# Fachhochschule Dortmund

University of Applied Sciences and Arts

# A Classification of Digital Transformation Projects' Characteristics: A Literature Review

**Project Thesis Report**

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# 1. Introduction

"Digital Transformation" has become a buzzword in recent era. We are living in an age when the business world is willingly taking on more steps towards bringing digital transformation into their practice. Currently, organizations are undertaking small, medium, or even big digital transformation projects because of raising demands in different industries. Nevertheless, digital transformation is not a new aspect. Transformation and innovation regarding digital aspects are already getting priority in the diversified business and industrial sectors from the 1990's (Lozic, 2019).

The journey of digital transformation began by understanding the benefits of keeping the digital form of documentation and preserving those for a long duration. Gradually, the companies started to see a new light in regulating their products, processes, services and business models through digital transformation and started to search a process to make this transformation effective (Barthel and Hess, 2019). Step by step it prompted changes not only in processes, but also in the organizational environment and strategic management which paved the way for normalizing digital transformation projects (Lozic, 2019). A digital transformation project is a project involves multiple view and perspectives from information technology, innovation and organizational change (Hafseld et al., 2021a).

The process of Digital Transformation includes improving operational efficiency or simplifying the work process to empower value co-creation considering the process of digitalization and digitization (Verhoef et al., 2021; Zoppelletto et al., 2020). It proves that the three terms "Digital Transformation", "Digitalization" and "Digitization, are related, but not same. Due to being closely related, they have been used  interchangeably which has led to confusion according to what they actually mean (Mergel et al., 2019). For instance, digital transformation process has been considered to be a process only to improve existing process with help of various technologies (Kraus et al., 2021). Whereas this process resembles digitalization process (Björkdahl, 2020; Elg et al., 2021; Kuusisto, 2017; Rachinger et al., 2018). On the other hand, from the perspective of Branca et al., (2020), transformation process of organizational functions such as communication, business model and information technology is known as digitalization. Although, this expresses the thought of digital transformation (Elg et al., 2021; Mergel et al., 2019; Verhoef et al., 2021). Kayikci and Roosevelt et al. (2018; 2015) indicate digitization process as digitalization. Consequently, it

affects the understanding and management of such processes. The challenge in properly defining and understanding the difference of the terms motivated undertaking this study.

Research has highlighted the rise of digitalization project implementation in all types of organizations that are looking to remain competitive (Kraus et al., 2021). Organizations have been found to undertake digital transformation projects as a step towards digitally transforming ( Sanchez-Segura et al., 2021). Despite this growing trend and need for digital transformation projects in organizations, there is still very little knowledge available on how to properly manage them. And to enable developing proper management approaches for digital transformation projects, it is crucial to first establish a common understanding on what such projects entail.

Considering the ongoing circumstances of alternating the terms of digitization, digitalization and digital transformation, the aim of this literature is to bring a common understanding of digital transformation project. Researchers have attempted to provide several definitions for the term. Henriette et al. (2015) defines digital transformation projects as those involving the implementation of digital capabilities to support business model transformations; Grahn et al. (2021) defined digital transformation projects as projects involving software or programmable instructions; and Sanchez-Segura et al. (2021) projects to be developed in the process of the digital transformation. Nevertheless, there is no one agreement of what such projects entail. There is still a high demand for creating an universal definition of Digital Transformation Project (Kraus et al., 2022).

This review paper has been encouraged by the thought provided by Kraus et al., (2022), and involves the exploration of how DT projects have been defined so far. Existing research that has provided definitions of DT projects will be reviewed to identify commonalities and attempt to generate a universal definition. Another purpose of this review paper was to analysis and accumulating the characteristics of DT projects to better understand what they entail.  Barthel and Hess (2019) stated their assumption about the impact of understanding the concept of DT project to better design and manage them. Besides, researching on the process of managing Digital Transformation (DT) Project has been highly recommended by Henriette et al., (2015), which provided motivation for the second research question. Grahn et.al (2021) supported the above recommendations by discussing about the failure of companies while opting digitalization projects because of the lack of perception and difference between DT and

digitalization projects. Which means shortcomings in understanding the process, inadequate knowledge sharing and insufficient experience in digital transformation may lead to failure (Mirkovic et al., 2019). Some other reasons have also been found towards this failure as following. Failed projects have been seen to have characteristics such as having a weak and unstable vision and objective and inadequacy in leadership skills (Mirkovic et al., 2019). When there are no clearly defined roles and an absence of reacting urgently to any tasks, the backbone of transforming breaks down easily due to a lack of a responsible person (Mirkovic et al., 2019). Despite all of those, the root cause of most the failure cases, (around 70%), is misconception about DT projects characteristics and definition (Smith, 2020). Such factors have motivated the author to conduct this review and provide an understanding of characteristics that describe DT projects.

There are multiple literature review papers such as (Hafseld et al., 2021a; Ivančić et al., 2019; Ulas, 2019; Verhoef et al., 2021) on digital transformation projects which are mentioned in section 2 but are framed from other perspectives e.g strategies, impacts, processes and challenges. This scoping review aims to add another dimension to research in order to find out people's understanding and differentiating level of Digital Transformation and Digitalization Projects and the considerable key factors of DT projects. According to the discussion on previous paragraph, this process is scarce in literature. In section 2, the research gap and questions of this study are also elaborated. Section 3 describes the methodology followed to conduct this scoping review and contains all the screened articles included and analyzed during the review. The analysis part of all those articles is included in section 4. Section 5 discusses the findings gathered from the analysis and presents recommendations for future studies. A brief conclusion is provided in section 6.

## 2. Background

### 2.1. Digital Transformation

Digital Transformation can be defined as a transformative journey that influences digital capabilities and technologies by empowering business models, operational processes, and customer experiences to achieve valuable outcomes (Morakanyane et al., 2017). In the early period, DT was commonly referred as digitalization and thought to be the process that can only be applied to technical innovation (Henriette et al., 2015). Henriette et al., (2015) conducted a

systematic literature review to understand the arena of DT and found that it has an impact on a vast arena including digital capabilities, business model, operational process and customer satisfaction including the whole organization.

In 2018, another systematic literature review (SLR) was conducted by Pihir et al., (2018) aiming to define DT and identify its drivers. The study focused more on the digital maturity model and its connectivity with DT. The factors and enablers of DT and methodologies of assessing an organization's digital maturity were part of the analysis. It also analyzed the impact of different technologies and emerging trends with DT (Pihir et al., 2018). The generic drivers of DT were brought to light by Osmundsen et al., (2018). After conducting a SLR with 21 relative papers, they identified 4 drivers along with 6 objectives, 8 success factors and 3 implications from the point of view of different researchers (Osmundsen et al., 2018).

Subsequently, Mergel et al., (2019) did an empirical investigation through interviewing 40 experts from 12 European countries to derive the definition of DT. Their investigation resulted in defining some factors; such as drivers, area of application, included process, output, outcome and impact of DT (Mergel et al., 2019). Realizing the struggle of organizations to find out how to take over DT, Barthel and Hess, (2019) came forward by holding a literature review to collect visions from projects. Initially, they tried to gather the view, how the transformation was going on in IT, Techno Change and Organizational Change projects and visualize a holistic view of DT projects. Consequently, they did a case study based on 4 different companies to strengthen their study through portraying the resources and approached those companies to adapt while moving towards DT (Barthel and Hess, 2019). Zaoui and Souissi, (2020) gathered the approaches towards DT through conducting a systematic literature review. Moreover, Antonizzi & Smuts, (2020) conducted a study to identify the characteristics of DT considering its relation with digital entrepreneurship.

Most of the time DT has been the topic of the research coupling with other relative topics. Whereas, independently defining DT was seen in (Reis et al., 2018). After that Zhu et al., (2021) have come up with a systematic literature review on analyzing the structure of digital transformation.

## 2.2. Digitalization

Digitalization encompasses the incorporation, customization, advancement, and oversight of groundbreaking digital technologies within organizations, incorporating the procedure of digitization (Wiesböck, 2018). We look forward to seeing what research, specially review papers, has been published based on digitalization in this section. In 2017, Kuusisto (2017) brought in light the organizational effect of digitalization which resulted in indicating the main areas where the impact becomes visible. Those areas are learning and spreading knowledge, innovation, organizational flexibility and business ecosystem and structure (Kuusisto, 2017). Along with the remarkable progress of digitalization, the conceptual theory of digitalization was differing from point of view of different organizations. "Digitalization: A Literature Review and Research Agenda" was one of the literatures attempting to analyze definitions of digitalization (Reis et al., 2020). They had derived three specialized domain of developing digitalization- social, economic and organizational (Reis et al., 2020). But no further discussion was found on those. Though digitalization has been the topic of analysis in many cases, a few articles can be found which talked about digitalization projects. A recent structured literature review was found to frame the success factors of digitalization projects from specifically business process and  project management based articles (Baier et al., 2022).

## 2.3. Digitization

Digitization is known as the first step towards Digital Transformation. Digitization is known to be a process of empowering analog or physical artifacts into digital version to enhance their integration into business process (Schallmo and Williams, 2018). Several articles are seen to be discussing library digitization (Holley, 2004; Lopatin, 2006; Petersohn et al., 2013; Verheusen, 2008). Lopatin, (2006) provided us with a guideline centralizing the factors which has impact on library digitization. Many aspects of such digitization projects had been reviewed from the angle of the published paper during 2000-2005. Besides, digital preservation of archives and cultural heritage in library management had already become a common phenomenon during the 2000's. Still, the concept, methods and techniques of digitization were a matter of concern, which was noticed by Routhier Perry (2014). He pointed out the challenges commonly faced during digitization and how those can be overcome from a human and organizational perspective (Routhier Perry, 2014) Another article by Mohammed  (2013) was found to explore the digitization project going on in Nigerian Universities' libraries pointing the challenges and solutions.

## 2.4. Research Gap

The projects refered as Digital transformation or digitalization do not seem to be in the limelight. DT has become a popular research topic with researchers investigating its processes (Ivančić et al., 2019; Ulas, 2019), strategy (Björkdahl, 2020; Zoppelletto et al., 2020)., impacts (Elg et al., 2021; Hafseld et al., 2021a; Rachinger et al., 2018; Verhoef et al., 2021) and challenges (Almeida et al., 2020; Branca et al., 2020; Effah and Nuhu, 2017; Legner et al., 2017) . But none of the articles approached understanding the definition of DT projects and its common characteristics. The same fact goes for digitalization. The researchers have analyzed the definition, structure and process of digitalization and the success factors of digitalization projects. But the definition and characteristics of digitalization projects are not figured out. On the contrary, digitization projects got more featured regarding their process and challenges. Still, defining digitization projects were missing in the context. This review will therefore consider both three terms to ensure it fully captures the different definitions and characteristics provided in existing literature.

## 2.5. Research Questions

Primarily, the objective of this research article was to conduct a scoping review to find out how existing literature are defining "Digital Transformation Projects" and deliver the most common aspects. Thereafter, a new dimension was added to this review by also analyzing the characteristics or factors in such projects which are in practice by different organizations and have been discussed in the existing literature. Several drivers or factors were predefined by the author to analyze how those have an impact on DT projects. The research questions can be summed up below:

- How are the existing articles defining "Digital Transformation Project"?
- What are the characteristics of Digital Transformation Project?

