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Marlene Bråthen & Elisabeth Doan

Ambidexterity to overcome the challenges of digital transformation

A Bibliometric Review

Abstract

Digital transformation is a complex process, and many organisations fail in their endeavours. Extant research presents different aspects that organisations struggle with within their digital transformation process. Some researchers state that external drivers such as digital technology, digital competition, and digital customer behaviour can influence the digital transformation process. In contrast, other researchers express that it can be challenging to succeed with the digital transformation as it affects the internal operational processes, business models and customer experiences. However, a common feature of the extant literature is that substantial research addresses innovation, learning and change in organisations. The reason why such topics are addressed in the literature can be explained by the fact that digital transformation constitutes a technological change and an organisational one. As external conditions, such as technology, are increasingly varied, learning and adapting to environmental changes is becoming more critical. Organisational ambidexterity, the ability to simultaneously handle explorative and exploitative learning, has by extant research been suggested as a potential strategy to foster organisational ability to maintain daily business concerns while continuously changing to tomorrow's business needs.

As surprisingly little research addresses how these two learning modes are involved in achieving digital transformation, this thesis offers a systematic literature review aided by bibliometric analysis to provide a conceptual bridge between extant research on organisational ambidexterity and digital transformation. We based our analysis on an exhaustive search of published academic literature conducted in the Web of Science (WoS) database, which resulted in 1 338 identified articles. After conducting an exclusion process based on given subjective and objective criteria, we were left with 279 papers. We further narrowed it down to 141 articles using bibliometric coupling to ensure thematic relevance. A content analysis of these 141 papers helped us identify nine core articles that linked organisational ambidexterity to digital transformation. Based on the review of extant research, we identified three dimensions (i.e. internal orientation, external orientation, and structural integration), consisting of nine different learning considerations necessary to manage digital transformation. We subsequently offer four propositions and a Venn diagram that both provide a foundation for further research and practice.

Keywords: Digital Transformation; Organisational Ambidexterity; Digital Ambidexterity; Bibliometric Review; Learning Considerations

Preface

This thesis constitutes the final part of our Master of Science degree in Economics and Business Administration at Oslo Business School, Oslo Metropolitan University - OsloMet. To fulfil the graduation requirements of the study program, we have written the dissertation "Ambidexterity to Overcome Digital Transformation Challenges: A Bibliometric Review" within the major of strategy, organisation, and management with a timespan of one semester. The theme of the thesis can be explained by our shared interest in digital transformation and how it is changing the way organisations operate. As digital transformation is a hot topic due to the frequent technological changes, we found it exciting to contribute to the research field by conducting a bibliometric review on this topic.

Our master thesis constitutes an experiment performed with our supervisor Karl Joachim Breunig to write a research article that would potentially become published during our project engagement. Being a part of this experiment has been very interesting and has broadened our academic horizon. We have gained valuable insights into how research projects are conducted and shared with an academic audience. The final paper of the experiment, which represents a shorter version of this thesis, has been submitted to the ISPIM Innovation Conference in Berlin and will be presented virtually on the 23rd of June 2021. The article submitted to ISPIM is included under Appendix A, and the slides of the presentation are attached in Appendix B.

This master thesis has been a fascinating and educational project, but at the same time challenging. We have had invaluable support throughout the whole process, and for this, we would like to thank our supervisor Karl Joachim Breunig for his excellent guidance and constructive feedback. Further, we would like to thank our family and friends for their moral support and input throughout the thesis. Finally, we would like to thank each other for constant laughter, great discussions, and a lot of encouragement throughout this process.

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1.0 Introduction

1.1 Background

In the era of inevitable change and transformation, the ability to cope with uncertainty is gaining increasing importance (Durão et al., 2019). To succeed and survive in the long run, organisations must find new ways to face rapid technological innovations to stay competitive. However, facing rapid innovations is a complicated process, and approximately 70 per cent of all firms fail in their transformation (Robinson, 2019). Although a great deal of research has been devoted to answering how organisations survive environmental changes, they still struggle to adapt. Organisational ambidexterity, "the ability to simultaneously pursue both incremental and discontinuous innovation and change" (Tushman & O'Reilly, 1996, p. 24), is often a solution that emerges in organisational theory. To achieve ambidexterity, organisations must explore new technology and new markets to benefit from future opportunities. At the same time, they must exploit existing markets and technologies to take advantage of what works now (March, 1991).

There is a large amount of previous research on digital transformation (DT) and organisational ambidexterity (OA). However, when combining these two topics, the field significantly shrinks and consists mainly of case studies from recent years. This illustrates that the field is under development and may have high relevance for organisations today. Based on a large amount of existing research on the two separate bodies of literature, it is intuitive to think that the connection between organisational ambidexterity and digital transformation has been accounted for. This can be explained by the organisations' need to understand how to achieve organisational ambidexterity to succeed with digital transformation. However, extant literature consists of research focusing on, for example, how organisational members respond to an ambidextrous organising model designed to accelerate digital innovation (Smith & Beretta, 2020) and how established enterprises adopt and scale agile forms of organisational design in times of digital disruption (Gerster et al., 2020). Nonetheless, we have not been able to identify extant literature that focuses directly on how organisations can use ambidexterity to achieve digital transformation. Therefore, there is a research gap in the field and a need to identify a foundation that can inform future research and practice. Our goal with this thesis is to identify such a foundation by conducting a

systematic literature review. Our thesis seems to be a valuable contribution, as it will contribute to filling the existing research gap by expanding the theoretical understanding of the connection between organisational ambidexterity and digital transformation.

1.2 Purpose and research question

This thesis seeks to take stock of prior published research to identify a conceptual bridge between organisational ambidexterity and digital transformation. The aim is to integrate the two fields and improve the understanding of how organisations must learn to manage digital transformation. Therefore, the ambition of this thesis is to address the following research question:

How can a structured literature search utilising bibliometric analysis of current published scientific research contribute to building a bridge between organisational ambidexterity and digital transformation?

The research question will be answered through a structured literature search. By using the final search database for the bibliometric analysis, we identified core articles for the content analysis to assess how extant research on DT and OA can be integrated. The last search contained an initial sample of 1 338 articles, which were first reduced to 279 papers, and subsequently narrowed down to 141 documents in our bibliometric analysis. Finally, we identified a sample of nine articles, which we based our content analysis upon.

Moreover, the review of extant research has enabled us to identify three dimensions (i.e. *internal orientation, external orientation,* and *structural integration*) underpinned by nine learning considerations. In the light of these, we offer three propositions organisations should take into consideration to succeed with digital transformation. As it is hard for organisations to facilitate all three propositions continuously, a Venn diagram has been developed to illustrate the different positions an organisation may be located in. The most optimal position led to a fourth proposition, emphasising the importance for organisations to continually focus on the three propositions simultaneously. Overall, our contribution can function as a vantage point for further conceptualisation, attempting to integrate organisational ambidexterity and digital transformation.

1.3 Delimitations

Our thesis seeks to combine two different bodies of literature: extant research on digital transformation and extant research on organisational ambidexterity, each of which link to several other bodies of literature. Therefore, we are aware that there exist relevant concepts that we do not include in this thesis. Organisational ambidexterity can, for instance, be linked to concepts such as dynamic capabilities, knowledge management strategies and absorptive capacity. Digital transformation can, in addition, expect to be connected to theories of innovation and various technologies. However, we have chosen to delimit our thesis to focus solely on organisational ambidexterity and digital transformation to answer our research question.

1.4 Structure

The outline of the thesis is as follows: the next chapter presents a review of relevant literature related to the research question of this thesis. Further, Chapter 3 describes the research methodology, and Chapter 4 presents the analysis and the findings. In Chapter 5, we discuss the findings and provide a conceptualisation. Finally, a conclusion is presented in Chapter 6, consisting of a contribution, practical implications, limitations of the thesis and directions for future research.

2.0 Theory

In this chapter, we will first explain the concept of organisational ambidexterity. Second, we will present existing literature on digital transformation.

2.1 Organisational ambidexterity

The Oxford Advanced Learner's Dictionary defines the term ambidextrous as: "To be able to use the left hand or the right hand equally well" (Oxford University Press, 2021). Robert Duncan first introduced the concept of "organisational ambidexterity" in 1976, and it has since aroused great interest. The research field has grown broader as the phenomenon has been studied in several contexts such as management, organisational learning, strategy, and technological innovation. Consequently, the term has been used in various ways, resulting in a vague generic use of the term. To prevent confusion, this thesis will use the definition of

Tushman and O'Reilly (1996), as they describe organisational ambidexterity as "the ability to simultaneously pursue both incremental and discontinuous innovation and change results from hosting multiple contradictory structures, processes, and cultures within the same firm" (p. 24).

An essential contributor to the research field is James March (1991), which conceptualised exploration and exploitation. Exploration will primarily facilitate disruptive innovation as organisations continuously search for new knowledge and capabilities. Further, this will give them the opportunity and necessary competencies to enter new markets, develop new products and improve their business process (March, 1991; Raisch & Birkinshaw, 2008; O'Reilly & Tushman, 2013). To succeed with this process, organisations will experience a need for autonomy, experimentation and flexibility (March, 1991; Tushman & O'Reilly, 2013). In contrast, exploitation sheds light on incremental innovation (Andriopoulos & Lewis, 2009) to the extent that organisations compete in markets with mature technologies. Moreover, it focuses on leveraging existing knowledge by continuously improving and refining current competencies, products, and processes (March 1991, Raich & Birkinshaw 2008, Tushman & O'Reilly, 2013). In order to succeed with exploitation, there will be a need for efficiency, control and security (March, 1991; Tushman & O'Reilly, 2013).

Moreover, it is well known in the literature of ambidexterity that it is difficult to cope with managing the inherent tension between exploration and exploitation (March 1991; Tushman & O'Reilly 1996; Raisch & Birkinshaw 2008). This can be explained by the fact that exploration reduces the speed of improvements in organisations, and exploitation makes experimentation less attractive (Levitt & March, 1988). Exploitation has, therefore, a trade-off relation with exploration, as most organisations tend to focus more on one of them (e.g. by constantly engaging in new projects without maintaining profitability in current initiatives or by failing to adjust to new market needs) (Andriopoulos & Lewis, 2009; Sinha, 2015). This tendency is also called myopia, and extant research illustrates that organisations commonly overestimate exploitation and underestimate exploration (Levinthal & March, 1993).

Furthermore, the reason why exploitation is favoured can largely be explained by the need for short-term success where the return is positive, imminent, and predictable. In contrast, exploration is more ineffective as the pursuit of new ideas, markets, and technologies will

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have less certain outcomes, longer time horizons and more diffuse effects where the return will be uncertain, distant and often negative (March, 1991). If organisations do not manage to balance the two inherent tensions and overemphasise one of them, they will be insufficient in the long run. Subsequently, exploration and exploitation function as a paradox, "a situation where two seemingly conflicting or mutually exclusive factors seem to be true at the same time" (De Wit, 2017, p.14). Hence, several researchers have stressed the importance of balancing exploration and exploitation to secure both short-term and long-term success (He & Wong, 2004; Andriopoulos & Lewis, 2009; O'Reilly & Tushman, 2013; March, 1991; Teece, Pisano, & Shuen, 1998).

Additionally, prior literature identifies three prevalent ways to organise for ambidexterity: sequential, structural, and contextual. First, sequential (i.e. temporal) ambidexterity suggests that organisations achieve ambidexterity over a longer period by switching structures that focus on exploration and exploitation, meaning that organisations work on one of the conflicting objectives at a time (e.g., Duncan, 1976). Second, in the light of rapid changes, structural (i.e. simultaneous) ambidexterity was introduced, and involved operating with dual structures, mainly two separate subunits that each pursue one conflicting objective (e.g. Tushman & O'Reilly, 1996). Third, contextual ambidexterity implies an organisational environment that supports and gives the employees incentives to effectively split their focus and allocate their effort and time between exploratory and exploitative activities (e.g. Gibson & Birkinshaw, 2004).

Finally, extant research points out the importance of choosing wisely one of the three ways of organising for ambidexterity. Because small and medium-sized enterprises (SMEs) operate differently from large firms with several units (Chang & Hughes, 2012), extant research indicates that it is risky to state that these three ways of organising organisational ambidexterity are appropriate for all firm sizes. Lubatkin et al. (2006) emphasise that SMEs often lack the number of resources and hierarchical systems, making it challenging to facilitate structural ambidexterity. Therefore, due to the lack of facilitative mechanisms, they argue that SMEs should rely more on contextual ambidexterity. Further, Müller et al. (2019) argue that start-ups also lack the option of structural ambidexterity as they have similar organisational constraints and only have the chance for attaining ambidexterity through the contextual approach. However, larger firms can easily obtain structural ambidexterity as they are more resourceful, have a formal structure and managerial expertise (Müller et al., 2019;

Lubatkin et al., 2006). Due to this fact, managing for contextual ambidexterity may be a bit harder as it requires more integration, cooperation, and autonomy in the process (Chang & Hughes, 2012). Consequently, in this context, none of the firms should facilitate sequential ambidexterity, as it is reasonable to assume that it is not suitable for organisations that constantly operate with a lot of change and new technologies.

2.2 Digital transformation

In recent years digital transformation has emerged as an essential research topic as the entrance of new digital technologies forces incumbent firms in different sectors to transform their business. As an emerging topic, digital transformation has gained significant interest, which has resulted in various research directions and a complex research field (Holand et al., 2019). For instance, DT has become an essential factor in research for information systems (Bharadwaj et al., 2013; Piccinini et al., 2015), and the extant literature concerns both the adoption and use of digital technologies (e.g. Nambisan et al., 2017; Sambamurthy et al., 2003). Moreover, DT has been researched in both marketing literature concerning the effects of social media and digital advertising (e.g. Miklosik & Evans, 2020) and in the strategic management literature regarding "the conceptualisation, operationalisation and renewal of the business model" (Verhoef et al., 2021, p. 889). Consequently, it lacks evidence of a shared understanding of this research phenomenon, and Verhoef et al. (2021) emphasise the need to understand when, why, and how digital transformation works as the extant research is incomplete.

Further, as there does not exist a universal definition of digital transformation, many researchers have tried to define the term. For example, Vial (2019) defines DT as "a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication and connectivity technologies" (p.118). Reis et al. (2018), on the other hand, define DT as "the use of new digital technologies that enable major business improvements and influences all aspects of customers' life" (p. 418). However, this thesis will go forward with the definition of Verhoef et al. (2021), describing DT as: "a change in how a firm employs digital technologies, to develop a new digital business model that helps to create and appropriate more value for the firm" (p. 889). This conceptualisation will not only address new digital technologies like artificial intelligence (AI), machine learning (ML), robot process automation (RPA) and the

internet of things (IoT), but it will also include changes in the organisational fundamentals, such as in the business model, operationalising processes, strategy, organisational structure or culture (Vukšić et al., 2018).

In addition, it is critical to separate digital transformation from related terms such as digitisation and digitalisation since these words have been used interchangeably and instinctively in previous research. Furthermore, incumbent firms may transform gradually into a digital organisation, and it can therefore be beneficial to notice the difference between these three terms (Verhoef, 2021). In short, digitisation is primarily limited to converting analogue information into a digital format and is connected to the activity level in organisations. Thus, digitisation involves changing and automating existing activities in the firms (Holand et al., 2019). In contrast, digitalisation concerns a change at the process level in organisations where digital technologies can improve existing business processes, e.g. through automation. Therefore, this term significantly impacts how organisations compete and interact with customers (Holand et al., 2019; Verhoef, 2021). In accordance with the two other terms, digital transformation is described as a change on the organisational- and ecosystem level and is centred around the changes digital technology has on the business model. Therefore, digital transformation has a direct impact on the whole organisation, especially the value creation (Holand et al., 2019; Henriette et al., 2015).

