by this mapping, the following research questions were elaborated:

Q1). What is the growth of studies on digital transformation methodologies in the last 10 years?

Q2). Which countries have contributed the most to studies on digital transformation methodologies?

Q3). Were the studies driven from the context of the COVID-19 Pandemic?

Q4). What studies are oriented to data privacy laws such as GDPR or LGPD?

B. Search and Selection Strategies

To elaborate this mapping, the following databases were used: ACM Digital Library, IEEE Xplore, Science Direct, Scopus and Springer Link. To access the publications without restrictions, was used the CAPES journal portal (<http://www.periodicos.capes.gov.br>).

To perform the searches on the bases listed above, an English search term was constructed using the keywords, originating the following term: ("business transformation" OR "company transformation") AND "digital transformation") AND ("team management" OR "squad management" OR "talent management" OR "process management" OR "process modeling" OR "agile" OR "agility").

The searches were carried out in April 2021 and 127 articles were found, 4 articles found in the ACM database, 1 article from the IEEE Xplore database, 18 articles from the ScienceDirect database, 90 articles on the Scopus database and 14 articles on the SpringerLink database.

TABLE I.
RESULTS OF SEARCHES ON THE BASES

Base	Search results
ACM Digital Library	4
IEEE Xplore	1
Science Direct	18
Scopus	90
SpringerLink	14

According to TABLE 1, Scopus was the basis with the highest number of results representing 70.8% of the total and the IEEE Xplore with the lowest result with only 1 article found.

After the search, the articles were submitted to a filtering process through the selection and exclusion criteria. It is worth noting that in the first stage of the searches, studies with more than 10 years of publication have been filtered and that are not in the Portuguese or English languages.

C. Selection Criteria

In order to filter the most relevant articles of the mapping, inclusion and exclusion criteria were defined which are:

Only studies in the languages Portuguese and English were included; and articles proposing methodologies or frameworks aimed at digital transformation and related to business transformation.

Studies that are not directly associated with research questions; duplicate texts; and studies not made available in full for free download were excluded.

After applying the criteria, of the 127 studies found 8 were rejected because they were duplicated, 85 were rejected because they were not directly associated with research questions and 3 because they were not available free of charge. From this, 30 articles were selected to make up the studies.

TABLE 2 shows how the results were after the application of the criteria, however we can see that only the ACM Digital

Library database not presented relevant studies for systematic mapping.

The remaining articles were submitted to some quality criteria, where 4 objective questions were applied where they can be answered with "yes" representing 1 point, "partially" representing, 0.5 point and "no" representing 0 point. With

TABLE II.
RESULTS OF STUDIES AFTER THE APPLICATION OF INCLUSION AND EXCLUSION CRITERIA.

Base	Results before	Results after
ACM Digital Library	4	0
IEEE Xplore	1	1
Science Direct	18	5
Scopus	90	22
SpringerLink	14	2

this, each article can reach a maximum of 4 points. Articles that have reached a cutoff score of 1.4 points are accepted by the quality criteria. Thus, the following questions were elaborated:

1. Did the study prove the validity of the results obtained statistically?
2. Did the study create a new digital transformation methodology?
3. Did the study structure the methodology so that it is replicable?
4. Did the study show the result of the application of the methodology in a real environment?

Of the 30 articles that reached this phase, 12 articles reached the cutoff score and were accepted and considered relevant for the study. In Figure 1 we can graphically visualize this result.

After quality selection and evaluation, the studies were forwarded for in-depth reading and analysis and the results can be found in the data analysis and discussion section.

III. DATA ANALYSIS AND DISCUSSION

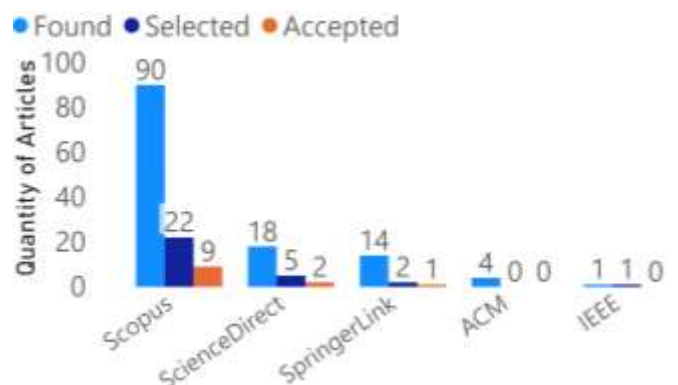


Fig 1. Quantitative of articles that were found, selected and accepted by each search base.