# 3. Research Methodology

Deciding between systematic and scoping review was a crucial part at the beginning of the research. However, according to the intention and research questions, the research went to the direction of assessing and understanding the level of knowledge in the field of Digital transformation projects. It leads to doing a Scoping Review which has a same thought process (Peters et al., 2020). According to (Munn et al., 2022),

*"Scoping reviews are a type of evidence synthesis that aims to systematically identify and map the breadth of evidence available on a particular topic, field, concept, or issue, often irrespective of source (ie, primary research, reviews, non-empirical evidence) within or across particular contexts. Scoping reviews can clarify key concepts/definitions in the literature and identify key characteristics or factors related to a concept, including those related to methodological research."*

This research has a mirror view of the stated definition by synthesizing the evidence to clarify the research questions and identifying the key factors to characterize the concept of Digital Transformation Projects. The scoping review has been driven by the guidance of Munn et al., (2022) and Petres et al., (2020) combining with author's own perspectives. The review was started through a keyword-based searching process and ended up by sorting out those articles which can add value to the research goal depending on some chosen factors. The inclusion and exclusion criteria had been defined before the review started for each sortation step which helped the author to avoid biasness. Figure 2 demonstrates a summarized view of the review process done for this article.

### 3.1. Scoping Review Process

The process of scoping review in this research was started on June 11, 2022. The articles published till that day has been counted as the initial source of this literature review. After that, new publication can be released but those were not considered for limited time and avoiding complexity. The review was conducted through four steps. The guideline of this whole process is explained below to make it clear how the review has been conducted and how the author has reached the final decision.

### 3.1.1. Setting Research Objectives

The review process initiated with defining the purpose and expected goal of this research. The purpose was to search articles which emphasized to explain projects' details of "Digital Transformation Project". The goal was to uncover how DT projects have been defined (if any) from various sectors and by various researchers to find common understating among the researchers.

### 3.1.2. Search for Literatures

According to the research purpose, the following keywords were chosen to come up with all the relevant articles. Digitalization and Digitization with an 's' have been searched separately to cover all research that use both terms. The variation of terms used in the search string are listed below:

- Digital Transformation Project
- Digital Transformation
- Digitalization Project
- Digitalization
- Digitalisation Project
- Digitalisation
- Digitization Project
- Digitization
- Digitisation Project
- Digitisation

The search was conducted only using google scholar and without using any other filter. For each keyword, the search was continued till 6 pages. 528 number of articles in this span was included in the first shot from 63,82,793 search results.

### 3.1.3. Screening of the Articles

As mentioned, without any filtering 528 articles were added according to the above inclusion criteria. To organize those papers, a reference manager, Zotero, was used. In the first round of screening 30 duplicate articles were excluded which was automatically defined by Zotero. It was decided to review only peer-reviewed journals. Accordingly, 51 numbers of conference papers and 108 reports, theses, books, book sections, non-peer-reviewed journals and magazine articles were excluded. For other reasons 29 items were excluded, such as articles written in a language other than English, published in non-peer-reviewed sites or journals and for which, only citation was available. At the end of the first screening, 310 journal articles were selected for the next round of screening.

In the second round, the author went through the abstract of the selected articles from the first round. The target was to get the pieces of literature that emphasized on explaining or reflecting

thoughts about the predefined keywords by going through the titles and abstracts. Through this round, 128 research items were selected for the next round from 310 items.

Third round mainly focused on searching if the selected items can be retrieved for further screening or cannot be accessed. For this, the author went through all the articles included in Zotero and checked if the files of those articles were available or not. If not available, those were searched again in google scholar. During the search period, it was noticed that despite being available on the site, Zotero was not able to add some of the articles automatically. Therefore, those were added manually later. This screening round led to exclude 10 articles from 128, which were not possible to access or retrieve.

At this stage of screening, the objective was to screen the selected articles to find out if those will be value-adding to the research purpose or not. It is important to mention that rather than going into depth of the articles, the author skimmed through those to reach the desired objective of this stage. During this screening process, 13 more articles were found which were conference papers, thesis reports and reports but the reference manager indicated them as journal articles. Those were excluded at this stage resulting in 54 articles which passed for the final screening.

The final round of screening was done simultaneously with data extraction. For pursuing the desired data for research purposes some factors were defined which will be stated later in the data extraction step. For this, the author went through the selected articles deeply. During this process, the ones which do not provide value-adding information for the defined factors were ultimately excluded. Therefore, the screening ended up having 38 items which are 7.19% of identified items at the start of the review process.

Figure 1 will give a summarized view of screening process done in this scoping review.
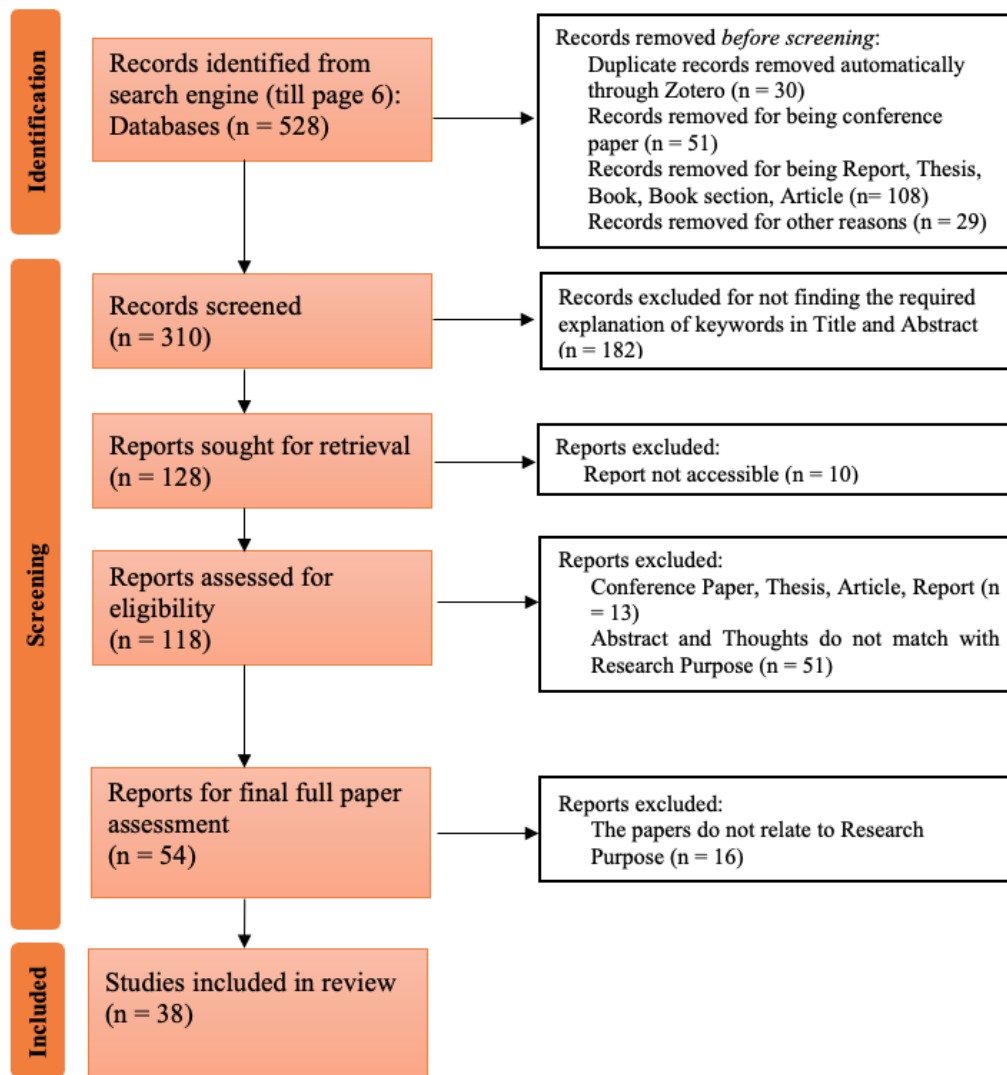
*Figure 1 : Screening Process for the Scoping Review (Source: Own)*

### 3.1.4 Quality Assessment

Without having a process of validation of selected research articles, the review process contains a possibility of being biased and can create a chance of gathering divert or irrelevant datasets. As this scoping review has been done by one author, there was no chance of cross validating each other's findings. To resolve this issue, the author decided to crosscheck the process of screening and went through the selected articles thrice to validate the collected dataset from those articles.

## Setting research question

| How the existing articles are defining "Digital Transformation", "Digitalization" and "Digitization" and their projects? | What are the characteristics of these types of projects? |
|---|---|

## Setting keywords

Digital Transformation Project, Digital Transformation , Digitalization Project, Digitalization, Digitalisation Project, Digitalisation , Digitization Project, Digitization , Digitisation Project, Digitisation

## Screening Criterion

| **Search Engine:** Google Scholar<br><br>**Reference Manager:** Zotero | **Focus Factors:** Definition of Keywords, Implementatin reason, Genre of research, Project drivers, initiation step, triggering object, team formation, acceptance; Innovation type and area, Expertise | **Time Frame:** All |
|---|---|---|

## Exclusion Criterion

| Articles, Report, Magazines, Conference papers, Thesis parers | Non-peer reviwed articles | Paper which does not contain English Version | Non-accesible paper |
|---|---|---|---|

## Quality Assesssment

The articles were read to identify the relevant papers that addredd the objectives of the review

*Figure 2: Flow chart of Research Method (Source: Own)*

## 3.2. Articles Selected for the Review

As mentioned in the previous section, the author ended up with 38 relative articles. The articles are clustered in the table below. They are divided into three groups according to the keywords search done in the first screening part. For easier identification, each article was assigned with a corresponding code number (e.g., P1, P2..Pn) as shown in table 1, 2 and 3.

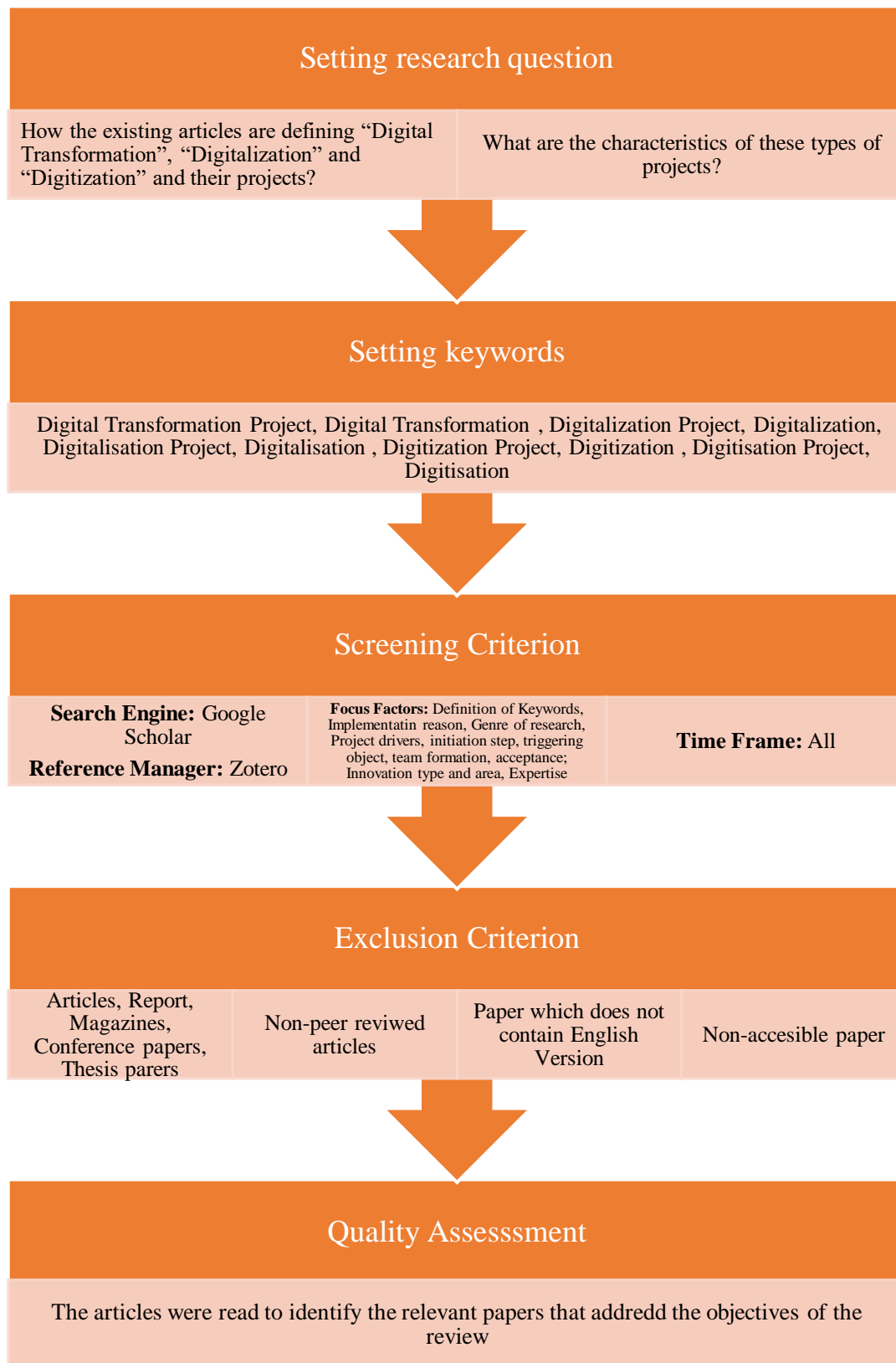*Table 1: Digital Transformation Projects and Digital Transformation*