The digital transformation process is pervasive and affects all parts of the organisations and how it does business. To get a better understanding of the phenomenon, it will be helpful to separate the DT process into four different aspects: (1) characteristics, (2) drivers, (3) impacts and (4) transformed areas.

First, the behaviour of digital transformation has been characterised as complex, radical, disruptive, evolutionary, and continuous. As some of these characteristics are contradictions, it may be confusing. However, Morakanyane et al. (2017) explain this in a good way:

> While digital transformation was referred to as a radical change more than as an evolutionary process, we believe an evolutionary process is a more inclusive term that captures the fact that digital transformation evolves with time, and whenever this evolution takes place, the impacts bring about a radical change to the organisation. (p. 438).

Second, extant literature has identified several attributes that can enable and influence the digital transformation process. For instance, Verhoef et al. (2021) have identified three external drivers: digital technology, digital competition, and digital customer behaviour. However, Kane et al. (2015) insist that it is not sufficient only to use digital technologies to drive the digital transformation process. Digital capabilities described as "technology skills possessed or required by employees, customers and other stakeholders in different areas that can enable the organisation to thrive in a digital environment" (Morakanyane et al., 2017, p. 438) are essential for organisations, in addition to other factors such as strategies and culture to achieve digital transformation.

Third, the impacts of digital transformation are the effects of the organisations' experience and whether these effects can be positive or negative. Further, the impacts it creates have been classified into two categories: customer-focused and organisation-focused. However, one value realised by both the categories is value creation, which represents the ultimate impact organisations strive for in digital transformation (Morakanyane et al., 2017).

Fourth, the final aspect, transformation areas, are the areas impacted during the process of digital transformation. Extant research suggests several impacted areas (e.g. Piccinini, 2015; Matt et al., 2015), but the key areas are operational processes, business models and customer experiences (Westerman et al., 2014; Morakanyane et al., 2017). Moreover, a focus on these three areas engages transformation in other aspects of the organisations. Digital transformation is, therefore, a lot more than a technological shift as it has a strategic impact and can affect every aspect of the organisation (Henriette et al., 2015).

To summarise, organisational ambidexterity and digital transformation are two separate bodies of literature. However, both research fields relate to learning and innovation, and are necessary for long-term survival. This can be explained by the fact that organisations can use ambidexterity to manage the digital transformation as both of the research fields cause organisations to change their way of operating: organisational ambidexterity by ensuring a balance between exploration and exploitation, and digital transformation by changing the business model in line with new technological innovations. As these two bodies of literature constitute a continuous process that develops over time within organisations, but its impacts result in a radical change for the organisations, it is evident that they can be combined. We can therefore argue that there exists a link between organisational ambidexterity and digital transformation.

3.0 Methodology

In this chapter, the methodology for the thesis will be presented. First, we will explain our choice of using bibliometric analysis. Second, we describe the four-stage excluding process used to identify relevant papers for further analysis. Finally, we present how we conducted the descriptive-, bibliometric-, and content analysis.

3.1 Research design

In this thesis, we have conducted a systematic literature review with the use of bibliometrics. A systematic review is a scientific investigation with a pre-planned method that involves a comprehensive search to find relevant articles and then use explicit, reproducible criteria in selecting articles for the review (Cook et al., 1997). Bibliometrics further indicates "the collection, the handling and the analysis of quantitative bibliographic data, derived from scientific publications" (Verbeek et al., 2002, p. 181). This method can be beneficial as it "extends the span of science by better linking efforts across research domains" and discovers "topical relationships, research trends, and complementary capabilities" (Porter et al., 2002, p. 351). It can even cause the emergence of a new field of research (Fahimnia et al., 2015). Employing this method will therefore contribute to understanding the existing body of knowledge for the given research field, provide a solid theoretical foundation and substantiate the presence of the research problem (Levy & Ellis, 2006).

3.2 Sample

A literature search in the selected database Web of Science (WoS) has been conducted to answer our research question. We completed an exhaustive structured literature search and experimented with different combinations of terms and phrases to identify the sample of extant published research articles that best answered our research ambition. After performing various searches that referred to the title of the articles, we decided to conduct a "topic" search which matches the entered keywords with the "title", "abstract", "author" and "keywords plus" of the articles in the database. The topic search was performed on the 4th of February and consisted of the following search string:

Topic=((Ambidext* AND Digit*) OR (Ambidext* AND Disrupt*) OR (Explor* AND Exploit* AND Digit*) OR (Explor* AND Exploit* AND Disrupt*)).

After experimenting, we decided to re-run the initial search, and the final search was performed on the 14th of April, 2021. We included relevant keywords for ambidexterity in combination with digit* and disrupt* to ensure that we did not miss any relevant articles as the terms digitisation, digitalisation, digital transformation, and disruption are interrelated and applied differently in research articles. Through this combination of keywords, 1 338 papers were identified with a timespan of all years (1987-2021).

To select the relevant papers for further analysis, we conducted a four-stage excluding process. First, we excluded 2021 from publishing years and were then left with all whole years to retain the opportunity to identify potential evolution in the field. Second, to avoid misinterpretations, we excluded papers in other languages than English: French (9), Spanish (9), Portuguese (7), German (3), Polish (2), Chinese (1), Czech (1), Italian (1), Russian (1), Slovak (1) and Turkish (1). Third, we excluded all irrelevant document types such as letters (1), reprints (1) and retracted publications (1) and was left with articles (1120), reviews (95), proceeding papers (61), early accesses (26), editorial materials (9), book chapters (6) and a book review (1).

Fourth, to ensure relevance, we systematically excluded research categories consisting of articles with unrelated information that did not contribute to our research agenda. This process consisted of two different selection methods based on the number of articles within the category. First, for categories consisting of 25 or more research articles, a bibliographic co-occurrence analysis was performed in the software program VOSviewer to identify relevant keywords. Further, we chose a threshold of three to analyse the research category thoroughly and ensure relevance. By examining the various clusters in each research category, we identified whether the category focused on both organisational ambidexterity and digital transformation. Clusters that were discarded had keywords mainly related to organisational performance, optimisation, and specific attributes to technology. Since the discarded categories could contain high-impact articles, we read the abstracts on the 15 most relevant research articles for each category to ensure that we did not overlook them. Second, if the category consisted of less than 25 research articles, all the abstracts were read to ensure relevance. The categories we were left with were management (121), computer science information systems (94), business (86), information science library science (51) and business finance (8). The exclusion process led to a result of 279 academic articles.

3.3 Analysis

Our analysis is progressed in a three-stage process. First, we conducted a descriptive analysis of our findings to assess the topic's development and identify which scientific disciplines and publication outlets that contributed to the knowledge that informed our thesis. Second, to secure a systematic and objective review, a bibliometric analysis was conducted with the application of VOSviewer. Using the framework of science mapping, we constructed networks and identified relevant concepts linked to terms such as "ambidexterity" and "digital transformation". Subsequently, we examined different clusters consisting of related articles and identified central articles to ensure thematic relevance. Moreover, the bibliometric analysis aimed to condense this amount to provide a sample of highly relevant core articles which we base our content analysis upon. Third, we conducted a content analysis where the selected articles have been coded and mapped in Microsoft Office Excel to look at similarities and differences in order to investigate the link between ambidexterity and digital transformation. Therefore, this analysis allowed us to make replicable and reasonable assumptions by interpreting the selection of the textual material.

3.3.1 Descriptive analysis

For the descriptive analysis, we exported the final search database from WoS to an Excel file. After cleaning all the irrelevant data in Excel, all articles were represented by their authors, title, journal, document type and publication year. For the documents categorised as early access, the publication year was missing, and therefore, we manually filled in the year of the early access publication. Further, we included the SCImago Journal & Country rank by adding one column: the SJR Quartile. The column was filled in manually, and the journals that we did not manage to find were marked as "Q0". In addition, we added a second column for the journal category (i.e. Business, Management, Economics, Technology, Library and information science, Multidisciplinary and Organisational behaviour). To assess the appropriate value for the journal category, we first visited the SCImago Journal & Country Rank website to get an idea of which category the journal belonged to, and we then visited each journals' website to ensure the journal discipline. Further, we transformed the .xlsx file into a .txt file and uploaded it to Microsoft Power BI to create visual illustrations of the final data search. Finally, we employed Microsoft Excel to create a table that provides an overview of the development in published articles within each SJR category.

3.3.2 Bibliometric analysis

A bibliometric analysis was conducted to obtain a better overview of the 279 identified articles. We exported all the articles into a txt. file containing full record and cited references from Web of Science and applied the software program VOSviewer to analyse our dataset. The program allowed us to visualise the dataset, identify clusters of interrelated articles, and further generate a "map", where clusters of the unit of analysis are characterised by colour where items with similar colour belong to the same cluster. To have more trustworthy clusters, we created a Thesaurus file, which is a text file that can clean the data. We used this file to merge two similar terms, where for example, "organisational ambidexterity" was replaced with "ambidexterity". We chose not to merge terms such as "exploration" and "exploitation" with the term "exploration and exploitation" as these terms theoretically can be used in different ways.

VOSviewer contains several types of analyses to find literary correlations (i.e. co-authorship, co-occurrence, citation, bibliographic coupling, and co-citation) (Van Eck & Waltman, 2020). We found co-occurrence, co-citation, and bibliographic coupling analysis to be most helpful in answering our research question. Co-occurrence is a method that extracts keywords from the title, abstract and the author-supplied keyword list of a publication (Van Eck & Waltman, 2020) and is conducted to identify the most relevant terms in our dataset. Co-Citation is a method that creates a link between two items cited by the same document (Van Eck & Waltman, 2020) and is conducted to understand the relationship between the references. Bibliographic coupling is a method that creates a link between two items that both cite the same publication (Van Eck & Waltman, 2020) and is initially conducted to find the most influential articles.

Further, by applying VOSviewer, we had the opportunity to identify the most influential keywords, references, or articles by using several key metrics such as links, total link strength, occurrences, and average publication year. Links indicate the number of links of a keyword to other keywords in the visualisation, and total link strength implies the total strength of the link of a keyword with other keywords. Occurrences express the number of documents in which a keyword occurs. The average publication year states the average year of the documents in our dataset when a keyword or term appears (Van Eck & Waltman, 2020).

Since the overlay visualisation of the bibliographic coupling analysis illustrated that the most influential articles are older, but the overlay analysis of co-occurrence illustrated that digital transformation is a hot topic, we found it interesting to read the abstract of all influential articles to ensure that they did not refer to the topic "digital transformation". Our suspicion was confirmed as none of the articles included the terms of exploration, exploitation, or ambidexterity in the context of digital transformation. Therefore, we decided to examine all the 279 articles starting in 1994 to figure out when digital transformation became an important topic and when ambidexterity was used in the same setting. After skimming the abstracts of the articles, it turns out that the two topics were first included together in papers originating from 2018. Due to the delimitation of the thesis, we decided to exclude the articles published before 2018 to best answer our research question. Our search was therefore narrowed down to focus on newer papers within the time span of 2018 to 2020, and we were left with 141 out of 279 articles.

3.3.3 Content analysis

For the further literature review, we read the abstract of all the 141 articles to ensure thematic relevance. We selected those contributing to answering our research question and filling the existing research gap between organisational ambidexterity and digital transformation. Every article we read was scored on their relevance related to the research question on the following scale: (A) Relevant; (B) Borderline relevant; and (C) Irrelevant. During this process, the articles that did not contain information about the concept of organisational ambidexterity and the phenomenon of digital transformation were discarded, for example, articles regarding organisational performance, optimisation, and specific attributes to technology. The selection of articles resulted in seven out of 141 papers. To assure that we did not exclude relevant papers, we carefully read all the abstracts to the 23 articles published in 2021 within the final search. After the assessment, we decided to include two of the articles in our further analysis, as they could contribute to answering our research question. We were then left with nine relevant articles.

In the content analysis, the nine papers were read thoroughly and coded in Excel to give an overview of the articles. The overview consisted of various columns describing the

papers' main ideas and findings, how the articles described different ways organisations could handle the digital transformation, and interesting points for further analysis. After coding the articles, we analysed the collected information to find common features.

4.0 Findings

This chapter will present the most important findings from the three analyses described in the previous chapter. First, in the descriptive analysis, the findings are illustrated through graphs and charts. Second, the findings from the bibliometric analysis are visualised through maps and tables. Third, the findings in the content analysis are found by investigating the commonalities in the core articles. In addition, we have included a part called "Other findings", which consist of findings that cannot be linked to these three analyses.

4.1 Descriptive analysis

To identify trends and key figures in our data set, we employed Power BI and Microsoft Excel. First, we looked at the publishing years in our dataset to reveal development trends of scientific research. Figure 4.1 illustrates an overall research growth within the research field.
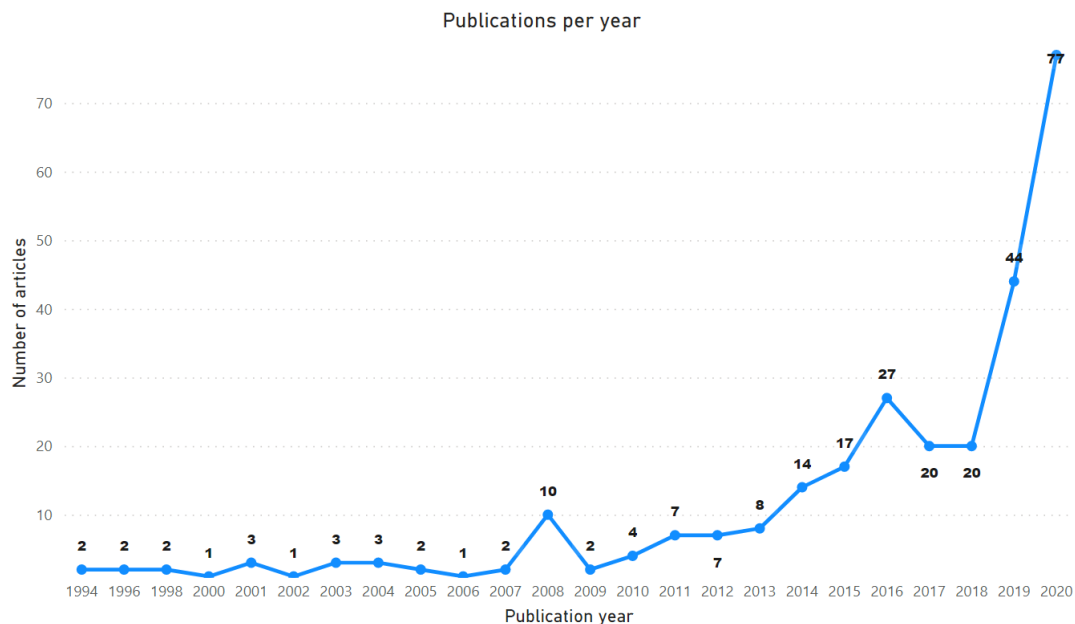

Figure 4.1: Development of publications per year within the database consisting of 279 articles.