A. Data Analysis and interpretation

In this section, the results obtained from the analysis of the studies are presented, answering the research questions.

Q1). What is the growth of studies on digital transformation methodologies in the last 10 years?

The objective of this issue is to identify the annual growth of studies involving digital transformation methodologies and seek future perspectives on the subject.

Figure 2 shows the growth of studies based on the selected articles. We can observe that from 2011 to 2016 there were no publications accepted by the criteria determined. Only from 2017 relevant articles began to be published, with the exception of 2019.

It is important to remember that in 2021 with only 4 months, already has the same amount of articles from the previous year. This occurrence may signal a significant increase in the number of publications until the end of the year. One fact that may cause an increase in the last year is the great need for forced adaptation for companies of all branches due to the COVID-19 Pandemic, however, it is believed that in the coming years there will be a growing publication of studies related to the subject.

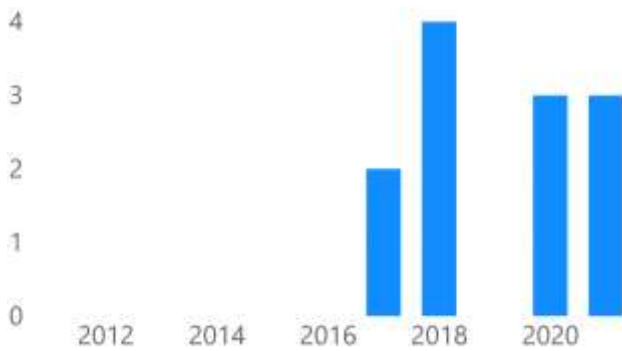


Fig 2. Quantitative studies per year in the last 10 years. Reference of the articles recorded in question Q1.

- 2017: [11; 16]
- 2018: [6; 7; 12; 15]
- 2020: [5; 10; 14]
- 2021: [7; 8; 13]

Q2). Which countries have contributed the most to studies on digital transformation methodologies?

This issue aims to present a survey of which countries have contributed the most in the last 10 years with studies.

According to Figure 3, it can be seen that Germany and the Czech Republic are the leaders in publications, with 2 each. The other 8 countries are also tied with only 1 publication. However, despite the simple superiority of Germany and the Czech Republic, the most important information that can be absorbed is the diversity that is presented in the chart below:

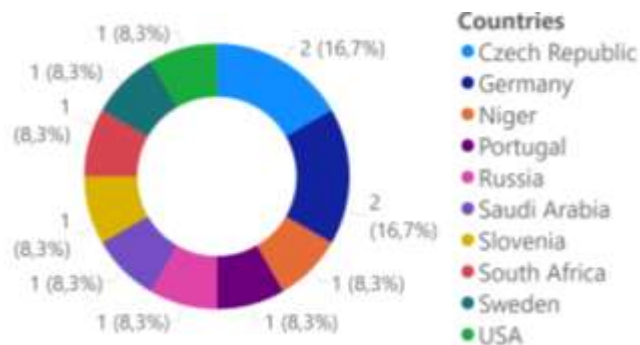


Fig 3. Quantitative studies by country of publication.

Reference of the articles recorded in question Q2.

- Czech Republic: [7; 15]
- Germany: [5; 6]
- Niger: [13]
- Portugal: [16]
- Russia: [9]
- Saudi Arabia: [14]
- Slovenia: [10]
- South Africa: [11]
- Sweden: [12]
- USA: [8]

Q3). Were the studies driven from the context of the COVID-19 Pandemic?

This question aims to identify the impact of COVID-19 on studies related to digital and business transformation.

Figure 4 shows in a graph the percentage of articles that refer to COVID-19. Through this indicator, the influence of this Pandemic can be observed to search for business transformation methodologies.