| Selected Articles' Information_Group 1 | | | |
|---|---|---|---|
| **Title** | **Journal** | **Citation** | **Code** |
| **An attempt to understand complexity in a government digital transformation project** | International Journal of Information Systems and Project Management | (Hafseld et al., 2021a) | P1 |
| **Government inter-organizational, digital transformation projects: five key lessons learned from a Norwegian case study** | Procedia Computer Science | (Hafseld et al., 2022) | P2 |
| **Mastering the Digital Transformation Process: Business Practices and Lessons Learned** | Technology Innovation Management Review | (Ivančić et al., 2019) | P3 |
| **COVID-19 Pandemic: Shifting Digital Transformation to a High-Speed Gear** | Information Systems Management | (Soto-Acosta, 2020) | P4 |
| **Digital transformation in oil and gas companies a case study of bien dong poc** | Petrovietnam Journal | (Tung et al., 2020) | P5 |
| **Adopting a digital transformation strategy to enhance business network commons regeneration: an explorative case study** | The TQM Journal | (Zoppelletto et al., 2020) | P6 |
| **Digital transformation: A multidisciplinary reflection and research agenda** | Journal of Business Research | (Verhoef et al., 2021) | P7 |
| **Defining digital transformation: Results from expert interviews** | Government Information Quarterly | (Mergel et al., 2019) | P8 |
| **Digital transformation in healthcare: Analyzing the current state-of-research** | Journal of Business Research | (Kraus et al., 2021) | P9 |
| **Digital Transformation Process and SMEs** | Procedia Computer Science | (Ulas, 2019) | P10 |

*Table 2: Digitalization/Digitalisation Project and Digitalization/Digitalisation*

| Selected Articles' Information_Group 2 | | | |
|---|---|---|---|
| **Title of the paper** | **Journal** | **Citation** | **Code** |
| **Digitalisation and quality management: problems and prospects** | Production Planning & Control | (Elg et al., 2021) | P11 |
| **Digitalisation and the UN Sustainable Development Goals: What role for design** | ID&A Interaction design & architecture(s) | (van der Velden, 2018) | P12 |
| **The contribution of digitalisation to business longevity from a competitiveness perspective** | The TQM Journal | (Rossato and Castellani, 2020) | P13 |
| **Exploring digitalisation at IKEA** | International Journal of Retail & Distribution Management | (Hagberg and Jonsson, 2022) | P14 |
| **Digitalization and society's sustainable development – Measures and implications** | Proceedings of Rijeka Faculty of Economics: Journal of Economics and Business | (Jovanović et al., 2018) | P15 |
| **The Challenge of Digitalization in the Steel Sector** | Metals | (Branca et al., 2020) | P16 |
| **The Challenges and Opportunities in the Digitalization of Companies in a Post-COVID-19 World** | IEEE Engineering Management Review | (Almeida et al., 2020) | P17 |
| **Strategies for Digitalization in Manufacturing Firms** | California Management Review | (Björkdahl, 2020) | P18 |
| **The digitalization of retailing: an exploratory framework** | International Journal of Retail & Distribution Management | (Hagberg et al., 2016) | P19 |
| **Digitalization: Opportunity and Challenge for the Business and Information Systems Engineering Community** | Business & Information Systems Engineering | (Legner et al., 2017) | P20 |
| **Digitalization and its influence on business model innovation** | Journal of Manufacturing Technology Management | (Rachinger et al., 2018) | P21 |
| **Digitalization and business models: Where are we going? A science map of the field** | Journal of Business Research | (Caputo et al., 2021) | P22 |
| **How digitalization changes the workplace** | Dynamic Relationships Management Journal | (Cijan et al., 2019) | P23 |
| **Organizational effects of digitalization: A literature review** | International Journal of Organization Theory and Behavior | (Kuusisto, 2017) | P24 |

| Title | Journal | Citation | Code |
|---|---|---|---|
| **Institutional Barriers to Digitalization of Government Budgeting in Developing Countries: A Case Study of Ghana** | The Electronic Journals of Information Systems in Developing Countries | (Effah and Nuhu, 2017) | P25 |
| **Digitalization Canvas – Towards Identifying Digitalization Use Cases and Projects** | Journal of Universal Computer Science | (Heberle et al., 2017) | P26 |
| **When the tail wags the dog? Digitalisation and corporate reporting** | Accounting, Organizations and Society | (Rowbottom et al., 2021) | P27 |
| **Improvement of Receiving Department by a Digitalization Project in a Medical Devices Company** | Manufacturing Engineering | (Pagán Ruiz, 2014) | P28 |
| **On the Relationship Between Information Management and Digitalization** | Business & Information Systems Engineering | (Riedl et al., 2017) | P29 |

*Table 3: Digitization/Digitisation Project and Digitization/Digitisation*

| Selected Articles' Information_Group 3 | | | |
|---|---|---|---|
| **Title** | **Journal** | **Citation** | **Code** |
| **Developing a digitisation framework for your organisation** | The Electronic Library | (Holley, 2004) | P30 |
| **Mass Digitisation by Libraries: Issues concerning Organisation, Quality and Efficiency** | LIBER Quarterly | (Verheusen, 2008) | P31 |
| **Digitization and the Future of Natural History Collections** | BioScience | (Hedrick et al., 2020) | P32 |
| **Excavation is Destruction Digitization: Advances in Archaeological Practice** | Journal of Field Archaeology | (Roosevelt et al., 2015) | P33 |
| **Sustainability impact of digitization in logistics** | Procedia Manufacturing | (Kayikci, 2018) | P34 |
| **The Albert Einstein archives digitization project: opening hidden treasures** | Library Hi Tech | (Mendelsson et al., 2014) | P35 |
| **Resource leveling for a mass digitization project** | Library Management | (Petersohn et al., 2013) | P36 |
| **Challenges of digitization of the National Archives of Nigeria** | Information Development | (Balogun and Adjei, 2019) | P37 |
| **Monitoring digitisation: lessons from previous experiences** | Journal of Documentation | (Manžuch, 2009) | P38 |

# 4. Data Extraction and Analysis

After the vigorous analysis for sortation, the steps come to the extraction of required data for moving forward to achieve the research purpose and use suitable techniques to arrive at a point of decision combining those data (Nielsen et al., 2016). To obtain the research purpose, frequency and content analysis were used. This review was mainly directed toward a qualitative analysis. As a result, most of the factors below were found to be qualitative data, except only a few, such as the number of articles published in a period and density of articles published in a continent.

## 4.1. Addressing the Research Objectives

Data extraction and recording them accurately is the crucial and most important part while addressing the research objectives in a review paper. We need to remain conscious while doing data extraction to reduce biases. To maintain a structured data extraction form, it should be regulated before defining the study protocol (Kitchenham and Charters, 2007). During conducting this scoping review, a google form was prepared beforehand for the analysis part. Questions and fields were designed according to the decision factors so that data regarding those factors could not be missed from any of the articles. The questions contained a mixture of open and closed questions. Figure 3 will exemplify those questions. The main target of this scoping review is towards analyzing the understanding of Digital Transformation project. It was noticed that the existing articles have interchangeably used the term Digital Transformation and Digitalization to indicate Digital Transformation project. Considering this fact while extracting data, the author has considered only Digital Transformation project and Digitalization project focused articles and indicated both commonly as "Digital Transformation Project". The articles focused on Digitization project were focused on digitization solely which leads to excluding those articles from this analysis. Therefore, the analysis contains 29 articles from the selected one excluding the articles mentioned in table 3.
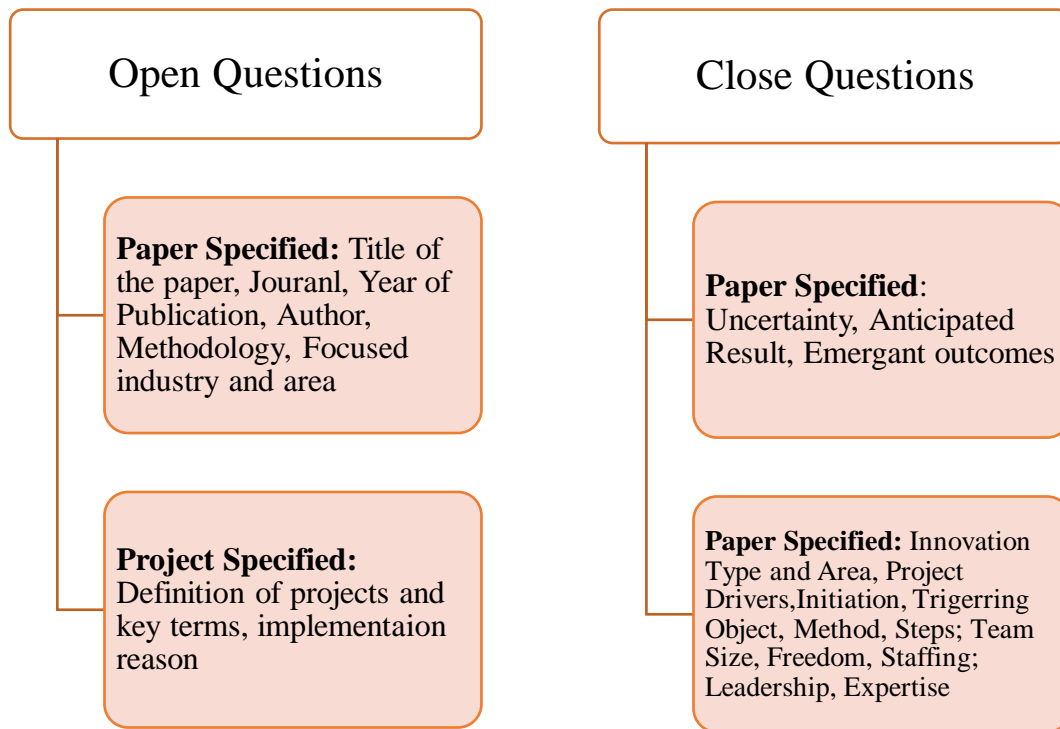
| Open Questions | Close Questions |
| --- | --- |
| **Paper Specified:** Title of the paper, Jouranl, Year of Publication, Author, Methodology, Focused industry and area | **Paper Specified**: Uncertainty, Anticipated Result, Emergant outcomes |
| **Project Specified:** Definition of projects and key terms, implementaion reason | **Paper Specified:** Innovation Type and Area, Project Drivers,Initiation, Trigerring Object, Method, Steps; Team Size, Freedom, Staffing; Leadership, Expertise |

*Figure 3: Factors considered while Data Extractions (Source:Own)*

To address the research objectives, three methods were adopted namely bibliometric analysis, frequency analysis and content analysis.