By looking at Figure 4.1, we identified an upward trend in the number of publications per year. The development in the number of publications from 1994 to 2017 indicates a relatively

gradual increase within the research field. The average of publications published within this period is six per year. The gradual increase could be explained by the technological development as our search string included words such as "digit*" or "disrupt*". Additionally, growth within the technological research field can have called for managers to know how to deal with these challenges in the organisation. Therefore, the gradual escalation can also be explained by the fact that publications within the management literature increased with the development of technology. Another observation worth noticing is the steep growth in the research field from 2018 to 2020. The exponential growth between 2018 and 2020 can be explained by the emergence of digital transformation, and it is frequently used by both practitioners and researchers in recent years. Based on this trend and the emergence of constantly new technologies, we predict that the number of publications will increase in the years to come.

Second, the journals can indicate the quality of the publications within our final search. The 279 articles in our sample were published in 176 different journals. Based on the large number of journals represented, this gives an average of approximately 1.59 articles per journal in our database. To get an overview of the ranking and the importance of the journals, we used the SCImagio Journal & Country Rank. Figure 4.2 presents an overview of the distribution of journals within each SJR Quartile.

Number and percentage of journals within each SJR Quartile

- Q3 9 (5.11%)
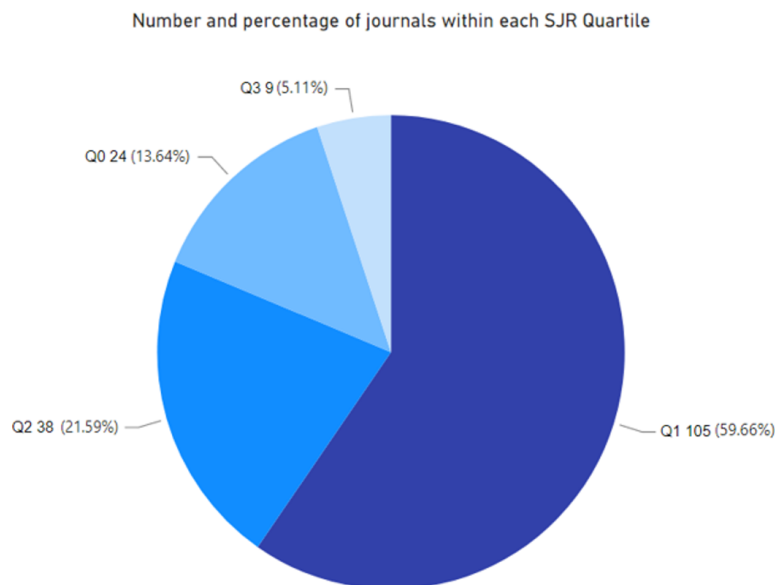- Q0 24 (13.64%)
- Q2 38 (21.59%)
- Q1 105 (59.66%)

Figure 4.2: Number and percentage of journals within each SJR Quartile.

The SCImago Journal & Country Rank divides the set of journals into four quartiles according to their SJR index. The SJR index of weighted citations per publication over three years can be a helpful indicator to compare journals within the same research field (ScimagoJR, 2021a). Therefore, the journals are ranked on a scale from Q1, which contains journals with the highest impact and prestige, to Q4, which consists of journals with the lowest impact and prestige. However, we also had to add a fifth value, Q0, as some of the journals were not included on the list of journals SCImago Journal & Country Rank offered. This can be explained by the fact that the SJR ranking is based on information from the Scopus database, and we used the database Web of Science (ScimagoJR, 2021b), which contains different articles and journals. To ensure that the journals categorised within Q0 did not exist in the Scopus database, we did some random searches, and it turned out to be correct.

As seen in Figure 4.2, none of the journals in the data search was categorised within Q4, and we were therefore left with the four quartiles Q0, Q1, Q2, and Q3. The fact that Q4 is omitted may have something to do with our narrowed search, as we may have unknowingly removed journals with low impact and prestige in the exclusion process. Nonetheless, that our dataset does not contain journals categorised within Q4 is counterintuitive. As Figure 4.1 illustrates, the research field has increased rapidly in recent years. Therefore, it is easy to assume that the research field is emerging and that the articles have not had the time to be published in high impact and prestigious journals. However, most of the articles were published in Q1 journals (59.66 per cent), while the rest were published in the remaining quartiles (40.34 per cent). Over half of the articles published in Q1 indicate that the data search consists primarily of high-quality journals and that influential records may not lag. High impact and prestigious journals may acknowledge this as an interesting field and want to publish such articles. As many journals are interested in publishing such articles, indicates that organisational ambidexterity and digital transformation may be strongly related topics.

The development of published articles within each quartile over the years is illustrated in Table 4.1. The column for Q1 shows that high impact and prestigious journals have been publishing continuously over the last 24 years. After investigating the articles in these journals, it appears that these articles contain terms such as exploitation and exploration and can thus be connected to the research field of organisational ambidexterity. This illustrates

that ambidexterity has been an ongoing interest. However, Table 4.1 reveals that research related to this field has exploded in recent years, which indicates that the concept of organisational ambidexterity is still essential and widely used. The fact that ambidexterity is still a widespread phenomenon can be explained by organisations' constant need to change with the environment. As the environment in recent years, to a large extent, has been affected by new technological changes, the ability to change has been more critical than ever. For that reason, as seen in Table 4.1, articles published in journals after 2014 will be the most interesting and useful to answer our research question.

	Q1	Q2	Q3	Q0	Total
1994				2	2
1996	2				2
1998	2				2
2000	1				1
2001	2	1			3
2002				1	1
2003		1		2	3
2004		1	1	1	3
2005		2			2
2006				1	1
2007	2				2
2008	9	1			10
2009	1	1			2
2010	3	1			4
2011	5	1		1	7
2012	5	1		1	7
2013	7	1			8
2014	11	3			14
2015	13	2	1	1	17
2016	21	1	1	4	27
2017	14	3	2	1	20
2018	14	4	1	1	20
2019	27	12	3	2	44
2020	51	18	3	5	77
Total	190	54	12	23	279

Table 4.1: Development in published articles within the SJR quartiles.

Finally, to gain an insight into which academic fields the articles belong to, we found it beneficial to investigate the journal disciplines. To do so, we reviewed each journal and assigned it to the topic closest related to it. Figure 4.3 illustrates the categorisation of the articles within the given journal discipline.
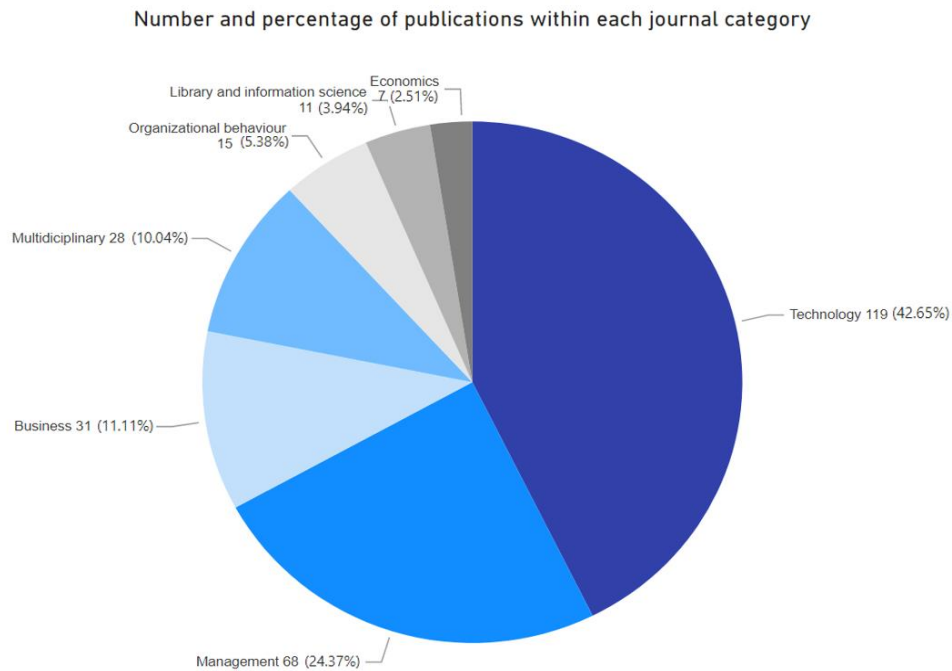
Figure 4.3: Number and percentage of publications within each journal category.

Articles published within the category "Technology" dominate our data search as it consists of 119 papers (42.65 per cent). One explanation for this could be the rapid growth of new technologies and the emergent need to adapt to these changes as they affect consumers, organisations, and society. The rapid growth of technology could also explain the high number of articles within the category "Management" consisting of 68 papers (24.37 per cent) as managers must possess knowledge on how to adapt and facilitate that the organisation manages to cope with the impact of technological changes. "Business" follows with 31 papers (11.11 per cent), and "Multidisciplinary" consists of 28 papers (10.04 per cent). This can be explained by the many aspects and perspectives within these categories, such as research addressing strategy on one side and laws and regulation on the other.

In addition, Figure 4.3 illustrates that the number of articles within the category "Technology" is quite similar to the number of articles within the categories "Management" and "Business". This may indicate that research of digital transformation can be linked to the

category "Technology" and that the concept of ambidexterity may be included in the categories "Business" and "Management". Further, the category "Multidisciplinary" can also contain both ambidexterity and digital transformation. The remaining articles are relatively evenly distributed across the last categories, "Organisational Behaviour", "Library and Information Science", and "Economics". These categories are relatively small, which may indicate that the articles are outside our research field and are not linked to the concept of ambidexterity and the phenomenon of digital transformation. The name of the disciplines also helps substantiate this.

To summarise, Figure 4.3 illustrates that approximately 80 per cent of the publications are published within the disciplines of "Technology"," Management" and "Business". This was an expected finding, as organisational ambidexterity and digital transformation belong to two separate research fields. However, a surprising discovery was that terms such as exploration (or explore) and exploitation (or exploit) are used differently in the various academic fields. Articles in the field of technology, for example, tend to use these terms separately in different contexts. In contrast, articles in "Business" and "Management" mainly include both terms together in a shared context and have a greater focus on how organisations can balance the paradox.

4.2 Bibliometric analysis

4.2.1 Co-occurrence analysis

The co-occurrence analysis is based on author's keywords as the unit of analysis and was performed through full counting, which means that each link has the same weight (Van Eck & Waltman, 2020). We used a threshold of three to decide the minimum number of occurrences of a keyword to ensure that all relevant keywords were included. To feature the most important and central keywords, we eliminated all keywords with a total link strength under seven, such as "internet of things" and "social media". These requirements resulted in 17 of 1 153 keywords. Further, we decided to set the minimum cluster size to include four keywords to prohibit many small clusters and make the visualisation more structured. The figure below visualises three clusters containing the 17 keywords.
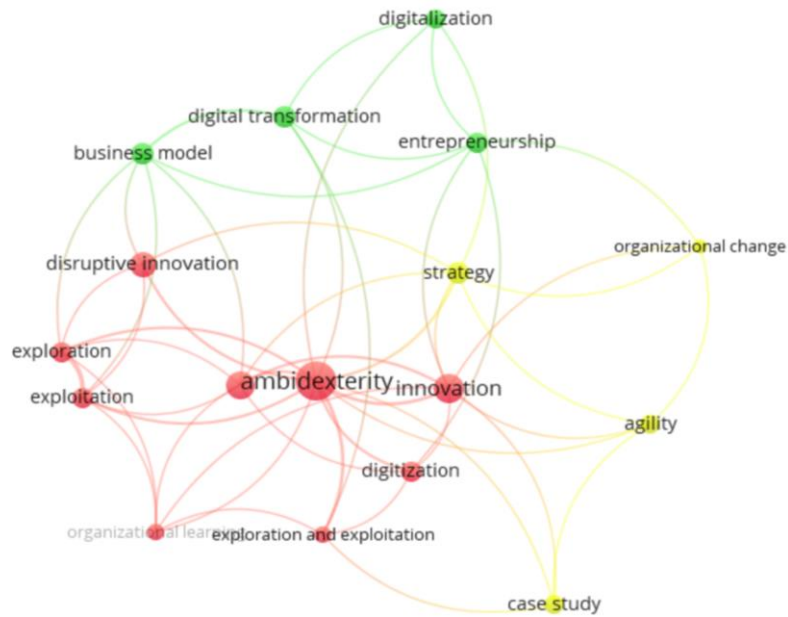
Figure 4.4: Network visualisation of the co-occurrence analysis.

In the network visualisation, the keywords are represented by a circle and their label. The size of the circle and label is determined by the number of occurrences of the keyword. The lines between the circles represent links, and the distance between them indicates relatedness between the keywords. For example, in Figure 4.4, the keyword "ambidexterity" has the largest circle and is linked to most keywords in the visualisation. One of the keywords "ambidexterity" is linked to is "digital transformation". Even though these two keywords are in different clusters and have a great distance between them in the map, they have a link. This can illustrate that ambidexterity is in some way connected to what is already written about digital transformation.

Moreover, the clusters are represented by different colours and suggest a similar topic among the keywords in one cluster. Appropriate labels could be allocated to each of them by analysing the main circles. The red cluster (Cluster 1) consists of nine keywords such as ambidexterity, innovation, dynamic capabilities (located left for ambidexterity), exploration, and exploitation. These keywords may be related to the topic of "organisational ambidexterity", and this cluster further seems to consist of keywords drawn from articles in our bibliographic data containing a context of how organisations have used ambidexterity to be more innovative. The green cluster (Cluster 2) consists of the four keywords: business model, digital transformation, entrepreneurship, and digitalisation. These keywords focus on

the main domain, "digital transformation". The yellow cluster (Cluster 3) gives us four keywords: strategy, organisational change, agility, and case study. These keywords can be related to change in the organisational theory.

The co-occurrence analysis in VOSviewer could also be illustrated as an overlay visualisation to see the average publications per year of the articles containing the keywords. Figure 4.5 shows that all the clusters change their previous colours to new colours representing the average publications per year. The colour bar presented in the bottom right corner of the visualisation extends from 2012 to 2020 and explains that the colours can range from blue (the earliest year) to yellow (the latest year).