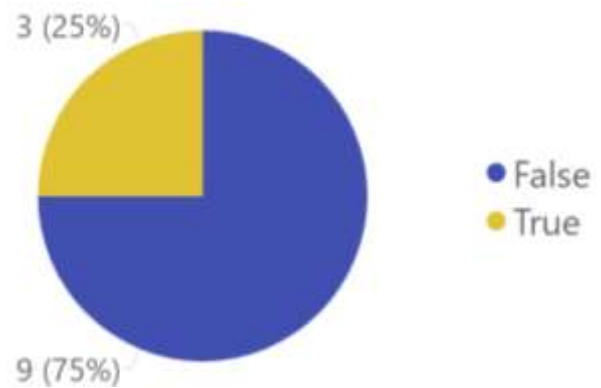


Fig 4. Quantitative of articles mentioning COVID-19. Reference of the articles recorded in question Q3.

- True: [8; 13; 14]
- False: [5; 6; 7; 9; 10; 11; 12; 15; 16]

In 6 articles published between 2020 and 2021, 3 were motivated by COVID-19, which we can conclude that the pandemic is of great importance for the results obtained in recent years and may continue to be the focus of many future studies.

Q4). What studies are oriented to data privacy laws such as GDPR or LGPD?

The issue concerns the adequacy of the methodologies found to the privacy and protection laws of personal data. From these laws, both companies and government institutions will need to adapt their business processes, but the reality of the selected studies is totally opposite.

As we can see in the Figure 5, in 12 selected studies, only 3 mention data protection, all of which were published in the years 2020 and 2021, moments that the concern with the subject took higher proportions.

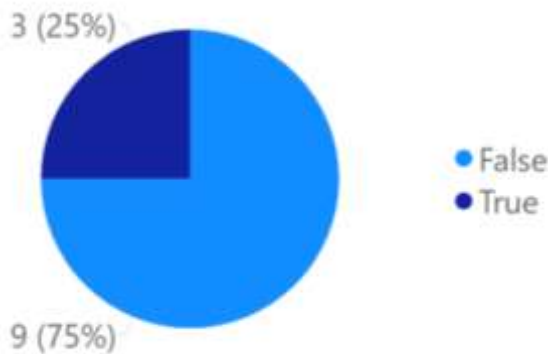


Fig 5. Quantitative of articles that took into account the LGPD or GDPR.

B. Threats to validity

During systematic mapping there were some factors that may have affected the results obtained. These factors are described below.

Internal factors: The date of the searches at the databases, because it was performed before the end of the first semester may have influenced the number of studies found that were published in 2021.

External Factors: This systematic mapping was still performed during the Pandemic period, however, we cannot say that in the post-pandemic period, the trends will remain the same. After the end of the pandemic, the need to be included in the digital environment may decrease, although many of the "digital" customs have come to stay.

IV. CONCLUSION

This study aimed to analyze how the world is reacting to adapt to the digital transformations that have been happening in the last 10 years, through a systematic mapping of the literature.

In the process, Petersen's systematic mapping method was used, which assisted in the elaboration of the process of searching, selecting and filtering articles. With the search terms defined, searches were performed in the following databases: ACM Digital Library, IEEE Xplore, Science Direct, Scopus and SpringerLink. At the end of the search, a total of 127 were found, all of which were articles in English. In the articles found, filtrations were applied through inclusion, exclusion and quality criteria, 12 articles were selected.

From the analysis and detailed reading of the selected articles, it was possible to answer the research questions. Therefore, despite presenting a possible interest on the subject only in recent years, the expectation is that the next few years it will be increasingly addressed (Q1), Germany and the Czech Republic were the 2 countries that most published studies on the subject (Q2), it could be observed a great influence of COVID-19 in the results of the studies, representing 50% of the articles of the last 2 years (2020 and 2021) of the (Q3) and 25% of the articles approach the theme LGPD (Q4). However, we can say that there are still few studies on the subject, but the trend is that, due to the pandemic, in the coming years there will be more patterns of digital transformation methodologies.

Thus, it is believed that this study can help academics and entrepreneurs who seek information and support involving new methodologies of digital transformation.

This review can be extended by changing the inclusion, exclusion and quality criteria, such as searching for articles that are not directly related to methodologies, but that deal with essential actions and projects to be carried out in companies for insertion in the context of Digital Transformation.

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