### 4.1.1. Bibliometric Analysis

Bibliometric analysis is done for scientific works to explore and evaluate spacious amount of dataset of relative research according to the research objectives (Donthu et al., 2021). This study conducted bibliometric analysis to find out the emerging topics within the context of Digital Transformation. It was performed with VOSviewer within the sample articles based on the co-occurrence of keywords. Two results were found by changing the parameter of "minimum number of occurrences of a keyword". This parameter will be represented with "k" in this review. While considering this parameter as 2; 9 keywords appeared.

The map created from the result, in figure 16, has three important clusters with blue, red and green colors. The cluster slaying in the middle which has red color gathers the articles focused on digital transformation combined with innovation and digitization in covid 19 period. The analysis shows the trend of DT related issues; for instance, work-from-home, digital tech-launch etc.; in the era of covid -19. The blue one has a focus on digitalization in business model

creation and transformation. The green one has a focus on digitalization with "s" which have been portrayed in different case studies.
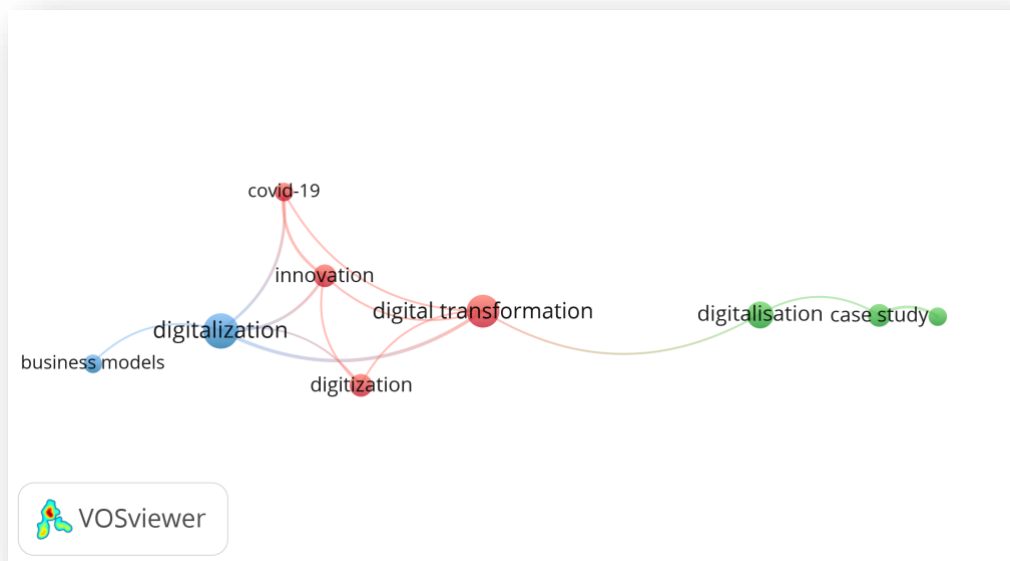


*Figure 4: Network Visualization of Co-occurrences of Keywords (k=2)*

Another cluster of keywords was created by considering the "minimum number of occurrences of a keyword" as 1, shown in figure 17. Initially, this analysis landed with 75 keywords. From those, 29 keywords were excluded. The exclusion criteria were (i) keywords indicating the same factor, (ii) name of countries which was used in just one article, and (iii) keyword related to bibliometric analysis and VOS viewer. This analysis gave nine numbers of clusters including 38 keywords. The olive-green cluster has the most powerful keywords with 21 total link strengths according to this analysis. It connects itself with all the keywords belonging to green, brown, pink and orange clusters. The focal point of this cluster is the digitization process in developing countries in the e-government sector. The second most powerful keyword is digital transformation with 19 link strengths in the violet cluster. This cluster focuses on the sustainable implementation of digital transformation in digital platforms and business networks.

The red cluster contains the same keyword digitalization with an "s". This emphasizes on retails sector and big data through doing multiple case studies. The keyword digital transformation project has been found in the blue cluster which focused on digital technology. The analysis shows that the words digital transformation, digitalization, and digitization relate to each other.

The topic of BIS Research, such as big data, artificial intelligence, biological system modeling etc., can also be found in this analysis as impact zone of DT. Other sectors which are influenced by DT are business model, innovation and so on. There are 5 other small clusters in brown, orange, green, pink and sky-blue color. Figure number 7 below provides a view of this bibliometric analysis though all keywords are not visible due to their less occurrence number and less link strength.
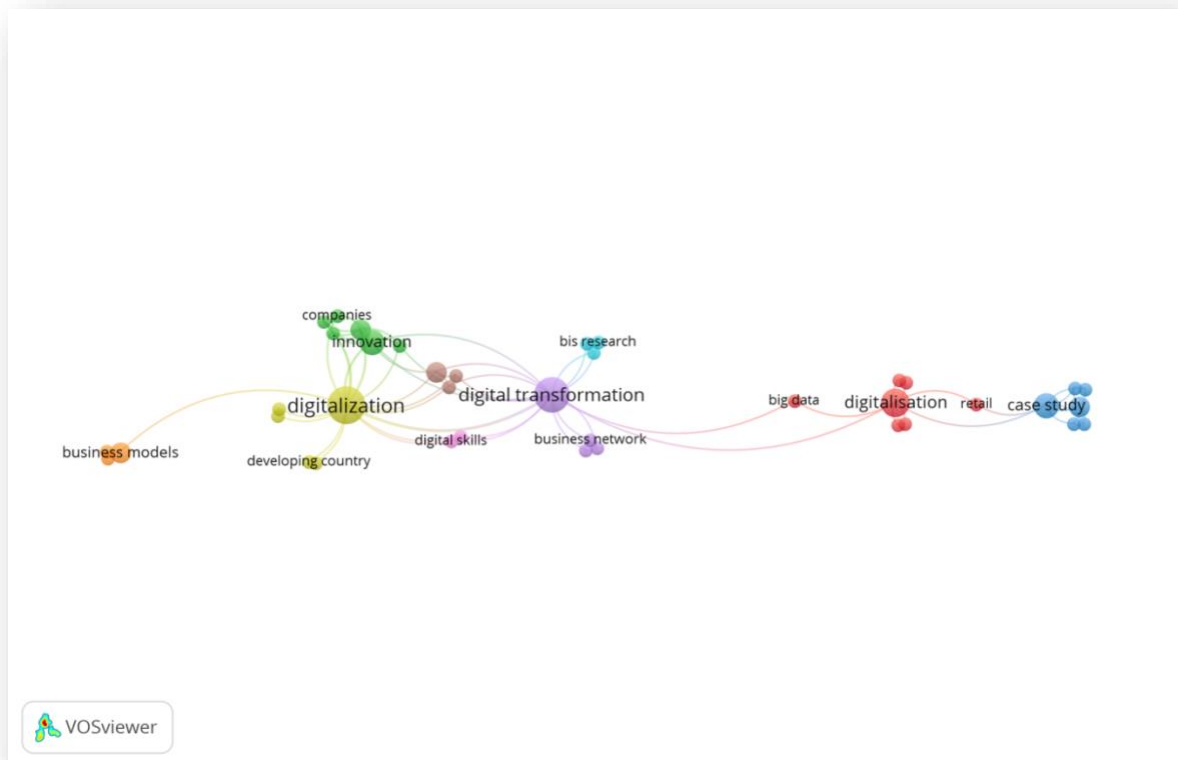


*Figure 5: Network Visualization of Co-occurrences of Keywords (k=1)*

### 4.1.2. Frequency Analysis

Frequency analysis is an important method included in literature review through which particular factor can be analyzed according to their number of occurrences (Ayat et al., 2021). In this literature, the investigation was done to find out (i) during which period, articles were mostly published, (ii) in which journals and (iii) where, especially in which continents, the researchers had carried out their research on emphasizing "Digital Transformation Project". A frequency analysis was also performed for emergent trends of selected articles.

**4.1.2.1. Research Publication Density in Journals**

This scoping review included 29 articles at the end of the sortation. It is seen the articles are published in 18 different journals over the world. Among them, the journals which contain more than one article are the Journal of Business Research (3), The TQM Journal (2), Procedia Computer Science (2), Business of Information System Engineering (2) and International Journal of Retail and Distribution Management (2). Other articles were published in various management and business review related journals. Though this review focused on collecting information about project characteristics, it is noticed that only one relevant article was found in a project-related journal named the International Journal of Information Systems and Project Management. It indicates that project-based journals are still not emphasizing and being involved to analyze the characteristics of the Digital Transformation Project which is the main focal point of this review.

**4.1.2.2. Research Trend**

The author started collecting the articles in June 2022. As a result, this review includes the related paper until that period. The analysis according to the year of publication shows that the first article "Improvement of Receiving Department by a Digitalization Project in a Medical Devices Company" by Wilnelia Pagán Ruiz was published in 2014 in the journal named Manufacturing Engineering (Pagán Ruiz, 2014). No articles were published in 2015.
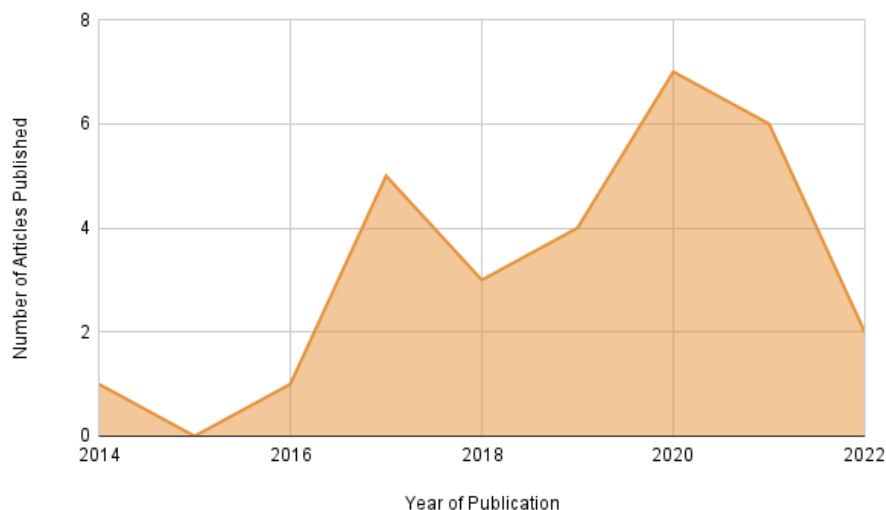


*Figure 6: Research Publication Density over the years*

The continuation of related research started in 2016 and increased dramatically by the following year. It proves that the wave of research on this topic started in 2017. The highest number (7) of articles were published in 2020. For the last 6 years, 2017-2022, around 93% of the articles in this review's dataset were published. Figure 4 will make this data clearer. Therefore, it can be said that interest in this topic has become trendy just recently. Moreover, researchers have become concerned with exploring how DT projects are being characterized in different organizations.