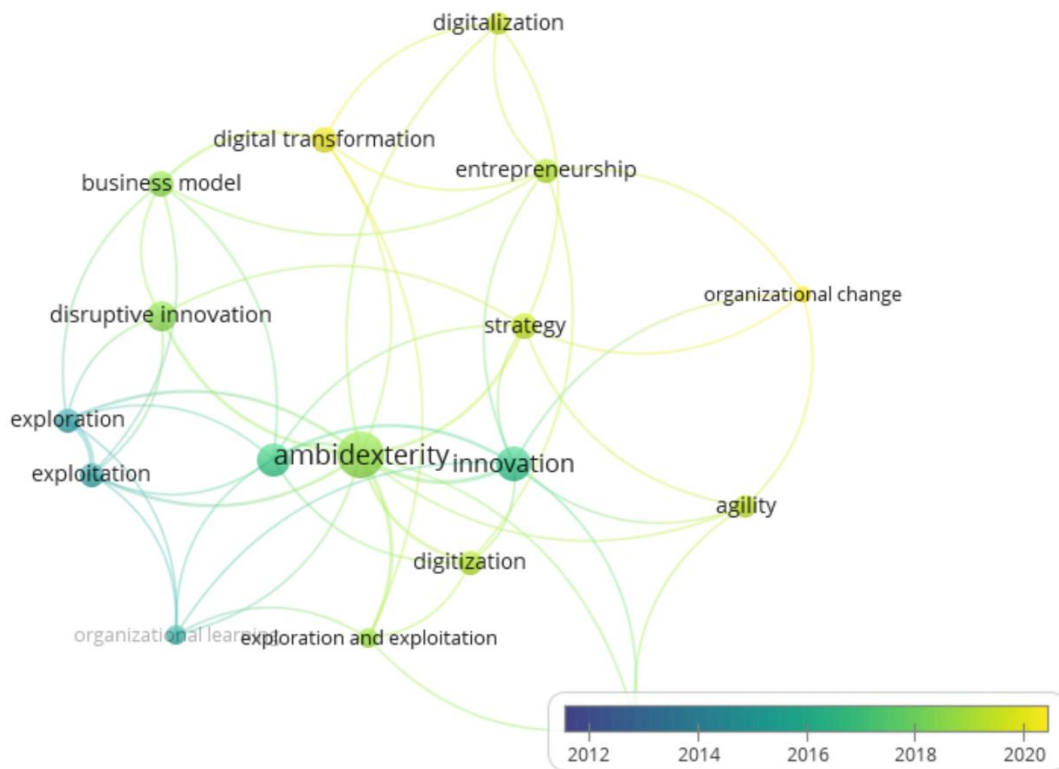*Figure 4.5: Overlay visualisation of the co-occurrence analysis.*

The visualisation shows that "organisational change" and "digital transformation" is the hottest topic in recent years with an average publication year of 2020 and 2019.67. One explanation could be that new technologies are entering the market at a fast pace and enhancing the need for organisations to change. This emphasises that digital transformation

involves a great deal of organisational change and indicates that they are no longer two separate research fields. Further, organisations today must learn new ways to change their way of operating to survive and succeed. This figure, therefore, illustrates that new terms will constantly emerge and that the field is under development.

"Ambidexterity", on the other hand, is frequently included in the publications with an average publication year of 2018.32. First, we found this a bit strange since ambidexterity has been a concept that has existed for a long time. However, the high score on average publication year can be explained by an increasing interest in the concept during recent years, and ambidexterity can therefore be considered a relatively popular topic. The least recent terms are "exploration" and "exploitation", with an average publication year of 2014.83 for both terms. As exploration and exploitation have the same average publication year, it can indicate that these two keywords have been used together and should have been merged with the keyword "exploration and exploitation" in the network visualisation. Furthermore, it is logical that these terms have a lower score on the average publication year as "ambidexterity" has gained interest in recent years, and "exploration" and "exploitation" together constitute a similar term. Several researchers may therefore have used the word "ambidexterity" instead of "exploration" and "exploitation".

The following table summarises the findings from the co-occurrence analysis. In the table, the keywords are sorted after their total link strength, but links, occurrences and average publication year are also included. The table illustrates that within the three different clusters, "ambidexterity", "business model", and "strategy" have the strongest link strength and are most influential.

Cluster 1				
Keywords	**Links**	**Total link strength**	**Occurences**	**Avg. pub. year**
Ambidexterity	13	23	21	2018.32
Innovation	9	12	12	2016.58
Exploration	6	12	6	2014.83
Exploitation	6	12	6	2014.83
Dynamic capabilities	8	10	11	2016.82
Exploration and exploitation	5	7	4	2018.50
Disruptive innovation	5	6	9	2018.22
Digitization	5	6	6	2018.83
Organizational learning	6	6	4	2015.25

Cluster 2				
Keywords	**Links**	**Total link strength**	**Occurences**	**Avg. pub. year**
Business model	6	7	7	2018.29
Digital transformation	5	6	7	2019.67
Entrepreneurship	6	6	6	2018.83
Digitalization	4	4	5	2019.20

Cluster 3				
Keywords	**Links**	**Total link strength**	**Occurences**	**Avg. pub. year**
Strategy	7	8	7	2019.14
Agility	5	5	5	2019
Case study	4	4	5	2018
Organizational change	4	4	3	2020

Table 4.2: Summary of bibliometric findings in the co-occurrence analysis.

4.2.2 Co-citation analysis

In the co-citation analysis, we used cited references as the unit of analysis with full counting. We determined the minimum number of citations of a cited reference as eight, which resulted in 77 of the 15085 cited references meeting the threshold. The clusters were set to have a minimum of four references to make the visualisation more organised, as many of the clusters only contained one reference. If we were to set the number of minimum sizes in a cluster below four, the most outstanding outliers from the red cluster would have been in other clusters. As these outliers had a solid distance to the main circle "March jg, 1991, organ sci, v2", their degree of relevance should be questioned. For that reason, we decided to go with a minimum cluster size of four cited references. Figure 4.6 can give an indication of which research fields the cited publications can be placed within.
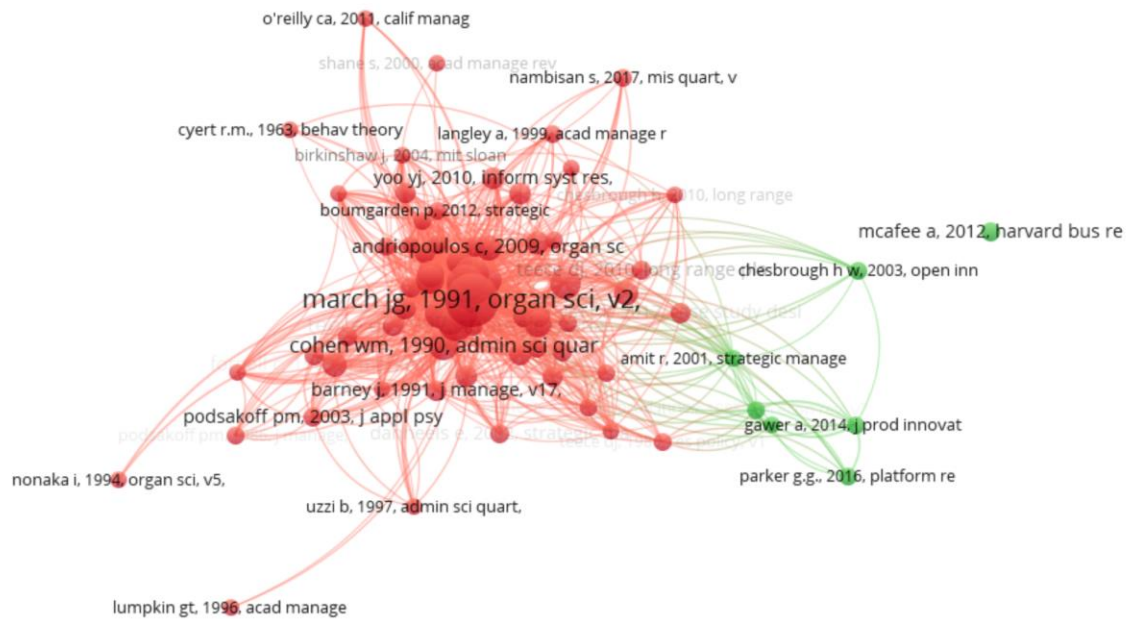
Figure 4.6: Network visualisation of the co-citation analysis.

Figure 4.6 illustrates that the red cluster consists of most references. References such as
March (1991), Andriopoulos & Lewis (2009) and Cohen & Levinthal (1990) indicate that the
red cluster can be connected to the research field of organisational ambidexterity.
In contrast, the green cluster is smaller and consists of references that address innovation and
technological change. Therefore, this cluster can be strongly related to digital transformation
as Parker et al. (2016) discuss how networked markets transform the economy. In addition,
Gawer & Cusumano (2013) addresses how organisations should deal with the market and
technological disruptions over time. However, the article written by McAfee & Brynjolfsson
(2012) stands out from the other references in the green cluster, as it is not linked to any of
them. This could be explained by the fact that the article focuses on how companies use big
data to succeed and may be more connected to the domain of technology than digital
transformation.

4.2.3 Bibliographic coupling analysis

The final analysis conducted in VOSviewer was the bibliographic coupling analysis. In this
analysis, we used the full counting method, and the unit of analysis was "documents". Based
on our wish to include articles dealing with digital transformation, we decided to keep the
minimum number of citations of a document to zero. This can be explained by the fact that
digital transformation has recently been a hot topic in the research field, and new articles

have not yet had the time to be cited. In fear of excluding relevant articles, we included all the 279 articles in the overlay visualisation in Figure 4.7.
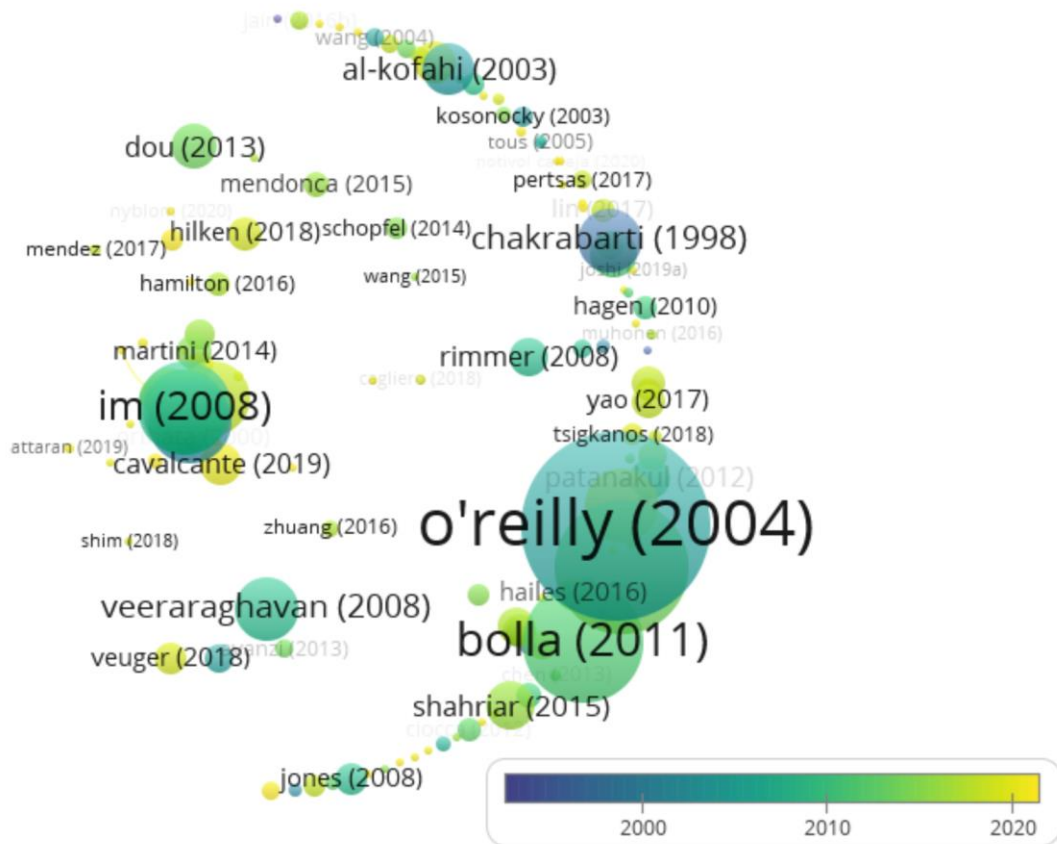

Figure 4.7: Overlay visualisation of the bibliographic coupling analysis.

As presented in the descriptive analysis, the earliest articles in our dataset originate from 1994. Therefore, we chose the range of the colour bar to include a timeline from 1994 to 2020, as it will give a more accurate illustration of the articles. In the overlay visualisation, the most prominent circles are the most cited articles in the map created by our bibliographic data. Even though these articles do not constitute the oldest, they can still be seen as slightly older articles. As this method is being used for recognising the core articles, we found it interesting to read the abstract of these articles. However, after reading the abstract to the most influential articles such as O'Reilly & Tushman (2004), Bolla et al. (2011), and Im & Rai (2008), it appears that the terms ambidexterity, exploration (or explore) and exploitation (or exploit) are not used in a context of digital transformation, but in other different ways. To identify relevant articles that can answer our research question, we read all the abstracts starting from 1994. We did not find any relevant articles for answering our research question until 2018, confirming that digital transformation is a newer topic. Consequently, we

narrowed our search to articles in the timespan from 2018 to 2020 and focused on the articles in the yellow circles illustrated in Figure 4.8. We were then left with 141 articles and used these to further narrow down our dataset to a core of highly relevant articles.
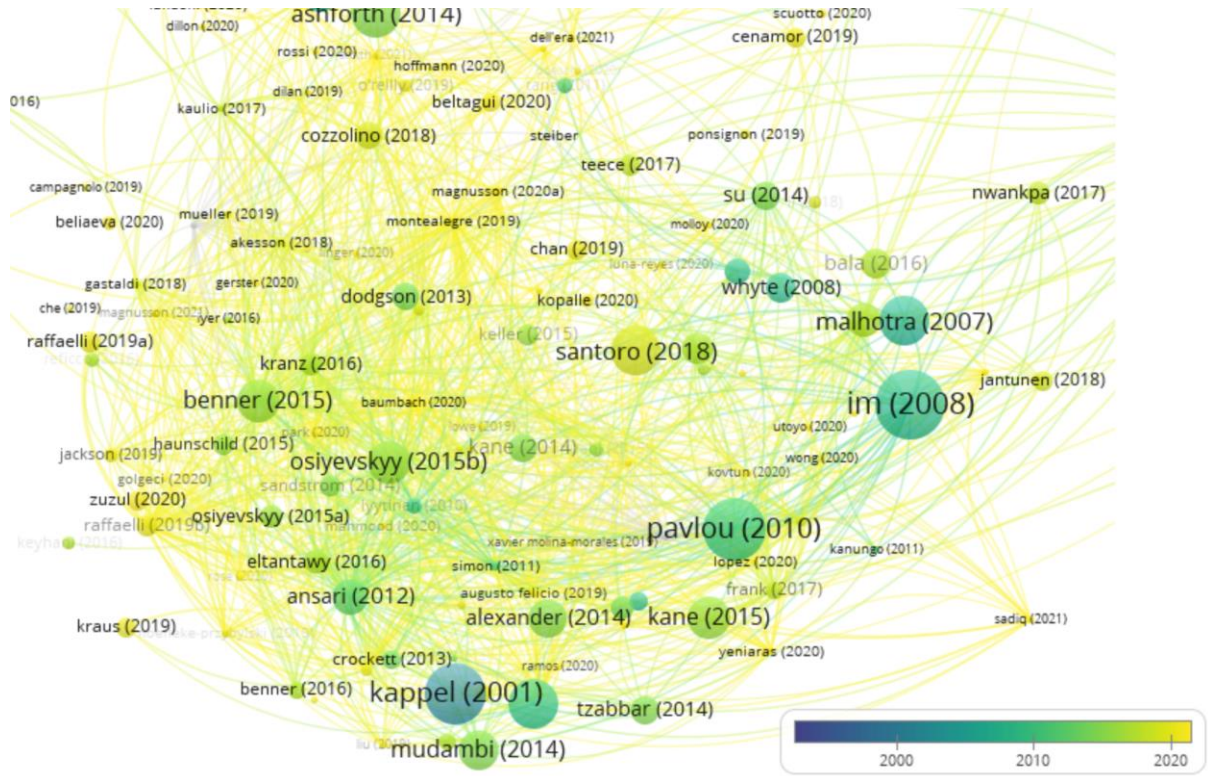

Figure 4.8: A close-up of the newer articles in the overlay visualisation of the bibliographic coupling analysis.

4.3 Content analysis

Considering that the literature has written extensively on the topics of organisational ambidexterity and digital transformation separately, we took for granted that some research articles would investigate the link between these two subjects. After a thorough reading of the articles in the initial search, it turns out that there was a significantly smaller number of articles that addressed this connection. Due to the lack of informative articles in this context, this content analysis will be based on the nine selected papers from the selection process described previously in this thesis. The selected articles will contribute to fill the research gap and help create a connection between organisational ambidexterity and digital transformation. The table below has been developed to give an overview of the nine articles with the purpose to establish an understanding of the conditions that allow us to connect the two research themes.

Reference	Description
Authors: Chan et al. (2018) **Title:** Agility in responding to disruptive digital innovation: Case study of an SME. **Journal:** Information System Journals.	The authors look at how small and medium-sized enterprises achieve the agility to respond to disruptive digital innovation. They have developed a framework on agility based on mitigating organisational rigidity, developing innovative capabilities, and balancing the tension of organisational ambidexterity.
Authors: Del Giudice et al. (2021) **Title:** A Self-Tuning model for Smart Manufacturing SMEs: Effects on Digital Innovation. **Journal:** Journal of Product Innovation Management.	The authors suggest that business models should rely on agility, adaption, and ambidexterity in the face of digital transformation. They investigate how these self-tuning models coped with the changes introduced by digital transformation, termed digital innovation.
Authors: Magnusson et al. (2020) **Title:** Closeness and distance: Configurational practices for digital ambidexterity in the public sector. **Journal:** Transforming Government - People Process and Policy.	The authors explore how organisations dynamically balance exploration and exploitation of digital initiatives, referred to as digital ambidexterity. They further argue that digital ambidexterity may allow for a more nuanced study of the phenomenon digital transformation.
Authors: Mahmood & Mubarik (2020) **Title:** Balancing innovation and exploitation in the fourth industrial revolution: role of intellectual capital and technology absorptive capacity. **Journal:** Technological Forecasting and Social Change.	The authors state that organisational ambidexterity can be a critical capability for Industry 4.0, the apex case of digital transformation. They further assert that the dimensions of intellectual capital and technology absorptive capacity can improve this capability.
Author: Molloy & Ronnie (2020) **Title:** Sustaining life insurance in the Fourth Industrial Revolution. **Journal:** South African Actuarial Journal.	The authors identified capabilities for the digital transformation to retain relevance in the 4th Industrial Revolution. They further state that to achieve sustained success in the 4th Industrial Revolution, the organisations must have a constant dual focus on business-as-usual and exploration.

Authors: Montealegre et al. (2019) **Title:** Understanding Ambidexterity: Managing Contradictory Tensions Between Exploration and Exploitation in the Evolution of Digital Infrastructure. **Journal:** Journal of the Association for Information Systems.	The authors discuss how to manage contradictory tensions between exploration and exploitation in the evolution of digital infrastructure. Furthermore, they identify higher-level organisational capabilities that help balance these tensions.
Authors: Scuotto et al. (2019) **Title:** Ambidextrous innovation orientation effected by the digital transformation: A quantitative research on fashion SMEs. **Journal:** Business Process Management Journal.	The authors express that the four identified dimensions (the structural dimension, the relational behaviour dimension, the cognitive dimension, and knowledge transfer) of social media platforms positively influence digital transformation in the ambidextrous innovation orientation. Ambidextrous innovation orientation is the ability to generate discontinuous innovations to penetrate new markets or enhance existing products. The four dimensions, therefore, foster the development of exploitation and exploration activities.
Authors: Steiber & Älange (2020) **Title:** Corporate-startup collaboration: effects on large firms' business transformation. **Journal:** European Journal of Innovation Management.	The authors examine three models of corporate-startup collaboration and their effect on the organisation's capabilities regarding their business transformation. Their findings illustrate that such collaboration has a positive effect on the organisation's business transformation.
Authors: Wu et al. (2021) **Title:** Enable digital transformation: Entrepreneurial leadership, ambidextrous learning and organisational performance. **Journal:** Technology Analysis & Strategic Management.	The authors analyse the relationship between entrepreneurial leadership and ambidextrous learning in digital transformation. They conclude with the fact that entrepreneurial leadership has a positive impact on ambidextrous learning.

Table 4.3: A description of the nine selected articles.

To understand how the nine articles can contribute to create a conceptual bridge between organisational ambidexterity and digital transformation, we will now present the main findings from each of the nine articles.

The first article states that boundary openness, the ability to obtain external resources outside of the SMEs boundary, makes it possible for organisations to stay updated with the latest trends and developments. As the SMEs demand specific expertise and skills to develop new products and solutions, they often enter a partnership with companies who possess complementary resources. Further, the authors express the importance of redirecting in-house human resources, as bringing in interns to explorative innovation projects can help organisations explore new technologies and business opportunities (Chan et al., 2018).

The following article emphasises that collaboration with external stakeholders will contribute to SMEs being more adaptive to customer needs and environmental changes. Their findings explain a system encouraged by networking and open innovation solutions. Supported by their networks, SMEs will innovate and operate in response to external feedback. In addition, the authors suggest a self-tuning model for SMEs to adjust quickly to market changes. This implies that organisations evaluate what needs to be changed or improved, to then leverage and explore new external knowledge and technology and make rapid internal adjustments in each business unit. This process will involve reconfiguring the SMEs' products and services and reconfiguring the entire business model where knowledge sharing, and value creation will be critical elements. Thus, by using custom models, SMEs can better connect knowledge, data, people, and activities (Del Giudice et al., 2021).

Further, Magnusson et al. (2020) believe that every employee should be involved in the digital agenda. By involving the employees in the process, the management ensures that they work toward the common goal and understand their responsibilities' purpose and value. This could be done by active communication between the management and employees through a dialogue, which is an effective way to ensure that the employees understand the digital initiative as a core business and allow the management to trust their thinking and teamwork to solve tasks and challenges. The top management must also ensure that every decision or investment is aligned with the overarching goal as they cannot micromanage due to the lack of time and information about the end-users. The top management should therefore strive for a more decentralised structure with local goal autonomy. However, there must be a certain degree of output control that guarantees that resources are not wasted on non-profit projects and that the investments contribute to the organisation's goals. Communication is, therefore, crucial to adequately change the internal organisational culture. Based on this, top managers

should structure the digital initiative by horizontal integration complementing the vertical integration to tighten the relations between different organisational divisions. By doing so, forums will create natural meeting spaces between divisions related to new technologies (Magnusson et al., 2020).

Magnusson et al. (2020) further state that it is an explicit need to involve external stakeholders when internal expertise alone is not sufficient. The initiative to increase collaboration with external factors, such as citizens, businesses, and universities, will expose new ideas and learning opportunities in organisations. By collaboration, an organisation will avoid doing the same practices as another organisation has already tried out, allowing them to learn from shared knowledge and experiences. In addition, the authors also emphasise that the top management needs to extend their current perspective regarding investments into new, innovative solutions, even though they might not give any visible short-term results. To succeed with navigating the internal culture towards being more innovative and ambidextrous, the management must dare to be risk-taking and not be afraid to make mistakes while experimenting with new ideas (Magnusson et al., 2020).

Moreover, management should separate the division for the digital initiative from the entity of traditional information technology (IT) as driving innovation is differentiated from IT. The innovation division has a central role in communicating, supporting, and teaching other divisions regarding how to use digital technologies and establish a deeper understanding of the digital technology they are using. By facilitating internal training and lead workshops, the division can increase the level of understanding throughout the entire organisation and can support and collaborate with the employees. This could be beneficial as the employees are experts within their respective tasks and can generate new additional ideas (Magnusson et al., 2020).

The following article, written by Mahmood & Mubarik (2020), further states that employees' education, training, skills, and experience are essential as they contribute to ambidextrous behaviours. They emphasise that the employee's ability to resolve problems quickly and effectively is dependent on their level of experience and knowledge. The higher the level of competence, the easier it is for the employees to deal with emerging challenges. In addition, if the employees can challenge assumptions behind prevailing knowledge and practices, access and apply knowledge from multiple domains, and discover new solutions to existing

problems, it will help the SMEs to operate more innovatively and productively. The authors also emphasise that external parties such as alliance partners, suppliers, customers, and consumers can help the SME utilise the existing market and develop new market trends. Connecting such ties enables the SME to improve and renew their existing knowledge base by controlling and accessing various perspectives, skills, and specialised knowledge (Mahmood & Mubarik, 2020).

Furthermore, Molloy & Ronnie (2020 states that the importance of people is distinct from technology. Many multinational enterprises (MNEs) lean towards acquiring people with the right competence and skills externally rather than recognising the potential within the organisation. The authors suggest that MNEs can foster the employees by facilitating continuous learning and training and acknowledging unique skills within the herd of employees. By doing this, organisations secure the employees' relevance and are investing in resources they already obtained. Additionally, MNEs should have a widespread desire to engage with partners. Partnerships build upon a mindset of an organisation's ability to obtain value from the chosen network by adopting a mutually and collaborative beneficial approach. By seeking partnerships, the MNE can learn and develop in the changing context. On the other hand, partnerships may lead to complications due to a lack of trust and a protectionist attitude, inhibiting the formation and fruition of enabling partnerships if the organisation takes an isolated position. An inconsistency between acknowledging a need for partnerships and resistance to committing to such partnership fully and openly can further limit the organisation's ability to respond to changing environments (Molloy & Ronnie, 2020, October 22-23).

The authors further express the importance of the management having a dual focus that focuses on the business today and the future business. This can be explained by risk aversion, where leaders may declare their obligation to the innovation of their business despite being naturally drawn away from these intentions, over-prioritising short-term and less uncertain investments. To achieve the most optimal functioning of a MNE when facing new digital technologies, the management should place the employees that are creative, opportunity-seeking, that can tackle uncertainty and have the ability to drive or inspire action across the organisation within their innovation units (Molloy & Ronnie, 2020).

In their article, Montealegre et al. (2019) suggest that by forming partnerships, the organisation can gain new insights and recognise complementary technologies that can be integrated into the organisations' operations. The authors' further state that organisations must facilitate a digital infrastructure within the organisation due to the latest technologies. It is essential that the digital infrastructure is integrated with the respective business model as it affects the organisation's daily work, operational rules, and standards. This responsibility is assigned to the top management and implies assessing the required technological competence, meaning finding people both inside and outside of the organisation who can possess the expertise about the new technology and help them integrate it. In addition, the top management must communicate critical activities which support the integration to the rest of the organisation (Montealegre et al., 2019).

Further, Scuotto et al. (2019) express that social media can contribute to a low-cost collaboration between SMEs and customers. By actively collaborating with the customers, organisations can acquire more information about their needs, which allows them to co-create new products that respond more closely to the customers' desires. In this way, the SME can use social media to capture external sources of information and secure innovation initiatives. In addition, the authors encourage the SME to collaborate with customers and other businesses such as competitors or suppliers. When external knowledge has been acquired, the SME can integrate it with internal knowledge to develop new knowledge. By bringing together inflowing and outflowing expertise, the organisation facilitates open innovation and requires a solid structure that will make it possible to monitor and organise the different information flows. Thus, knowledge sharing and knowledge transfer practices will constitute an essential aspect of the structure as they can be used to create value for the organisation and allow the organisation to become more adaptable, flexible and responsive to market changes (Scuotto et al., 2019).

Additionally, Steiber & Älanges' (2020) findings indicate that collaboration with a start-up will positively affect the MNEs' business transformation. By collaborating with start-ups, large organisations can gain access to innovations and thus find and develop external ideas that are beneficial to them. To integrate the new ideas, the authors emphasise that it is vital that the MNEs have practices that would make a re-configuring of assets and resources possible. For that reason, organisations need to reflect upon the purpose and the final goal

with each initiative of start-up collaboration and consider the potential advantage of combining different initiatives in a portfolio (Steiber & Alänge, 2020).

Finally, Wu et al. (2021) suggest that entrepreneurial leadership can be used to overcome the challenges of digital transformation. This could be done by clearly explaining to the employees the vision the organisation's digital transformation wants to achieve, engaging them to act more innovatively, and continuously supporting their new ideas.

4.3.4 Other findings

In our thesis, we intended to find contingencies that could explain differences within the nine core articles. However, after carefully reading the articles, we identified that they contained various sizes of organisations and used the concept of ambidexterity in different ways. Unfortunately, we did not find any connections between the firm size and how they use ambidexterity in the context of digital transformation. Additionally, we did not manage to link the different types of ambidexterity (i.e. sequential, structural, and contextual) to the identified articles.

5.0 Discussion

We aimed to create a more direct and visible bridge between organisational ambidexterity and digital transformation. This chapter will first present three dimensions identified from our content analysis that can contribute to achieving organisational ambidexterity. Second, we will do an in-depth assessment of the dimensions to identify vital learning considerations to succeed with digital transformation.

As Table 5.1 illustrates, the nine articles differ in both content and aspects. However, after reading the nine selected articles carefully in the content analysis, we became aware that these articles contained common features. From these common features, we were able to identify three dimensions that contribute to an understanding of the link between organisational ambidexterity and digital transformation. The dimensions are *(1) Internal orientation, (2) External orientation* and *(3) Structural integration*, which are used to give a comprehensive presentation of the findings in this chapter.

Reference	Internal orientation	External orientation	Structural integration
Chan et al. (2018)		X	
Del Giudice et al. (2021)		X	X
Magnusson et al. (2020)	X	X	X
Mahmood & Mubarik (2020)	X	X	
Molloy & Ronnie (2020)	X	X	X
Montealegre et al. (2019)		X	X
Scuotto et al. (2019)		X	X
Steiber & Älange (2020)		X	
Wu et al. (2021)	X		

Table 5.1: The nine core articles placed within the three central dimensions for achieving digital transformation.

5.1 Internal orientation

Internal orientation consists of a high degree of involving the employees in the organisation. The involvement is necessary to succeed with digital transformation, as it is difficult for the management to carry out the digital transformation without the support of the employees. Therefore, we argue that it is critical that the organisation includes the employees in the digital transformation process and that they get the opportunity to show their full potential. In this way, the organisation can benefit from the resources they already possess. Furthermore, as the *internal orientation* involves exploiting existing human resources, this dimension can be linked to exploitation in the context of organisational ambidexterity. Our findings also indicate that organisations can facilitate exploitation based on the three following learning considerations: (1) Active communication, (2) A decentralised structure and (3) Continuous learning.

Active communication

Active communication can help the organisation exploit its existing human resources in different ways. First, by actively communicating with the employees, managers can explain the vision they want to achieve through the organisation's digital transformation (Wu et al., 2021) and thus secure that the employees understand the digital initiative as a core business

(Magnusson et al. 2020). This will facilitate that the employees work towards a common goal and recognise the value and purpose of their responsibilities (Magnusson et al., 2020). If the employees are aware and fully informed about the sub-goals, visions and expectations that are set by the management, the organisation will, in turn, be more efficient in the decision making, as it will be easier for the employees to make good decisions on behalf of the organisation.

Second, by using active communication, the employees and the management can gain a closer and better relationship, which could be beneficial for both parties. On one side, it becomes easier for the management to trust the employees' thinking to solve tasks and challenges (Magnusson et al., 2020), as they, through regular communication, always will be on the same page. This can result in the management being more willing to encourage the employees to act innovatively and support new ideas for improvements suggested by the employees (Wu et al., 2021). On the other side, active communication will increase the probability that the employees will feel more involved in the processes and feel more seen, valued, and cared for. This can positively impact the employees' motivation, resulting in a more efficient work environment where each employee is always performing their best. By doing so, the organisation manages to exploit their human resources in an improved way.