**4.1.2.3. Zone of Research Publications**

While analyzing the locations of articles included in this scoping review, the observation implies that the selected articles are spread over different regions. The author mainly focused on dividing the articles according to their origin of continents. Among 29 articles, 74.3% articles were published around European countries where Italy contains the highest number, followed by Germany and Sweden. The figure below illustrates that other articles were focused equally on Asia and North America with a percentage of 11.4%. It is important to note that 7 articles were focused on multiple continents at a time and the percentage counted shown in figure 5 is created considering this fact.
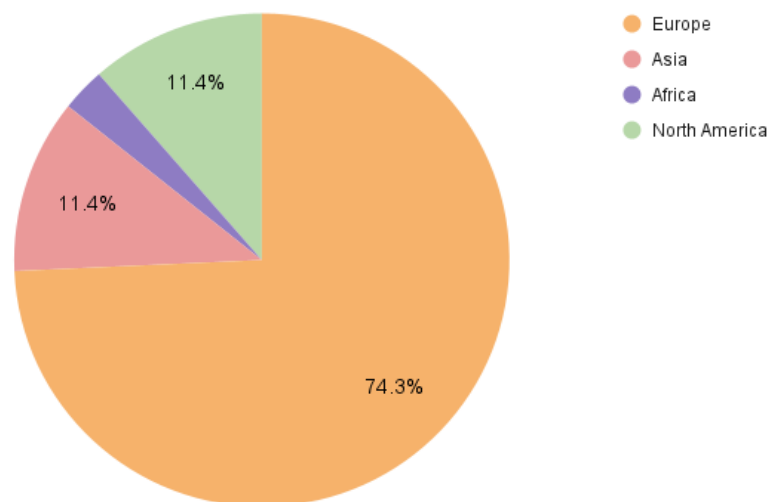


*Figure 7: Analysis based on Zone of Research Publications*

**4.1.2.4. Preferred Terminology**

In this section, the author analyzed the most preferred terminology used to talk about Digital Transformation Projects. The articles are using the following terms for the mentioned purpose;

(i) Digital Transformation Project, (ii) Digital Transformation, (iii) Digitalization/Digitalisation Project and (iv) Digitalization/Digitalisation. The highest number of articles (15) were found to prefer to use the term Digitalization/Digitalisation as shown in figure 6.
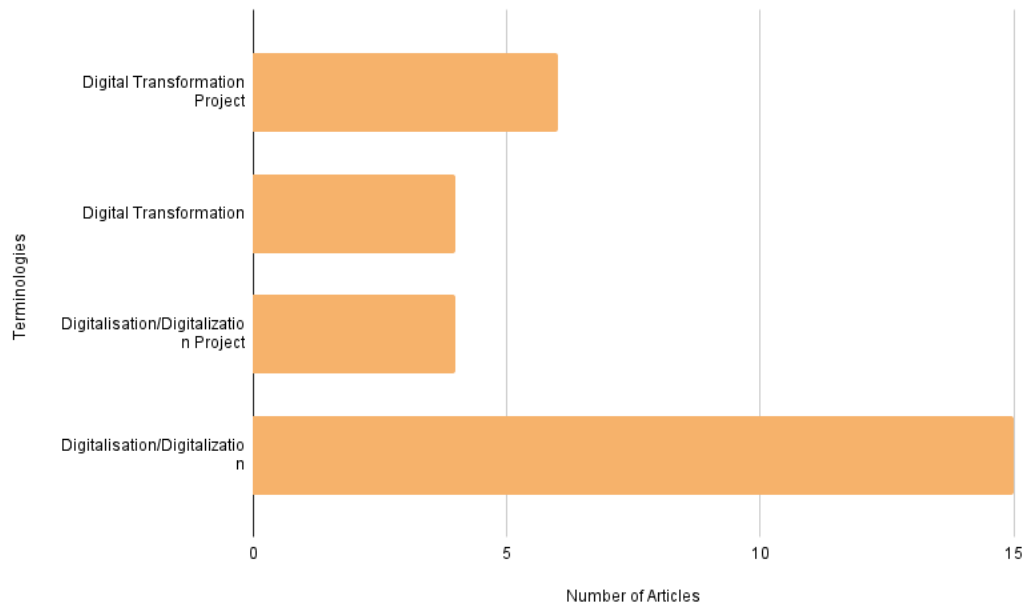


*Figure 8: Analysis based on Keywords*

It was also a noticeable phenomenon that among those 15 articles, around 93.3% were focused on different countries throughout Europe over the last 7 years. It indicates that "Digitalization/Digitalisation" has become a buzzword recently in case of discussing the facts about Digital Transformation Project. Additionally, European countries are emphasizing most to understanding and structuring DT project characteristics. Moreover, this analysis is becoming a trend in recent days.

### 4.1.2.5. Analysis based on Industry

One of the factors in the frequency analysis was the focus of articles on various types of industries. This review tried to discover all the industrial sections where the articles did their case studies to analyze the existing thoughts. Around 24% of articles were focused on Government Projects which are mostly published in recent years. It reflects that nowadays governments have become more concerned about implementing digital transformation projects to be more efficient. Besides, service companies are seen to be the most practicing industry

(29.6%) towards deploying digital transformation projects followed by Manufacturing Industries and Information Technology related Industries. 2 of the articles were delivered based on the agriculture industry over recent years which proves that this sector is going to be the next promising sector to analyze the characteristics of DT projects. In respect of organizational perspective, the analysis delivers that most of them are focused on either manufacturing or SMEs. Figure 7 illustrates this section with help of a pie chart.
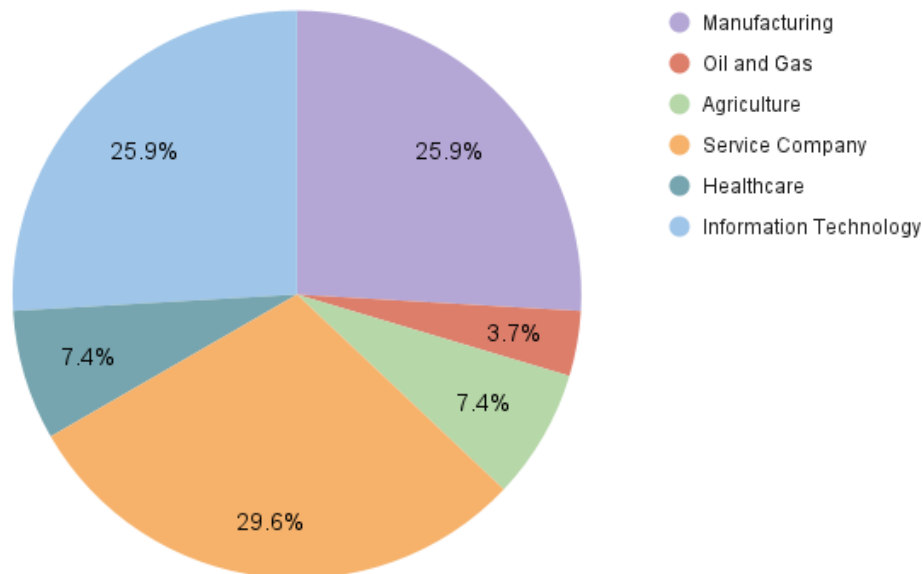


*Figure 9: Analysis based on Industry Focus*

**4.1.2.6. Analysis based on Research Method**

It is noticed that most of the researchers have chosen the same path to characterize DT projects. Based on the research method, the chosen articles were divided into three generic categories. Among them, 25 articles are done following the qualitative method which is around 86.2%. Other 4 articles were equally found in the section Quantitative (2) and Mixed Method (2). Among all articles most were case studies (24). 3 types of case studies were found; (i)exploratory, (ii)descriptive and (iii)explanatory. Describing one by one of those types will be helpful to understand the structure of the articles. According to Zainal, (2007), those 3 types can be described further. Explanatory refers to those case studies where the researchers do a casual investigation, by conducting interviews or surveys or analyzing existing documents; and where questionaries are mainly how and what-based (Zainal, 2007). Around 38% of the case studies from the selected articles belong to this group. While collecting information for case studies, the researchers had to reach out to people involved in projects in different ways. They

did not rely only on project leaders or project managers. Around 24% of the case studies belong to the descriptive and 21% to the explanatory group. Here descriptive refers to building up a comparison between theory and practice in any organization and exploratory refers to the researchers which are based on analyzing their established hypothesis and comparing multiple case studies of different or same organizations (Zainal, 2007). A small portion was found to be literature review research (5). Among the reviews, most of the authors focused on finding potential scope to improve and propose a framework accordingly. A diagram can be found in figure 8 demonstrating this section through a tree.
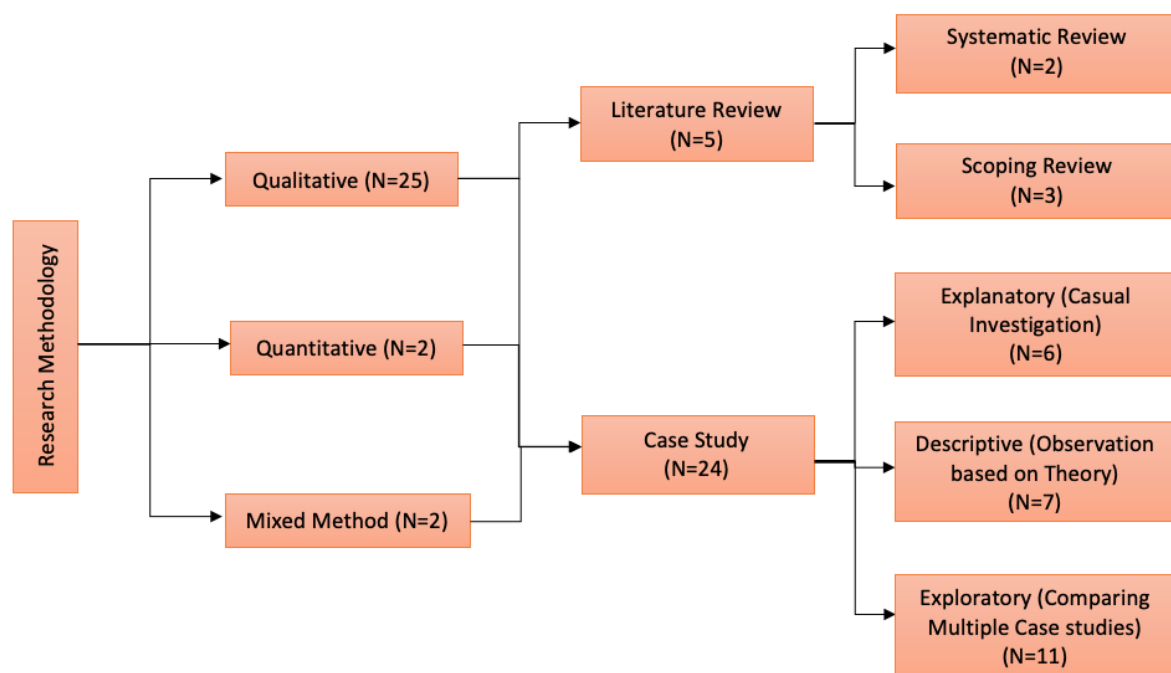


*Figure 10: Analysis based on Research Method*

### 4.1.2.7. Focus of Selected Articles

During the analysis, it was noticed that researchers have diversified interests while analyzing Digital Transformation Projects. This can be named the "Focus of Selected Articles" for each article. Three remarkable spotlights were observed in this perspective: characteristics/factors, implementation, and impact/effect. Table 7 contains information about 29 included articles. A broad view of the mentioned spotlights can be found here. Besides, it will provide a view of if the article contains two definitions; one for the project and another for elements of the terminologies used to describe DT. The cell marked with "✓" indicates that the articles possess the content written in the first row and the cell marked with "x" indicates the opposite.