Third, the management should facilitate active communication across the organisation to develop new, improved ideas and solutions. This can require an adequate change of the internal organisational culture (Magnusson et al., 2020). By ensuring that the communication is good across the whole organisation, different departments can help each other by collaborating and exploiting each other's expertise. In this case, interdisciplinary teams could be a good idea, as the organisation can utilise their existing resources while at the same time improving them by having employees learn from each other.

A decentralised structure
A good structure must be present for managers to include employees in the digital transformation and exploit their resources to the fullest. However, with the rapid technological development, the organisation is facing continuous change, and due to lack of time, the top management cannot micromanage. Therefore, Magnusson et al. (2020) suggested that the top management should strive for a more decentralised structure with local goal autonomy.

First, to succeed with such a structure, the top management must have a certain degree of output control that guarantees that the resources are not wasted on non-profit projects and that the decisions or investments are aligned with the overarching goals (Magnusson et al., 2020). If the top management does not ensure this, the organisation can become inefficient in their use of resources and waste a lot of resources, such as time and money.

Second, the delivery of value to the customers is changing with new technologies. As the employees have the most information about the end-users (Magnusson et al., 2020) and the management, in most cases, rarely have direct contact with the customers, the management must ensure that the employees are sharing this information as it is valuable. To succeed with the digital transformation, the management must therefore facilitate that new inputs regarding customers' needs will return to them in an effective way. If this is in place, the decentralised structure will function optimally.

Finally, according to Magnusson et al. (2020), the top managers should structure the digital initiative by a horizontal integration that complements the vertical integration. This is especially the case for larger organisations. By doing this, the structure will tighten the relations between different divisions in the organisation. This can result in natural meeting spaces between the divisions, such as forums related to new technologies. Such a structure will make it easier for the employees to get to know each other on a more professional- and personal level so that they know what each other is working on and can seek the right help later. In addition, it will make it easier for the divisions to cooperate, share knowledge, improve existing solutions, and develop effective common solutions.

Continuous learning
In facing new technologies and managing the digital transformation, the organisation needs to have employees with the right combination of competencies and skills. According to Molloy & Ronnie (2020), the organisation should recognise the potential within the organisation before acquiring people with the right competencies and skills externally. Therefore, continuous learning can be a good way for the organisation to improve and exploit the human resources they already obtain (Molloy & Ronnie, 2020).

First, it is vital that the organisation acknowledges the unique skills within the herd of employees (Molloy & Ronnie, 2020), as these skills can be valuable and helpful to succeed with the digital transformation. For example, an employee in the accounting department may be interested in IT and thus possess knowledge of useful tools the organisation can use. Therefore, the management or the HR department should always have a good insight into what competencies the employees possess before searching for external opportunities. By doing so, the management shows that they know the employees and their competence well, making the employees feel more appreciated and committed to giving back to the company. This is because it can be perceived as if the managers really care and are interested in the employees and their interests.

Second, by focusing on the further development of the employees' education, training, skills, competencies, and experience, the organisation will secure the employees' relevance (Molloy & Ronnie, 2020). Therefore, organisations should set aside enough time to send the employees to conferences and courses to gain new knowledge, experiences, and perspectives from other professionals. The higher the level of competence, the easier it is for the employees to deal with emerging challenges (Mahmood & Mubarik, 2020), such as digital transformation. Organisations should, in addition, focus on training new employees and ensure that they will learn what is necessary for their position. This can be done by using a mentor that they can rely on at any time, increasing the employee's ability to resolve problems quickly and effectively (Mahmood & Mubarik, 2020). Having a mentor early in the working relationship can make it easier for the employee to ask questions without being afraid to bother. This is an important phase, as it sets the standard for the rest of the working conditions. Overall, the organisation will gain on investing in their employees, as the employees will feel seen, which will result in more loyalty and a wish to stay when they are given such opportunities. As a result, the organisation gets more value out of its existing resources.

Third, when employees have a certain level of knowledge, they can more easily challenge how the organisation works. If the employees can challenge assumptions behind prevailing knowledge and practices, access and apply knowledge from multiple domains, and discover new solutions to existing problems, it will help the organisation to operate in a more productive way (Mahmood & Mubarik, 2020). Thus, the management should be open to new inputs and arrange for the employees to share knowledge and experiences.

5.2 External orientation

External orientation involves searching for new knowledge and capabilities outside the organisation to manage the digital transformation. Sometimes internal expertise alone is not sufficient, and there is a clear need to involve external stakeholders (Magnusson et al., 2020) such as customers, suppliers, universities, or other businesses. We argue that by entering a collaboration with external stakeholders, the organisation can obtain the necessary expertise. Molloy & Ronnie (2020) emphasise this by stating that if the organisation does not acknowledge the need for collaboration and resist committing to collaboration, it can limit its ability to respond to changing environments. As the *external orientation* involves exploring new opportunities, this dimension can be linked to exploration in the context of organisational ambidexterity. Our findings indicate that organisations can facilitate collaboration and exploration with the help of at least one of the three following learning considerations: (1) Partnership, (2) Networks and (3) Internship.

Partnership

A partnership is a formal way of collaborating, as it involves the organisation acquiring value by entering a mutual collaboration with another party (Molloy & Ronnie, 2020). First, a partnership can be beneficial as the organisation can gain new insights (Montealegre et al., 2019), expose new ideas (Magnusson et al., 2020), and learn and develop (Molloy & Ronnie 2020) in the context of digital transformation. For example, by entering a partnership, the organisation can avoid doing the same practices that another organisation has already tried out, thus saving valuable time. The collaboration, therefore, allows the parties to learn from shared knowledge and experiences (Magnusson et al., 2020), which can save both organisations a lot of resources such as time and money spent on experimenting.

Second, organisations should partner with companies with complementary expertise and skills that the organisation needs to develop new products or solutions (Chan et al., 2018). Montealegre et al. (2019) emphasise this by suggesting that the organisation also should recognise complementary technologies which can be integrated into the organisations' operations (Montealegre et al., 2019). By entering a partnership with a firm with complementary expertise, skills, or technologies, it will be easier for the organisation to integrate the new inputs into the organisation. However, the organisations must have practices that would make a re-configuring of assets and resources possible (Steiber &

Älange, 2020). An example of a good partnership is the collaboration between a start-up and a larger firm (Steiber & Älange, 2020). These two firms will gain from collaborating as they typically have the opposite strengths and weaknesses and can complement each other. A start-up can develop new ideas rapidly, meanwhile, a larger company often possesses economies of scale and economies of scope.

Third, it is crucial that organisations are aware that a partnership might lead to complications due to a lack of trust and a protectionist attitude towards the partner (Molloy & Ronnie, 2020). If the organisations fail to trust each other and act protectively in sharing knowledge and resources, a partnership can become difficult. Instead of profiting from the partnership, it will lead to disadvantages. This is often the case when one of the companies takes an isolated position of power as it inhibits the formation and fruition of enabling partnerships (Molloy & Ronnie, 2020). It is therefore essential that both parties have influence in the partnership and are willing to listen and negotiate with the other part if conflicts arise. Thus, when entering a partnership, organisations should always reflect upon the purpose of the partnership, look for the perfect partner, and be aware that a successful partnership can take time and think carefully about whether this is the best thing for the organisation.

Network
Being a part of a network is a more informal way of collaborating, as every organisation is in control and decides what and how much they will share with the others. By connecting such ties, the organisation can renew their existing knowledge base by gaining access to various perspectives, skills, and specialised knowledge (Mahmood & Mubarik, 2020). However, the organisation will get more in return if they share relevant information, help, and support the other organisations in the network. For example, an organisation may want to become part of a network because they are interested in gaining insight into a particular type of technology. If the organisation feels that none of the other companies wants to share this information, they will most likely not become a part of the network as they will feel like they will not get anything in return. Therefore, it is vital that the organisation find a network consisting of companies with a common interest in working together towards a shared goal and having open innovation solutions.

In addition, a network can help the organisation not only to stay up to date with the latest trends and developments (Chan et al., 2018) but also in developing new market trends (Mahmood & Mubarik, 2020). In this way, organisations can be more adaptive to customer

needs and environmental changes (Del Giudice et al., 2021). Scuotto et al. (2019) express that social media can contribute to a low-cost collaboration between the organisation and the customers. One way to do this is to use the forum on social networks where the customers have close contact with the organisation. The organisation can provide suitable employees who can answer questions and provide guidance when needed. In addition, by actively collaborating with the customers, the organisation can acquire more information about their needs, allowing them to co-create new products that respond more closely to their desires. If the customers feel that they are listened to and that their opinion is valued, the organisation is building a good customer relationship, which is essential for them to move in the right direction. In this way, the organisation can use social media to capture external sources of information and secure innovation initiatives. Therefore, the organisation will innovate and operate in response to external feedback as it explores new opportunities (Del Giudice et al., 2021).

Internship

Internships are a temporary collaboration between a student and an organisation. As it is vital that the lack of specific competence does not stop or delay projects or daily operations, this way of collaborating may be beneficial as the management and the employees in the organisations have the opportunity to learn from the intern. An intern can contribute with motivation, competence, new insights, and proposals that the organisation may not have thought of before. This can be explained by the fact that the intern comes straight from school and is updated on the latest theories and technologies. As the intern enters the organisation with a new perspective, it can help the organisation improve and be more explorative. Chan et al. (2018) support bringing in interns, as it will help the organisation to explore new technologies and business opportunities. Therefore, an internship can be necessary to obtain relevant information and capabilities to succeed with digital transformation.

5.3 Structural integration

Structural integration involves integrating the *internal orientation* and the *external orientation*. As these two dimensions can be linked to exploitation and exploration, it can be challenging for the organisation to balance the tensions between them simultaneously and achieve organisational ambidexterity. Most organisations tend to focus more on one of them, as exploitation ensures short-term success. However, to survive in the long run and succeed with the digital transformation, the organisation needs to continuously prioritise exploitation

and exploration. Our findings indicate that organisations can facilitate organisational ambidexterity in the context of digital transformation based on the three following learning considerations: (1) Knowledge sharing and knowledge transfer practices, (2) A dual focus and (3) A digital infrastructure.

Knowledge sharing and knowledge transfer practices
Knowledge sharing, and knowledge transfer practices are vital to integrate the acquired external knowledge with the internal knowledge to develop new knowledge. The development of new knowledge is essential to create value and for the organisation to adapt to new market changes. Therefore, the management must facilitate knowledge sharing not to miss important information and good ideas and knowledge transfer practices to ensure that the information reaches the right people. Without integration, the organisation may not utilise the information in the best possible way and become inefficient and regressive. This, therefore, requires a solid structure that will ease monitoring and organising for the different information flows. Thus, knowledge sharing and knowledge transfer practices will constitute an essential aspect of the structure as they can be used to create value for the organisation and allow the organisation to become more adaptable, flexible and responsive to market changes (Scuotto et al., 2019).

A dual focus
A dual focus among the management is essential to achieve organisational ambidexterity. This implies a focus on both the business today and in the future. However, this can be hard in practice as the leaders can be influenced by risk aversion. Mainly, the management can declare their obligation to the innovation of their business even though they are naturally drawn away from these intentions, over-prioritising short-term and less uncertain investments (Molloy & Ronnie, 2020). Therefore, it is vital that the management extend their perspective regarding investing in new, innovative solutions and continuously focus on exploring even though it might not give any visible short-term results. To succeed with navigating the organisation towards being more innovative and ambidextrous, the management must dare to be risk-taking and not being afraid of making mistakes while experimenting with new ideas (Magnusson et al., 2020). Organisations should therefore hire leaders who focus on innovation and dare to fail. It is important that leaders dare to make mistakes, dares to feel the uncertainty, and dares to take the risk necessary for the organisation to move in the right direction. This sends a sign to the employees that it is allowed to make mistakes if the

intention is to take the organisation to the next step. Therefore, an organisation must dare to make mistakes, as there is a lot of learning and development to take from such situations. Without failing, an organisation will never really succeed.

A digital infrastructure

Due to new technologies, organisations must facilitate a digital infrastructure within the organisation. According to Montealegre et al. (2019), the digital infrastructure must be integrated with the respective business model, as the new technology will be integrated into all areas of the business affecting the daily work, operational rules, and standards in the organisation. This responsibility is assigned to the top management, as it involves assessing the required technological competence. As discussed earlier, the top management must find people inside and outside the organisation who possess expertise about the new technology and help them integrate it (Montealegre et al., 2019). In such situations, it might be necessary for the organisation to hire consultants who are experts in the business field that are requested. By hiring a consultant who knows the business area well, both the top management and the employees will feel that the questions they might ask will be answered reasonably and understandably. In addition, the organisation will get a sense that the system is integrated safely and properly.

Further, the management should place creative, opportunity-seeking employees that can tackle uncertainty and possess the ability to drive or inspire actions across the organisation within their innovation unit (Molloy & Ronnie, 2020). This unit should be separated from the entity of traditional information technology (IT) as driving innovation is differentiated from IT. The innovation division will have a central role in the *structural integration* of the organisation as it is communicating, supporting, and teaching other divisions regarding how to use digital technologies. By facilitating internal training and lead workshops, the division can increase the level of understanding throughout the entire organisation. This could be beneficial as the employees are experts within their respective tasks and can generate new additional ideas (Magnusson et al., 2020).

To summarise, organisations should optimally have a self-adjusting model that allows the organisation to adjust and adapt quickly to the market changes. This implies that the organisation evaluates what needs to be changed or improved within the organisation to exploit and explore new external knowledge and technology and make rapid internal adjustments in each business unit. This will involve reconfiguring the entire business model

where knowledge sharing, and value creation will be critical elements. By reconfiguring the business model, the organisation can facilitate a better connection between knowledge, data, people, and activities (Del Giudice et al., 2021).

5.4 Conceptualisation

From the identified articles, we have created a link between the two separate bodies of literature: organisational ambidexterity and digital transformation. The link consists of three necessary dimensions the organisations must facilitate to manage the digital transformation. Within these three dimensions, we have identified nine learning considerations to ensure organisational ambidexterity in the organisation. These findings have been compiled into the figure below.
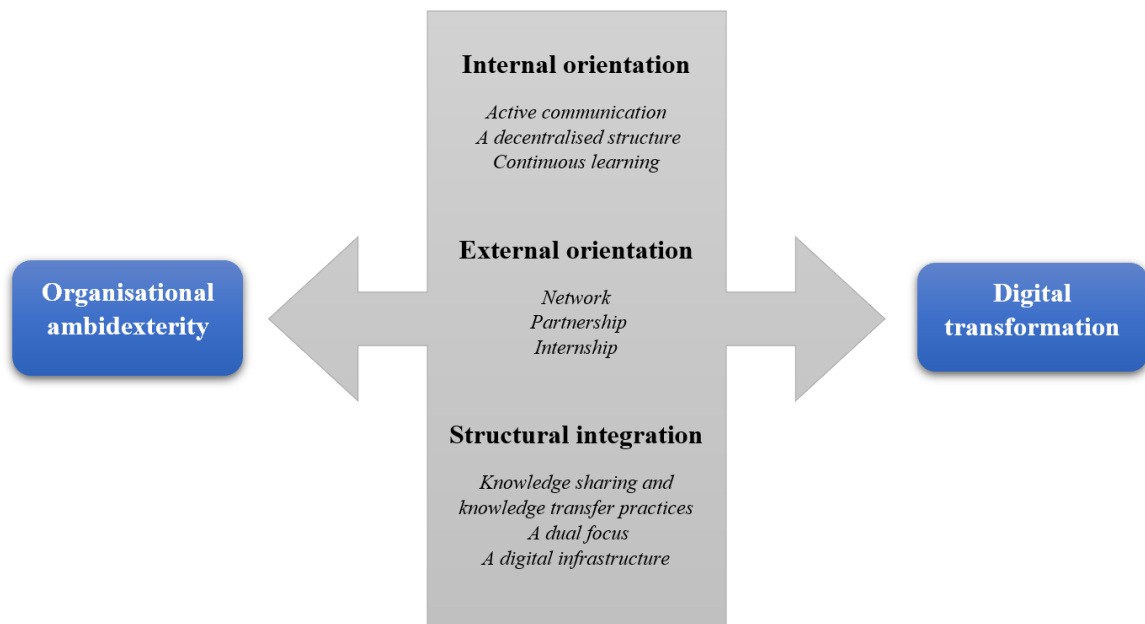

Figure 5.1: The conceptual link between organisational ambidexterity and digital transformation.

Figure 5.1 illustrates how organisations must orient themselves to be able to use organisational ambidexterity to achieve digital transformation. In this context, organisations must make use of learning within the three dimensions to succeed. Therefore, it is important that organisations are aware of these nine learning considerations when carrying out digital transformation. We will use these learning considerations to provide one theoretical proposition related to each of the three dimensions.

Our discussion indicates that the three learning considerations within the *internal orientation* focus on the organisation's employees. First, active communication facilitates good communication within the organisation, so the employees feel they are part of the digital transformation. Second, a decentralised structure ensures that the organisation effectively involves the employees. Third, continuous learning secures that the employees can continually evolve to remain relevant resources for the organisation. Organisations must therefore facilitate *internal orientation* as it emphasises the importance of involving the employees in the organisation. Thus, we are offering the following proposition:

> *P1: To succeed with digital transformation, organisations must secure exploitation by internally facilitating active communication, a decentralised structure, and continuous learning.*

Further, our discussion illustrates that the *external orientation* consists of three learning considerations involving obtaining new knowledge and capabilities outside the organisation. First, by entering a partnership, the organisation can acquire value from the other party through shared knowledge and experiences. Second, by participating in networks, the organisation can renew their existing base by gaining new insights. Third, by introducing internships, the organisation can bring in people who possess the competence and capabilities they lack. Organisations should therefore enter a collaboration with external stakeholders. Hence, P2 is offered:

> *P2: To succeed with digital transformation, organisations must secure exploration by externally facilitating partnership, network, and internship.*

Finally, our discussion implies that the three learning considerations within *structural integration* must be present to integrate the *internal orientation* with the *external orientation*. First, knowledge sharing, and knowledge transfer practices are necessary to integrate the acquired external knowledge with the internal knowledge to create value. Second, a dual focus in management is essential to ensure the operation of the business both today and in the future. Third, a digital infrastructure must be in place to integrate new technologies. Therefore, organisations need to have a business model that allows the organisation to adapt quickly to new changes in the market. P3 is therefore offered:

P3: To succeed with digital transformation, organisations must balance the tensions between exploitation and exploration by integrating knowledge sharing and knowledge transfer practices, a dual focus, and a digital infrastructure.

To summarise, these three propositions are individually important for the organisation to succeed with the digital transformation. Consequently, we want to emphasise that all three must be present to secure organisational ambidexterity and for the organisation to manage the digital transformation in the long run. Figure 5.2 gives an illustration of this below.
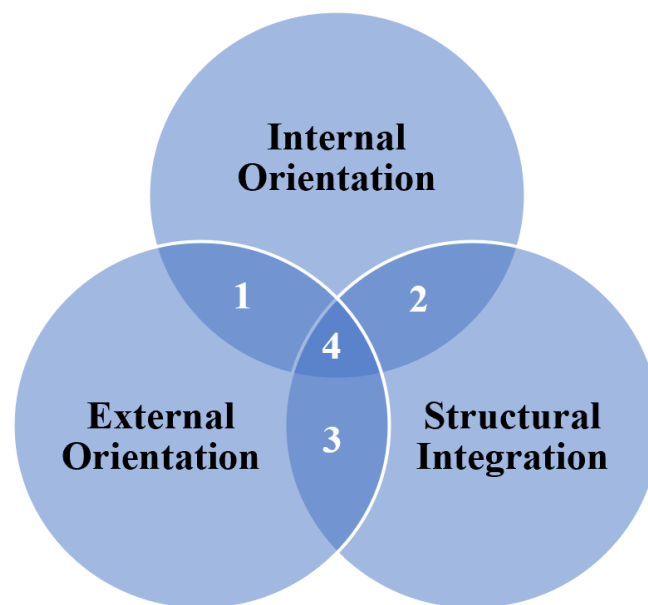
Figure 5.2: A Venn diagram of the relation between the different dimensions.

The figure illustrates that an organisation is located at one of the four intersections. If the organisation solely focuses on the *internal orientation* and the *external orientation,* it will end at Intersection 1. In practice, this means that the organisation facilitates both exploitation and exploration. However, given that the organisation lacks integration mechanisms, it will be challenging to balance the tensions between these contradictions in the long run. This intersection point can lead to less cooperation, non-optimal use of resources, and an unprofitable operation.

Further, if the organisation only prioritises the *internal orientation* and the *structural integration*, it is located in Intersection 2. In practice, this means that the organisation facilitates exploitation and possesses the integration mechanisms for this. Organisations in this intersection will therefore lack exploration, which is vital for long-term success. Without facilitating exploration, the organisation will lack new ideas and knowledge, have difficulties following market trends and changes, and not survive in the long run.

In addition, if the organisation is located in Intersection 3, it will solely focus on the *external orientation* and the *structural integration*. In practice, this means that the organisation facilitates exploration and possesses the integration mechanisms for this. The lack of exploitation will make it difficult for the organisation to operate profitably, as they do not utilise their internal resources optimally. This can result in inefficient use of resources, organisational inertia, and an unprofitable operation.

Finally, if the organisation facilitates all three dimensions, it will be located at Intersection 4. This is the most optimal intersection point as it facilitates the integration of both exploration and exploitation, so-called organisational ambidexterity. In practice, this means that the organisation continuously focuses on all the three dimensions to succeed with the digital transformation. Therefore, we are offering the fourth proposition:

> *P4: To succeed with digital transformation in the long run, organisations must continuously focus on P1, P2 and P3 simultaneously as they combined will constitute organisational ambidexterity.*

After all, when facing new technologies, organisations stand in a sea of choices. To navigate through this landscape, the organisation should always facilitate organisational ambidexterity to end up in Intersection 4. Because digital transformation constitutes an evolutionary process, this is something they must continuously strive for. However, it may be that organisations are placed in Intersection 1, 2 or 3 from before, or that they eventually end up here. This can be explained by the fact that it can be challenging for organisations to balance the tensions of exploitation and exploration in practice over time. To be located in these intersections can work in the short term, but if the organisation does not strive to end up in Intersection 4 and thus can continuously learn from its own mistakes, it will be challenging to succeed with the digital transformation in the long run.

6.0 Conclusion

In this thesis, we have examined extant published research to answer the research question: *How can a structured literature search utilising bibliometric analysis of current published scientific research contribute to building a bridge between organisational ambidexterity and digital transformation?* To investigate the bridge between organisational ambidexterity and digital transformation, we conducted a systematic review consisting of a descriptive-, a bibliometric-, and a content analysis. The descriptive – and the bibliometric analyses were based on the 279 academic articles extracted from the final search of 1 338 research articles. Through the descriptive analysis, this thesis confirms that organisational ambidexterity and digital transformation constitutes an interesting field as there has been an exponential growth of research articles in recent years. Furthermore, another finding indicates that organisational ambidexterity and digital transformation may be strongly related topics, as most of the articles were published in high impact and prestigious journals. Finally, the descriptive analysis reveals that approximately 80 per cent of the publications are published within the disciplines of technology, management, and business. This can indicate that organisational ambidexterity and digital transformation belong to two separate research fields.

Further, in the bibliometric analysis, the co-occurrence analysis emphasises a link between the concept of organisational ambidexterity and the phenomenon of digital transformation. These bodies of literature are so-called "hot topics" in the field. The co-citation analysis illustrates that extant literature is divided into two different clusters; one that is connected to organisational ambidexterity and one that is connected to digital transformation. The bibliographic coupling analysis helped us narrow down the search database to 141 articles to only consist of papers from 2018 to 2020, as the most influential articles in this field were less suitable for answering our research question. This can be explained by the fact that they not used in the context of digital transformation. The findings of the content analysis, consisting of nine core articles, illustrate a lack of research about the bridge between these two phenomena and that the field is immature and thus, under development.

6.1 Main contribution

We provide two theoretical contributions in this thesis. First, this thesis will contribute to filling the existing gap in the published research literature by constituting a foundation for integrating organisational ambidexterity and digital transformation. Based on the

identification of the nine core articles, we reveal how extant research has addressed three very different dimensions and nine associated learning considerations when describing how organisational ambidexterity contributes to digital transformation. In the light of this, we manage to offer three propositions (P1, P2 and P3) organisations should take into consideration in order to succeed with the digital transformation. Second, our suggested Venn diagram illustrates the overlapping relationships between the dimensions. Organisations will often be located in one of the non-optimal intersections (1, 2 or 3) as it is in practice challenging to facilitate for all the three dimensions simultaneously. Therefore, it is essential that organisations continuously strive to end up in Intersection 4 as it facilitates all the dimensions, thus a successful digital transformation. As a result, a fourth proposition (P4) was offered. Overall, will our contribution constitute a good starting point for those who want to conduct subsequent empirical and conceptual research on this theme.

6.2 Implications for practice

The findings in this thesis can provide several practical implications. As this thesis identifies and conceptualises the findings from a core canon of prior published research articles, it can increase both researchers' and practitioners' understanding of how organisational ambidexterity can be utilised to deal with digital transformation. This can be explained by the fact that we offer a link between the two different research fields of organisational ambidexterity and digital transformation, as there does not exist any extant research that directly links these two separate bodies of literature. Further, we contribute with nine learning considerations that describe how practitioners can address and apply to learn within the three dimensions to help organisations succeed with the digital transformation. As most organisations fail to carry out the digital transformation, it is becoming increasingly important for managers to pay attention to the learning considerations behind the digital transformation process. Our contribution, therefore, offers a valuable starting point for this.

6.3 Limitations

Although our thesis introduces a foundation for integrating the two different research fields, potential methodological limitations should be considered. Mainly, the foundation of this article is limited to a topic search based on a specific search string within a particular database. The research articles identified in this thesis are determined by a topic search, and by performing a more specific title search, we could be left with other articles. This will also be the outcome if we were to apply a different search string containing other words. For example, an alternative search string could contain solely variations of words such as organisational ambidexterity and digital transformation exclusively. In addition, the choice of using the Web of Science as a database has had an influence on which articles the data search consisted of. Alternatively, we could have adopted the databases EBSCO or Scopus.

Further, our sampling strategy is based on both objective and subjective criteria. Alternatively, we could have used another sampling strategy to narrow down our data search. Such a sampling strategy could be to manually review all the articles in the initial database to identify articles that consist of the terms organisational ambidexterity and digital transformation. Through this process, we could have found relevant articles containing research on these two bodies of literature that did not meet our sampling parameters (e.g. not mentioning the two terms or related terms in the title, abstract or keywords). However, conducting such a manual process will have significant limitations, as it is introducing considerable subjectivity into the article selection process, is exposed for personal perspectives and is time-consuming. For that reason, we believe that the systematic criteria, both objective and subjective, applied in our thesis are reasonable to identify relevant articles and provide a clear understanding of the link between organisational ambidexterity and digital transformation.

6.4 Further research

Several areas may be interesting for further research on this topic. Firstly, based on what we are aware of, we are the first to introduce a conceptual bridge between the two fields. Therefore, it requires that future research conducts similar studies to ensure that our findings are generalisable. Such studies can, for example, conduct a title search, use another search string, or retrieve a search database with a larger scope. This will be beneficial as additional

bibliometric studies will contribute to a more nuanced bridge between organisational ambidexterity and digital transformation and provide a more comprehensive and accurate picture of the emerging research field. Secondly, as there is a lack of research on organisational ambidexterity and digital transformation combined, we call for a collective effort to mature the research in this field. Given that the current research field consists mainly of qualitative case studies, future research should concentrate more on conducting quantitative studies. This will allow the research phenomena to be examined from different perspectives and angles. Finally, further research should investigate contingencies such as firm size and the types of ambidexterity more closely. This can be explained by the fact that different firms will have different needs to manage the digital transformation.

Reference list

Andriopoulos, C & Lewis, M. (2009). Exploitation-Exploration Tensions and Organizational Ambidexterity: Managing Paradoxes of Innovation. *Organization Science, 20*(4), pp. 696-717.
https://doi.org/10.1287/orsc.1080.0406

Bharadwaj, A., El Sawy, O. A., Pavlou, P. A. & Venkatraman, N. (2013). Digital Business Strategy: Towards a Next Generation of Insights. *MIS Quarterly, 37*(2), pp. 471-482.
https://www.jstor.org/stable/43825919

Bolla, R., Bruschi, R., Davoli, F. & Cucchietti, F. (2011). Energy Efficiency in the Future Internet: A Survey of Existing Approaches and Trends in Energy-Aware Fixed Network Infrastructures. *IEEE Communications Surveys & Tutorials, 13*(2), pp. 223-244.
https://doi.org/10.1109/SURV.2011.071410.00073

Chan, C. M., Yeow, A., Yen, T. S. & Pan, G. (2018). Agility in responding to disruptive digital innovation: Case study of an SME. *Information Systems Journal, 29*(2), pp. 1-20.
https://doi.org/10.1111/isj.12215

Chang, Y.-Y. & Hughes, M. (2012). Drivers of innovation ambidexterity in small- to medium-sized firms. *European Management Journal, 30*(1), pp. 1-17.
https://doi.org/10.1016/j.emj.2011.08.003

Cohen, W. M. & Levinthal, D. A. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly, 35*(1), pp. 128-152.
https://doi.org/10.2307/2393553

Cook, D., Mulrow, C. & Haynes, B. R. (1997). Systematic Reviews: Synthesis of Best Evidence for Clinical Decisions. *Annals of Internal Medicine, 126*(5), pp. 376-80.
https://doi.org/10.7326/0003-4819-126-5-199703010-00006

De Wit, B. (2017). *Strategy: An International Perspective* (6th ed.). Cengage Learning EMEA.

Del Giudice, M., Scuotto, V., Papa, A., Tarba, S. Y., Bresciani, S. & Warkentin, M. (2021). A Self-Tuning model for Smart Manufacturing SMEs: Effects on Digital Innovation. *Journal of Product Innovation Management, 38*(1), pp. 68-89.
https://doi.org/10.1111/jpim.12560

Duncan, R. B. (1976). The ambidextrous organization: Designing dual structures for innovation. *The management of organization design: Strategies and implementation*, pp. 167-188.