*Table 4: Focus for DT project-based articles*

| Code | Citation | Definition of Project | Definition Keywords | Characteristics / Factors | Implementation | Impact/ Effect |
|------|----------|:---------------------:|:-------------------:|:-------------------------:|:--------------:|:--------------:|
| P1 | (Hafseld et al., 2021a) | ✓ | x | ✓ | x | x |
| P2 | (Hafseld et al., 2022) | x | x | x | ✓ | x |
| P3 | (Ivančić et al., 2019) | x | ✓ | x | ✓ | x |
| P4 | (Soto-Acosta, 2020) | x | ✓ | x | ✓ | x |
| P5 | (Tung et al., 2020) | x | ✓ | x | ✓ | x |
| P6 | (Zoppelletto et al., 2020) | x | ✓ | x | ✓ | x |
| P7 | (Verhoef et al., 2021) | x | ✓ | ✓ | ✓ | x |
| P8 | (Mergel et al., 2019) | x | ✓ | ✓ | ✓ | x |
| P9 | (Kraus et al., 2021) | x | ✓ | x | ✓ | x |
| P10 | (Ulas, 2019) | x | ✓ | ✓ | ✓ | x |
| P11 | (Elg et al., 2021) | x | ✓ | x | ✓ | x |
| P12 | (van der Velden, 2018) | x | ✓ | x | x | ✓ |
| P13 | (Rossato and Castellani, 2020) | x | ✓ | x | ✓ | x |
| P14 | (Hagberg and Jonsson, 2022) | x | ✓ | ✓ | ✓ | x |

| | | | | | | |
|---|---|---|---|---|---|---|
| **P15** | (Jovanović et al., 2018) | x | ✓ | x | x | ✓ |
| **P16** | (Branca et al., 2020) | x | ✓ | ✓ | x | x |
| **P17** | (Almeida et al., 2020) | x | ✓ | x | x | ✓ |
| **P18** | (Björkdahl, 2020) | x | ✓ | x | ✓ | x |
| **P19** | (Hagberg et al., 2016) | x | ✓ | x | ✓ | x |
| **P20** | (Legner et al., 2017) | x | ✓ | ✓ | ✓ | x |
| **P21** | (Rachinger et al., 2018) | x | ✓ | ✓ | x | x |
| **P22** | (Caputo et al., 2021) | x | ✓ | x | x | ✓ |
| **P23** | (Cijan et al., 2019) | x | ✓ | x | x | ✓ |
| **P24** | (Kuusisto, 2017) | x | ✓ | x | x | ✓ |
| **P25** | (Effah and Nuhu, 2017) | x | ✓ | x | ✓ | x |
| **P26** | (Heberle et al., 2017) | x | ✓ | ✓ | ✓ | x |
| **P27** | (Rowbottom et al., 2021) | x | x | x | ✓ | ✓ |
| **P28** | (Pagán Ruiz, 2014) | x | x | x | ✓ | x |
| **P29** | (Riedl et al., 2017) | x | ✓ | ✓ | ✓ | x |

### 4.1.3. Content Analysis

Content analysis was held to find out the definition and characteristics of the "Digital Transformation Project". To bring all the selected articles in a common frame and find out the scenario of existing articles, first of all articles were reviewed to gain a common understanding. It was discovered that different researchers have presented the same factors in a various way. As one of the objectives was to identify how existing research has defined DT projects and to extract the characteristics of such projects, disciplines were formed based on description from each article. These disciplines represent the various ways that DT projects have been described i.e., characteristics of DT projects. The target was to dig down and analyze how they are interpreting this term according to different circumstances. Provided below are the disciplines identified and their respective categories.

- Project Objective (reason behind implementation)
- Project origin including drivers, initiators and triggering factors that lead to the implementation of the DT project
- Project Innovation focus including innovation type and innovation areas impacted by the project
- Project resource planning including project team aspects (size, freedom), project leadership and expertise of project members
- Project process including the applied project methods
- Project outcomes including end-users' acceptance

Among 29 chosen articles, one article contained the definition of Digital Transformation Project. No article was found covering the definition of Digitalization Project. It proves that the researchers have preferred to portray the characteristics and structure of those types of projects without giving any definite definition of them. According to the perspective of Hafseld et al., (2021a), when a project combines facets of information technology, innovation, and organizational change; and delivers a form covering all those facets' viewpoints, can be considered a Digital Transformation Project. It can be considered as the thought of the recent decade according to the publication time. As any other definition was not found for DT project, the author could not compare among them. Although many authors have shared their views regarding the terminologies used to describe digital transformation which have been described in the following section.

It was mentioned earlier that vision of researchers has seen to differ from each other in case of indicating to digital transformation project. Preferences switch between digital transformation and digitalization. Accordingly, some authors have stated the definition of digital transformation and digitalization interchangeably which can be found described in table 4 and 5 (Branca et al., 2020; Kraus et al., 2021). In some cases, authors have stated digitization as digitalization as well, though they have fully focused on only digitization (Kayikci, 2018; Roosevelt et al., 2015). This situation leads us to realize that there is a lot of confusion in understanding the differences among digital transformation, digitalization and digitization. As the author have only focused on digital transformation projects, the table will contain the definitions of digital transformation and digitalization from the perspectives of different authors. The term digitalization has been included as this is one of the most used terms, according to the analysis in section 6.1.4, to describe DT projects. Table 4 contains the definition of digital transformation found in 11 articles. All of them have different viewpoints, except P4 and P22. Moving to the next term, Digitalization, it was found to be defined in 20 articles. Among them, four clusters can be seen where the authors defined it in the same way. But the perspective of P16 and P34 initiate confusion by building the thought of digitalization respectively as digital transformation and digitization. Table 5 will give a quick view of those definitions.

*Table 5: Definition of Digital Transformation*

| Code | Digital Transformation |
|---|---|
| **P3** | A continuous process which consists of transforming organizational culture, technologies, and employee mindset to achieve the pick of digital maturity |
| **P4, P22** | A transformation process with the support of digital technologies to change business model |
| **P6** | A process of improving operational efficiency or simplifying the work process to empower value cocreation |
| **P7** | It is the master of both digitalization and digitization process, where considering company-wide improvements in order to flourish a better business model |
| **P8** | A cumulative transformation process to improve the flexibility of service through adapting automation in work process. This cumulative process starts with digitizing policies and documentation and ends with coming up with digital solution as a product or service. |
| **P9** | A process to improve an existing process in virtue of various transformation technologies (e.g. big data, internet of things, artificial intelligence) |

| P10 | A transformation process which brings strategical, managerial and business-related changes to reformulate those in a better way |
| P11 | A transformation process conducted via utilizing digital technologies which effect whole organizational environment |
| P21 | A restructuring process of economical and sociotechnical portion of an organization via building a bridge between the contributor and receiver of the business sectors |
| P29 | Transforming business and society model from partly to fully digitized one |

*Table 6: Definition of Digitalization*

| Code | Digitalization |
|---|---|
| P5 | Synthesis of digital technology and business model in virtue of various transformation technologies (e.g. big data, IoT, AI) to modify operative and organizational patters (Tung et al., 2020). |
| P7 | Process to boost process improvement and cost effectiveness with the help of various digital technologies. |
| P8 | A process digitizing current process to bring remarkable changes |
| P11, P18, P21, P24 | Bringing digital changes by making use of digital technologies to a process which possess value adding products and results and effects environments in a positive way |
| P12 | The process of initiating a digitalized way of getting values towards making improvements |
| P13 | A business model which considers the application of digital technologies in order to bring changes |
| P14, P19, P29 | Utilizing and involving digital technologies in everyday life |
| P15, P26 | Utilizing digital technologies which reforms business model and working process to achieve value adding production. |
| P16 | Transformation process of organizational functions such as communication, business functions and so on |
| P20, P22, P23 | A sociotechnical process of adapting multiple digital technologies in broader organizational and social environment |
| P21 | Migrate physical activities to online interactive process through digital platform |
| P34 | Capturing analog data and storing them in a digital way to make them easily available |

## 4.1.3.1. Project Objective

This scoping review has the intention to observe the project implementation reason to find out why the organizations taking the step to implement Digital Transformation Project. In classifying them, we found two main reasons. Either they are approaching to transform their existing business process or bringing some performance improvement on board to make their

life easier. In this section, the author considered 24 case studies included in this article and excluded the literature reviews. The reason behind these inclusion and exclusion criteria is that case studies are meant to be exploring social behavior by observing any existing cases in different organizations (Zainal, 2007). As a result, these 24 articles will provide us with the viewing point of the organizations who implemented DT projects with their reasons. Business re-invention as an implementation reason has been noticed in 13 articles that have studied around 69 various organizations. Making a strong place in the competitive market is one of the most observed reasons behind reinventing business processes.
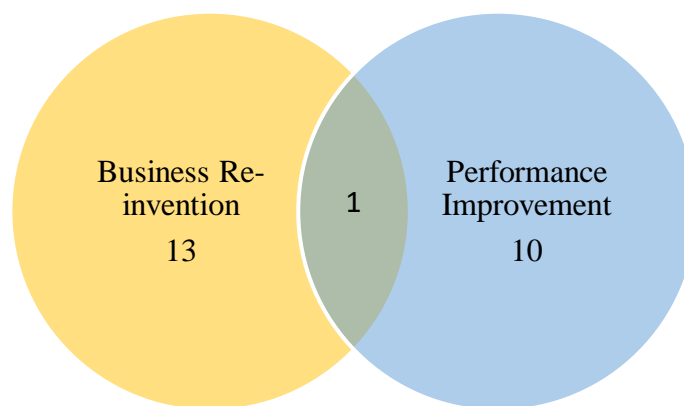


*Figure 11: Implementation Reason Analysis*

Besides, improving business model and process to bring changes in economic environment, was one of the most common reasons behind the transformation. According to 10 articles, organizations wanted to bring performance improvements in their organizational process. The purpose of this was from different angles, e.g., build new business model, bring digital product and service, improve process quality. Surprisingly, behind all those purposes, the triggering point was a common one. That is fulfilling the need and requirements of internal and external customers. Figure 9 will give a quick view of this section.

### 4.1.3.2. Digital Transformation Project Origin

- **Project drivers**

Project drivers are considered as those terms which work as the main catalyst to run any project. The key drivers found in the selected articles are organizational/ business value, innovation, and digital technology.
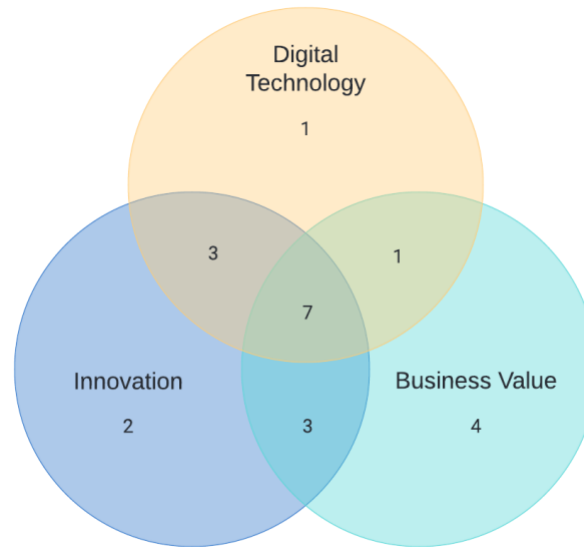
*Figure 12: Venn Diagram explaining Project Drivers*

A large portion of the selected articles, around 27.6%, have not discussed the drivers in their research. Only 7 articles have focused on a single driver, whereas others have multiple drivers for their projects. Among the chosen articles, around 24% were found to be driven by all the facets mentioned here. Over the year those articles have originated from mostly European countries which indicates that the organizations especially in this zone are being motivated to run through multiple facets at a time. Following that, the second most focused driver is the business value (13.7%) originating from different continents over the world. Figure 10 will demonstrate this section with a venn diagram.

- **Project Initiators**

Project initiation is meant following the steps or hierarchy of job roles through which the project idea is initiated. The initiation process can be divided into two distinct parts: top-down and bottom-up. In the sense of project management, what is reflected by these two terms is briefly explained in Daradkah et al., (2018). When the initiation approach comes from a project manager or project team members involved in higher decision-making positions can be recognized as a top-down approach. This is more of a managerial perspective (Daradkah et al., 2018). On the other hand, if the initiation of a project generates from the team members' perspective and forms activity-based detail planning, is recognized as a bottom-up approach (Daradkah et al., 2018).
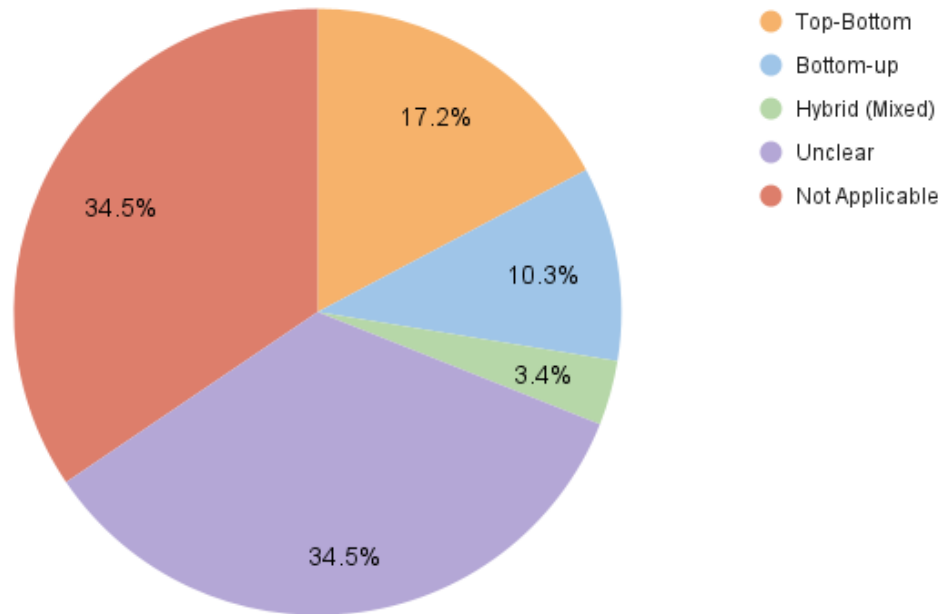
*Figure 13: Analysis based on Project Initiation*

Among the selected articles, most of the projects are either run by one of the approaches. Only one article by Heberle et al., (2017) is run by both. It talked about taking the most suitable characteristics from both approaches according to the project goal. But a huge portion of the articles (34.5%) portrayed the projects' other characteristics without talking about their initiation approach. At the same time, the same portion (34.5%) of the articles have spoken about the initiation process but not clearly so that it can be distinguished. These percentages are shown in a pie chart in figure 13.

- **Projects Triggering Factors**

During the analysis, it was observed that some of the researchers are emphasizing the project-triggering factors. The factors can be either internal factors which focus on organizational or business-related issues or external factors which explain the triggering point from technology and market-related aspects. Among 29 selected articles, 11 articles were found where the projects were triggered by both internal and external factors. The reason behind opting for Digital Transformation projects were both pushed by the need for business improvements in the organization and the need arose by customers and technological improvements.
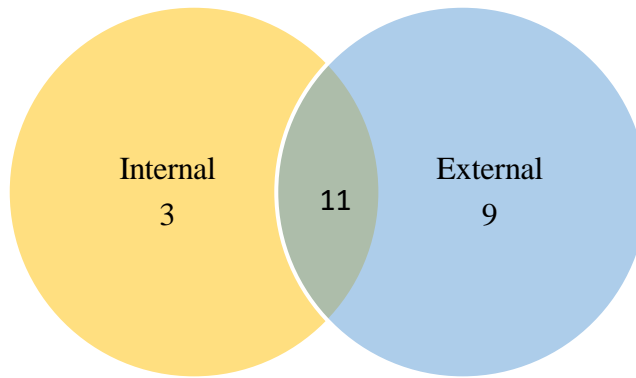
*Figure 14: Analysis based on Project Triggering factor*

Following that, 9 articles were focused on solely external factors which are mostly (8) from recent years (2017-2021). It reflects the increasing demand from the market and the technological point of view to opt for this type of project. Several papers (6) among the selected ones did not mention the project-triggering objects at all. Figure 14 reflects this section.

- **Temporary Organizational View**

A wide range of companies are commencing project in the way of developing their structures such as service companies (e.g healthcare, education, financial services, logistic) , manufacturing industries (e.g automotive, heavy manufacturing), information technological (e.g social networking, telecommunication) companies and so on (Sydow et al., 2004). The resemblance of this statement has been also found during the analysis based on industry part in section 4.1.2.5. In the way of adopting project, one of the most concerned nature is "Temporary Organizational View" (Turner and Müller, 2003). Seeing from the viewpoint of being a temporary organization, commonly, the parent industries form project to achieve any specific goal. This project remains temporary as it ends by reaching the goal (Turner and Müller, 2003).
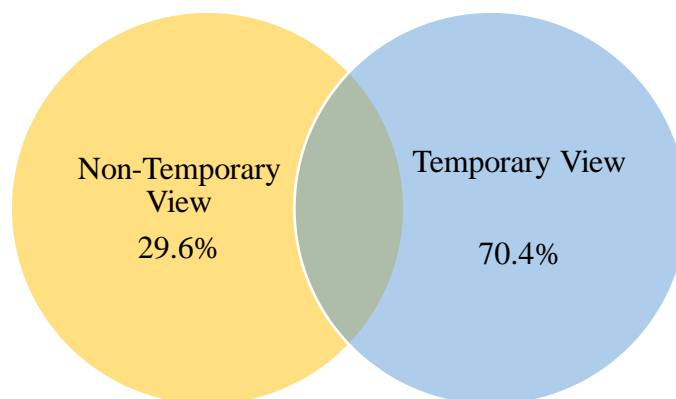


*Figure 15: Venn Diagram explaining Temporary Organizational View*

According to the analysis in this review paper, the author found 70.4% organizations which have initialized DT projects from a viewpoint of Temporary Organization. It reflects that organizations are emphasizing to have temporary DT projects to reach their goals.

### 4.1.3.3. Project Innovation Focus

- **Innovation area**

When starting a project, it is usual to consider the particular area that will receive emphasis. Those can be divided into product, process, service and business model (Barthel and Hess, 2019). According to the analysis, the process is the mostly preferred innovation area by the organizations. 6 articles have solely utilized Digital Transformation projects to bring diversification in their processes.
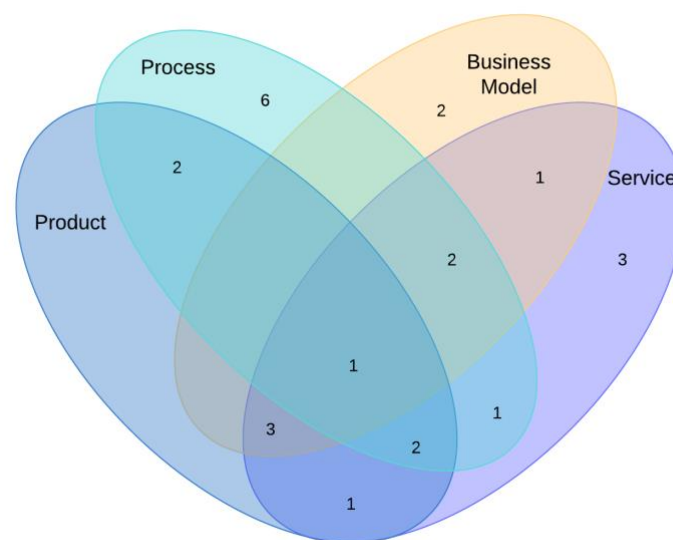


*Figure 16: Venn diagram for analyzing Project Innovation Area*

Service is the second most preferred area which has been mentioned to be chosen individually in 3 articles. Besides, a remarkable portion (14) of the samples stood to prove that the service is practiced by being merged with one or two other innovation areas. The practice of merging two or more innovation areas is seen to be preferred in most European countries during the last 4 years where one exceptional article is seen to have an origin in Africa. One of the innovation areas, product, has not been seen to be chosen individually as a focus factor according to the author's analysis. Despite having the thought from Hagberg et.al., in (2016), the researchers

are not seen to be concerned much about the innovation areas before 2019. Consequently, none of the articles published prior to the mentioned time (17.2%) have made any references to such areas. The venn diagram in figure 12 explains this section by distributing articles in their respective portions.

- **Nature of the Project Novelty**

Upon examining the target audience for whom the articles indicated the initiation or transformation of Digital Transformation projects, two distinct groups were identified. Those are the organization itself and the target market. Most of the articles (31%) were adapting this type of project for the sake of organizational improvements or modifications. Subsequently, 27.6% of the picked articles have described the target market as the only focus factor. Besides, 24.1% of the articles, have focused combinedly to meet the requirement of the target market and organizations. Lastly, it needs to be mentioned that 17.3% of the articles have not mentioned or indirectly described any focus factor to run their projects. Figure 11 will give a quick view of the number of articles focusing on two different factors in this section.
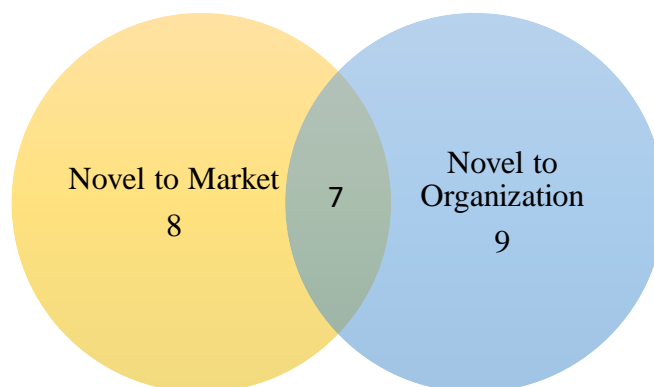


*Figure 17: Venn Diagram explaining Target Group of Projects*

**4.1.3.4.** *Project resource planning*

- **Project Team Formation**

To build an effective team, it is necessary to plan and decide the team's freedom and formation style according to the project's wants (Zainal et al., 2020). Accordingly, while analyzing, 4 different aspects of team formation were considered. Those are team size, team freedom, team formation and leadership style. Unfortunately, most of the selected articles have not mentioned those aspects of the projects. Among 29 selected articles, no article mentioned "team size". For

"team freedom", "team formation or staffing" and "leadership style", the number of articles that expressed those aspects were respectively 6, 8 and 7. Team freedom can be framed with two different portions; autonomous and leader driven. Out of the 6 articles that discussed team freedom, 5 articles highlighted the implementation of leader-driven processes within their organizations, while only one article indicated the importance of maintaining a fully autonomous team. In respect of team formation, the target was to find out whether the project teams are following (i) interdisciplinary patterns including technical and business departments or (ii) only members from the R&D department. The research shows that the first formation style is more widely favored when it comes to assembling a project team, as indicated by 8 articles that discussed team formation. Lastly, leadership style is considered to be an element of the project team as well in this analysis. There is a versatile choice of leadership style according to the researchers of 7 selected articles that discussed it. Three of them run their projects without any specific leader but two of them chose to reach the project goal with help of a specific leader. Furthermore, it was observed that in a some of articles (2), researchers discovered that despite assigning a designated leader, there was a tendency to follow the guidance of the project manager in executing Digital Transformation projects.

- **Expertise of project members**

When creating an effective team, the inclusion of expertise concerning the subject matter is one of the main requirements (Guinan et al., 2019). Expertise can be hired from either internal employees or external. Besides, the organization can also consider mixing both internal and external expertise. Analysis of this factor did not show up with any organization which went for only external expertise because it is easier to combine internal expertise from different zones. The reason behind this is that they are already familiar with each other and with organizational culture. Among the chosen articles, 8 articles have emphasized discussing the organization's process of gathering expertise in the projects. Most of them (7) considered both internal and external expertise simultaneously. Unfortunately, the researchers do not seem much interested to dig into this factor. The bar chart in figure 15 shows the number of analyses based on the expertise.
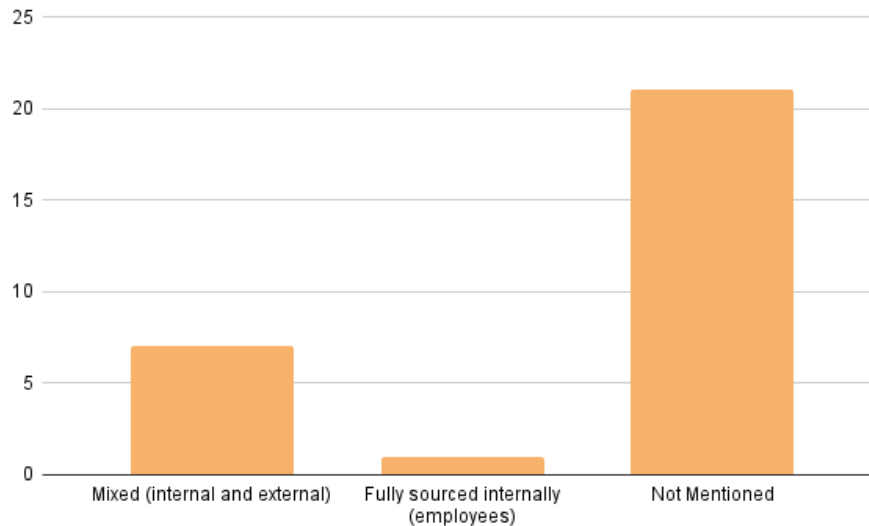
*Figure 18: Analysis based on Expertise of Projects*

### 4.1.3.5. Project Process

- **Project Management Method**

Project success and delivery depend mostly on choosing a project management methodology. It is a crucial element in the way to ensure project success by avoiding project risk (Salameh, 2014). Being an important factor, it was expected to be discussed in the selected articles related to Digital Transformation projects vastly. Surprisingly, only 2 articles have talked about it directly. Those were focused on design thinking process (Hafseld et al., 2021a, 2022). Design thinking is widely known as an agile iterative process for ruling projects involving various stakeholders or nurturing organizational innovation (Panke, 2019). Taking strategic decision and building a common vision was an important output at the beginning phase of the project. This chosen methodology helped them to decide about those in a systematic manner while being prepared to face challenges as well (Hafseld et al., 2022). It proves the importance of choosing a definite methodology that would fit the project according to its goal. For other articles, it was not clear which methods they chose to run the project.

### 4.1.3.6. Project Outcomes

- **Acceptance by end-users**

While planning to adopt a new form of a project, it is very important to analyze the project acceptance percentage in the team and take the necessary steps to strengthen the acceptance. It is an important success factor for the project. If the project team and support team accept the form of the project, it becomes much easier to run the project efficiently and removes the barrier initiated by the people's mindset. A significant majority (72.4%) of the chosen articles have placed strong emphasis on enhancing project acceptance within organizations. It indicates the importance given to this crucial success factor during initiating or transforming to Digital Transformation projects.

## 5. Discussion

The initial goal of this scoping review was to understand how Digital Transformation Projects have been defined in exiting literature in organizations through analyzing existing articles. It was surprising to find out that researchers are not clearly or vaguely defining DT projects, except one (Hafseld et al., 2021a). It is resulting in creating confusion while differentiating projects which is one of the reasons leading to failure with poor track record (Ross et al., 2019). The other reason seems to be lack of through understanding of the complexity of digital transformation projects which is estimated to cause failure by 66% to 84% (Libert and Beck, 2016). The review took a fresh turn when it started identifying the significant factors shaping the outline of DT projects. These factors can be called as project foundation as those provide a foundation for organizations looking to deploy DT projects. Those are elucidated in the content analysis section based on their usage frequency. While deciding to initiate DT project or transform to it, organizations are considering one or multiple foundations mentioned in table 7. They formulated their implementation strategy by taking into account the main catalysts that could potentially fuel the progress of their project. Certain individuals are observed to prioritize particular areas, such as product, process, business model, or service, when adapting to a DT project. It was evident that organizations often opted for multiple implementation strategies for a single foundation, resulting in increased flexibility and the ability to deliver a diverse range of outcomes. These factors are summarized in Table 7, presented as a taxonomy.

*Table 7: Classification of DT Project characteristics*

| Project Foundation | Use Cases | Implementation Strategy |
|---|---|---|
| **Project Objective** <br> (refers to reason behind implementation) | 82.8% | • Transformation <br> • Innovation |
| **Project Drivers** <br> (refers to the main catalyst to run any project) | 72.4% | • Business Value <br> • Innovation <br> • Digital Technology |
| **Project Initiators** <br> (refers to the steps or hierarchy of job roles through which the project idea is initiated) | 31% | • Top-bottom <br> • Botom-up <br> • Hybrid |
| **Project Triggering Factors** <br> (refers to source of motivation) | 79.3% | • Internal <br> • External |
| **Organisational View** | 100% | • Non-Temporary <br> • Temporary |
| **Nature of Project Novelty** <br> (refers to the target group for whom the initiation or transformation of DT projects were done) | 82.7% | • Towards Market <br> • Towards Organization |
| **Innovation Area** <br> (refers to the particular area to receive emphasis in DT projects) | 82.6% | • Product <br> • Process <br> • Business Model <br> • Service |
| **Team Autonomy** <br> (refers to the autonomy that the DT project team members have) | 20.7% | • High autonomy <br> • Low autonomy |
| **Team Formation** <br> (refers to how a DT project team is coordinated) | 27.6% | • Interdisciplinary Team <br> • Team with only specific discipline people |
| **Leader for DT** <br> (refers to choosing the leader for DT projects) | 24.1% | • Specific Leader for DT <br> • Project Manager |
| **Expertise of Project Members** <br> (refers to how project team is resourced) | 27.6% | • Full Internally Sourced <br> • Mixed with internal and external personnel |
| **Project Management Method** | 6.9% | • Agile <br> • Traditional |

| | | |
|---|---|---|
| (refers to choosing project management method to run the project) | | • Hybrid |
| **Project Acceptance** (refers to accepting the initiation or transformation of DT project) | 72.4% | • Inside organization<br>• To end customer |

The classification provided in this research enables to provide an understanding of characteristics of DT projects from several categories. This shows that DT projects are not a one kind of project but falls within a spectrum of various characteristics. This could explain why there is still confusion in defining such projects. For example, looking at the classification, it shows that the focus of innovation in DT projects can impact several areas such as product, process, service or business model. Similarly, although DT project management adopts to a greater percent agile methodology, hybrid methods has also been preferred in some situations. Thus, it can be difficult to have one way to describe the characteristics of such projects. Using classification i.e. taxonomy can be a better approach.

The best way to learn any process is to get a practical overview of that. Here comes the question, which types of organizations can help us to enhance our knowledge about implementing and running DT projects? The leading sector, in this case, is seen to be service companies; for instance, logistics, financial and information service-providing organizations; and manufacturing companies.

Digital Transformation project brings proper utilization of digital technologies (SMACIT) on boards. It is appreciated that organizations are not being stuck to a fixed system, rather being flexible either through transformation or innovation. While stepping forward, they are considering the adaptability, in other word project acceptance, of both organization and market. While still having many rooms for confusion in DT projects already, it is a wise decision to walk through a top-down initiation approach which is seen to be most practiced in this analysis. It helps to keep the project organized and make the information flow in one way which creates less misunderstanding. In conclusion, this study will assist organizations in reevaluating their focus on specific foundations and implementation strategies as they progress with future digital transformation projects. Besides, the implementation of the structured taxonomy presented in table 7 will assist them in simplifying their decision-making process when selecting between

various strategies and exploring them further after going through the analysis phase of this study.


# 6. Conclusion

During the 1980s, the first step towards digital transformation was taken by converting paper documents to electronic documents and later by developing the first terminal operating system (TOS) (Heilig et al., 2017). It started with only digitization and reached an era where we are heading to normalize digital transformation as a whole project or part of a project. As the most widely discussed topic in the corporate world, it is essential for the concept behind this project to be clearly understood. This scoping review was conducted to assess the current level of understanding about the concept of digital transformation, digitalization and digitization projects. It is structured upon the previous pieces of literature which focus on explaining the definitions, characteristics, and concepts of these types of projects. After building the analysis through frequency, content and bibliometric analysis, it produced some decision points and delivered five gaps below where the future researcher can do their analysis. This review has highlighted that while there is extensive discussion about the concept of digital transformation, there seems to be a lack of focus on the concept of DT projects. To have a common concept, we all need to be on the same page regarding this. But before, we need to initiate to frame "what is a digital transformation project?" coming upfront and discuss more about this topic. Nevertheless, the initiation is expected to appear very soon as we are already in a phase of dominating DT projects.


## 6.1. Future Research Scope

Naturally, being in a development stage, this scoping review found some spaces for development and further research. Those are as follows:


### 6.1.1. Build a mutual understanding

Creating differentiation among Digital Transformation Project, Digitalization Project and Digitization Project; and building a mutual understanding should be included in our checklist going forward. We cannot even realize that while running a DT project, we named it as a digitalization project. In some cases, we are talking about Digital Transformation Project but framing the project as Digitalization Project such as (Branca et al., 2020). We are practicing

vice versa as well (Kraus et al., 2021). Another fact that has shown up is raising digitalization and digitization same thought (Kayikci, 2018; Roosevelt et al., 2015) which is not the same. It is incredibly significant to work on building a fine line among those 3 types of projects which will not be misleading to others in future.

### 6.1.2. Structuring a definition for DT project

It was an utter surprise while searching for the definition of DT project and just finding one article explaining that (Hafseld et al., 2021). Before heading to make the fine line as discussed earlier, we should consider making the base for DT project. The most effective way could be reaching out to those who are running such projects and giving the structure of DT project's definition based on the current practice they are going through for the sake of the project.

### 6.1.3. Experimenting through building a framework or method

If we have a look at the analysis based on research methods, we can see the selected articles are either literature reviews or case studies including explanatory, exploratory and descriptive studies. The only type of research method that is not included here is experimental research. None of the articles have gone for building a framework or methods for applying or reframing DT projects in an organization and experimenting to see how those work. It will be a worthy decision to research this path to bring some new and effective frameworks and methods. This can be beneficial for individuals who are interested in delving into a DT project framework within their organization, as it can provide them with assistance and guidance.

### 6.1.4. Suitable Project Management Method

Choosing a compatible project management method in DT, Digitalization or Digitization projects is a rarely analyzed factor while discussing project characteristics. It has a lot of influence on project success. During the initial round of selection in this review, several articles were found, with a particular emphasis on this factor, some even exclusively focusing on it. Unfortunately, those articles did not possess the answers to the research questions for which they were excluded. It could be a novel approach to analyze the project management methodology engaged in such projects, along with their distinctive characteristics, in order to identify which, one contributes more value and in what various ways to achieve success.

### 6.1.5. Project Team Formation

Team formation is a vital part of a project. The terms considered in team formation are (i) team size e.g, small, medium or big, (ii) team freedom e.g, leader-driven or autonomous, (iii) team formation e.g, technical, non-technical or a combination of both and (iv) leadership style e.g, having a specific leader or not. Very few articles have a viewpoint from this angle among the selected articles. Emphasizing and analysis of this factor can be a significant step towards creating guidance, regarding how to form a suitable team depending on the project goal.

### 6.2. Limitations

This section is meant for acknowledging the limitation of this study. It will help to find out where the author has limited the research which can be a source of further research for others.

### 6.2.1. Use of a single search engine

The articles for this scoping review were searched and collected only through Google Scholar. There is a chance of relative articles' existence in other search engines e.g., Scopus, Web of Science, Semantic Scholar etc. The inclusion of articles for only one search engine can be seen as a limitation of the study.

### 6.2.2. Selection of articles

The review was restricted to a few inclusion criteria. Searching of relative articles was initiated with 10 keywords mentioned in section 3.1.2. The search continued till page number 6 for each keyword in google scholar. Besides, this literature review included only peer-reviewed journals in the English language. It is possible that the author missed out on some potential relative articles for the specified inclusion criteria. Nonetheless, the initial inclusion contained a reasonable large quantity of articles which reduces the chance of missing potential articles.

### 6.2.3. Time constraint

The study was initiated on June 11, 2022. The articles published after the specified time are not included in this review article. If any relative articles have been published after this period, they will be missed out from the reviewing process.

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