Durão, L. F., Guimarães, M. O., Salerno, M. S. & Zancul, E. (2019). Uncertainty Management in Advanced Manufacturing Implementation: The Case for Learning Factories. *Elsevier B.V*(31), pp. 213-218. https://doi.org/10.1016/j.promfg.2019.03.034

Fahimnia, B., Sarkis, J. & Davarzani, H. (2015). Green supply chain management: A review and bibliometric analysis. *International Journal of Production Economics, 162*(C), pp. 101-114.
https://doi.org/10.1016/j.ijpe.2015.01.003

Gawer, A. & Cusumano, M. A. (2013). Industry Platforms and Ecosystem Innovation. *Journal of Product Innovation Management, 31*(3), pp. 417-433. https://doi.org/10.1111/jpim.12105

Gerster, D., Dremel, C. & Brenner, W. K. (2020). How Enterprises Adopt Agile Forms of Organizational Design: A Multiple-Case Study. *ACM SIGMIS Database, 51*(1), pp. 84-103.
https://doi.org/10.1145/3380799.3380807

Gibson, C. B. & Birkinshaw, J. (2004). The Antecedents, Consequences, and Mediating Role of Organizational Ambidexterity. *Academy of Management Journal, 47*(2), pp. 209-226.
https://doi.org/10.5465/20159573

He, Z.-L. & Wong, P.-K. (2004). Exploration vs. Exploitation: An Empirical Test of the Ambidexterity Hypothesis. *The Institute for Operations Research and the Management Sciences, 15*(4), pp. 375-497.
https://doi.org/10.1287/orsc.1040.0078

Henriette, E., Feki, M. & Boughzala, I. (2015, October 3-5). *The Shape of Digital Transformation: A Systematic Literature Review.* Mediterranean Conference on Information Systems (MCIS). Samos, Greece.
https://aisel.aisnet.org/cgi/viewcontent.cgi?article=1027&context=mcis2015

Holand, A., Svadberg, S. & Breunig, K. J. (2019). Beyond the hype: A Bibliometric Analysis Deconstructing Research on Digitalization. *Technology Innovation Management Review, 9*(10), pp. 38-50.
https://doi.org/10.22215/timreview/1274

Im, G. & Rai, A. (2008). Knowledge Sharing Ambidexterity in Long-Term
    Interorganizational Relationships. *Management Science, 54*(7), pp. 1281-1296.
    https://doi.org/10.1287/mnsc.1080.0902

Kane, G. C., Palmer, D., Phillips, A. N., Kiron, D. & Buckley, N. (2015, July 14). *Strategy,*
    Not Technology, Drives Digital Transformation.
    https://sloanreview.mit.edu/projects/strategy-drives-digital-transformation/

Levinthal, D. A. & March, J. G. (1993). The Myopia of Learning. *Strategic Management*
    Journal, 14(S2), pp. 95-112.
    https://doi.org/10.1002/smj.4250141009

Levitt, B. & March, J. G. (1988). Organizational Learning. *Annual Review of Sociology, 14*,
    pp. 319-338.
    https://doi.org/10.1146/annurev.so.14.080188.001535

Levy, Y. & Ellis, T. J. (2006). A Systems Approach to Conduct an Effective Literature
    Review in Support of Information Systems Research. *Informing Science: The*
    International Journal of an Emerging Transdiscipline, 9, pp. 181-212
    https://doi.org/10.28945/479

Lubatkin, M. H., Simsek, Z., Ling, Y. & Veiga, J. F. (2006). Ambidexterity and Performance
    in Small-to Medium-Sized Firms: The Pivotal Role of Top Management Team
    Behavioral Integration. *Journal of Management, 32*(5), pp. 646-672.
    https://doi.org/10.1177/0149206306290712

Magnusson, J., Khisro, J., Björses, M. & Ivarsson, A. (2020). Closeness and distance:
    Configurational practices for digital ambidexterity in the public sector. *Transforming*
    Government People Process and Policy.
    https://doi.org/10.1108/TG-02-2020-0030

Mahmood, T. & Mubarik, M. S. (2020). Balancing innovation and exploitation in the fourth
    industrial revolution: role of intellectual capital and technology absorptive capacity.
    Technological Forecasting and Social Change, 160(1).
    https://doi.org/10.1016/j.techfore.2020.120248

March, J. G. (1991). Exploration and Exploitation in Organizational Learning. *Institute for*
    Operations Research and the Management Sciences, 2(1), pp. 71-87.
    https://doi.org/10.1287/orsc.2.1.71

Matt, C., Hess, T. & Benlian, A. (2015). Digital Transformation Strategies. *Business &*
    Information Systems Engineering, 57(5), pp. 339-343.
    https://doi.org/10.1007/s12599-015-0401-5

McAfee, A. & Brynjolfsson, E. (2012, October). *Big Data: The Management Revolution*. Harvard Business Review. https://hbr.org/2012/10/big-data-the-management-revolution

Miklosik, A. & Evans, N. (2020). Impact of Big Data and Machine Learning on Digital Transformation in Marketing: A Literature Review. *IEEE Access, 8*. https://doi.org/10.1109/ACCESS.2020.2998754

Molloy, L. & Ronnie, L. (2020, October 22-23). *Sustaining the life insurance industry in the Fourth Industrial Revolution: building a foundation for change.* Actuarial Society of South Africa's 2019 Convention. Johannesburg. https://www.actuarialsociety.org.za/convention/wp-content/uploads/2019/10/2019-MolloyRonnie-FIN.pdf

Montealegre, R., Iyengar, K. & Sweeney, J. (2019). Understanding Ambidexterity: Managing Contradictory Tensions Between Exploration and Exploitation in the Evolution of Digital Infrastructure. *Journal of the Association for Information Systems, 20*(5). https://doi.org/10.17705/1jais.00547

Morakanyane, R., Grace, A. A. & O'Reilly, P. (2017, June 18-21). *Conceptualizing Digital Transformation in Business Organizations: A Systematic Review of Literature*. 30TH BLED ECONFERENCE: DIGITAL TRANSFORMATION – FROM CONNECTING THINGS TO TRANSFORMING OUR LIVES. Bled, Slovenia. https://doi.org/10.18690/978-961-286-043-1.30

Müller, S. D., Påske, N. & Rodil, L. (2019). Managing Ambidexterity in Startups Pursuing Digital Innovation. *Communications of the Association for Information Systems, 44*(1), pp. 273-298. https://doi.org/10.17705/1CAIS.04418

Nambisan, S., Lyytinen, K., Majchrzak, A. & Song, M. (2017). Digital Innovation Management: Reinventing Innovation Management Research in a Digital World. *MIS Quarterly, 41*(1), pp. 223-238.

O'Reilly, C. A. & Tushman, M. (2013). Organizational ambidexterity: past, present, and future. *Academy of Management Perspectives, 27*(4), pp. 324-338. https://www.jstor.org/stable/43822033

O'Reilly, C. & Tushman, M. L. (2004). The Ambidextrous Organization. *Harvard Business Review, 82*, pp. 1-11.

Oxford, U. P. (2021, April 7). *Ambidextrous.* Oxford Learner's Dictionaries. https://www.oxfordlearnersdictionaries.com/definition/english/ambidextrous

Parker, G. G., Van Alstyne, M. & Choudary, S. P. (2016). *Platform Revolution: How Networked Markets Are Transforming the Economy - and How to Make Them Work for You.* Ww Norton & Co.

Piccinini, E., Hanelt, A., Gregory, R. W. & Kolbe, L. (2015, December 13-16). *Transforming Industrial Business: The Impact of Digital Transformation on Automotive Organizations.* International Conference on Information Systems. Fort Worth, USA. https://www.researchgate.net/publication/281855658_Transforming_Industrial_Busin ess_The_Impact_of_Digital_Transformation_on_Automotive_Organizations/citations #fullTextFileContent

Porter, A. L., Kongthon, A. & J-C, L. (2002). Research profiling: Improving the literature review. *Scientometrics, 53*(3), pp. 1-18. https://doi.org/10.1023/A:1014873029258

Raisch, S. & Birkinshaw, J. (2008). Organizational Ambidexterity: Antecedents, Outcomes, and Moderators. *Journal of Management, 34*(3), pp. 375-409. https://doi.org/10.1177/0149206308316058

Reis, J. C., Amorim, M. & Matos, N. M. (2018, March 27-29). *Digital Transformation: A Literature Review and Guidelines for Future Research*. World Conference on Information Systems and Technologies. Naples, Italy. https://doi.org/10.1007/978-3-319-77703-0_41

Robinson, H. (2019, July 10). *Why do most transformations fail? A conversation with Harry Robinson.* McKinsey&Company. https://www.mckinsey.com/business-functions/transformation/our-insights/why-do-most-transformations-fail-a-conversation-with-harry-robinson

Sambamurthy, V., Bharadwaj, A. S. & Grover, V. (2003). Shaping Agility Through Digital Options: Reconceptualizing the Role of Information Technology in Contemporary Firms. *MIS Quarterly, 27*(2), pp. 237-263. https://doi.org/10.2307/30036530

ScimagoJR. (2021a, March). *Help*. Scimago Journal & Country Rank. https://www.scimagojr.com/help.php

ScimagoJR. (2021b, March). *About us.* Scimago Journal & Country Rank. https://www.scimagojr.com/aboutus.php

Scuotto, V., Arrigo, E., Candelo, E. & Nicotra, M. (2019). Ambidextrous innovation orientation effected by the digital transformation: A quantitative research on fashion

SMEs. *Business Process Management Journal, 26*(5), pp. 1121-1140.
https://doi.org/10.1108/BPMJ-03-2019-0135

Sinha, S. (2015). The Exploration-Exploitation Dilemma: A Review in the Context of
Managing Growth of New Ventures. *The Journal for Decision Makers, 40*(3), pp.
313-323.
https://doi.org/10.1177/0256090915599709

Smith, P. & Beretta, M. (2020). The Gordian Knot of Practicing Digital Transformation:
Coping with Emergent Paradoxes in Ambidextrous Organizing Structures. *Journal of
Product Innovation Management, 38*(2), pp. 166-191.
https://doi.org/10.1111/jpim.12548

Steiber, A. & Alänge, S. (2020). Corporate-startup collaboration: Effects on Large Firms'
Business transformation. *European Journal of Innovation Management*.
https://doi.org/10.1108/EJIM-10-2019-0312

Teece, D. J., Pisano, G. & Shuen, A. (1998). Dynamic capabilities and strategic management.
Strategic Management Journal, 18(7), pp. 509-533.
https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-
Z

Tushman, M. L. & O'Reilly, C. A. (1996). Ambidextrous Organizations: Managing
Evolutionary and Revolutionary Change. *California Management Review, 38*(4), pp.
1-23.
https://doi.org/10.2307/41165852

Van Eck, N. J. & Waltman, L. (2020, November 25). Manual for *VOSviewer version 1.6.16*.
https://www.vosviewer.com/documentation/Manual_VOSviewer_1.6.16.pdf

Verbeek, A., Debackere, K., Luwel, M. & Zimmermann, E. (2002). Measuring progress and
evolution in science and technology – I: The multiple uses of bibliometric indicators.
International Journal of Management Reviews, 4(2), pp. 213-231.
https://doi.org/10.1111/1468-2370.00083

Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N. &
Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and
research agenda. *Journal of Business Research, 122*, pp. 889-901.
https://doi.org/10.1016/j.jbusres.2019.09.022

Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *The
Journal of Strategic Information Systems, 28*(2), pp. 118-144.
https://doi.org/10.1016/j.jsis.2019.01.003

Vukšić, V. B., Ivančić, L. & Vugec, D. S. (2018, September 17-18*). A Preliminary Literature Review of Digital Transformation Case Studies.* 20th International Conference on Managing Information Technology. Rome, Italy. https://doi.org/10.5281/zenodo.1474581

Westerman, G., Bonnet, D. & McAfee, A. (2014). *Leading Digital: Turning Technology into Business Transformation.* Harvard Business Review Press.

Wu, T., Chen, B., Shao, Y. & Lu, H. (2021). Enable digital transformation: entrepreneurial leadership, ambidextrous learning and organisational performance. *Technology Analysis and Strategic Management*. https://doi.org/10.1080/09537325.2021.1876220

Appendix A

Ambidexterity to overcome digital transformation challenges: A bibliometric review

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Abstract: This paper offers a systematic literature review aided by bibliometric analysis to provide a bridge between extant research on organizational ambidexterity and digital transformation. Whereas ambidexterity is suggested as a strategy for organizations to achieve explorative and exploitative learning, surprisingly little research has addressed how these two learning modes are involved in achieving digital transformation. Our study identified nine core articles providing a foundation for further research on the link between organizational ambidexterity and digital transformation. These articles reveal how extant research addresses three dimensions (internal orientation, external orientation and structural integration) comprising nine different learning considerations involved in digital transformation. Finally, we offer three propositions for further research aiming to establish a link between organizational ambidexterity and digital transformation.

Keywords: Bibliometric Review; Digital Ambidexterity; Digital Transformation; Exploitation; Exploration; Learning Considerations; Organizational Ambidexterity.

1 Introduction

It is difficult to achieve digital transformation, and approximately 70% of all firms fail in their attempts (McKinsey, 2016). Although a great deal of research has been devoted to answering the question of how organizations survive environmental changes (e.g., Teece et al., 1997), it is complicated to learn and to adapt to changes when external conditions, such as technology, are varied. Organizational ambidexterity, the ability to simultaneously handle explorative and exploitative learning, has been suggested as a strategy to foster organizational ability to maintain daily business concerns while continuously changing to meet the business needs of tomorrow.

A large amount of previous research on both digital transformation and organizational ambidexterity, separately, exist; however, there are few reports that combine these two topics, and they mostly consist of case studies from recent years. We have not been able to identify extant literature that focuses directly on how organizations can use organizational ambidexterity to achieve the digital transformation. Therefore, the identification of a foundation that can inform both future research and practice, by taking stock of prior published research to identify a conceptual bridge between the two concepts, is urgently needed.

The purpose of this study was to assess how extant research on digital transformation and organizational ambidexterity can be bridged to enable an improved understanding of how organizations must learn to manage the digital transformation. Therefore, this study aimed to address the following research question: *How can a structured literature search utilizing bibliometric analysis of current published scientific research contribute to build a bridge between the concepts of organizational ambidexterity and digital transformation?*

The research question was answered through a structured literature search by which the final database search was used for bibliometric analysis to identify core articles for a content analysis of how the two fields can be integrated. Our search resulted in an initial sample of 1338 articles that was reduced to 279 articles. Subsequently, the articles were further narrowed down to 141 papers in our bibliometric analysis. Finally, our content analysis was based on nine identified articles, which enabled us to identify three dimensions underpinned by nine learning orientations that can function as a vantage point for further conceptualizations attempting to bridge organizational ambidexterity and digital transformation. The nine learning considerations identified describe how practitioners can address and apply learning within the three dimensions to help organizations succeed with the digital transformation. In addition, we offer three propositions for further research aiming to link insight from organizational ambidexterity theory to digital transformation.

2 Theory

2.1 Organizational ambidexterity

The Oxford Advanced Learner's Dictionary defines the term ambidextrous as: "to be able to use the left hand or the right hand equally well" (Oxford University Press, 2021). The concept of "organizational ambidexterity" was first introduced by Robert Duncan (1976) and has since then aroused great interest. The research field has grown broader as the phenomenon has been studied in several contexts such as management, organizational learning, strategy and technology innovation. Consequently, the term has been used in various ways, and the generic use of the term is vague. To prevent confusion, this paper will use the definition of Tushman and O'Reilly (1996, p. 24), who describe organizational ambidexterity as "the ability to simultaneously pursue both incremental and discontinuous innovation and change results from hosting multiple contradictory structures, processes and cultures within the same firm".

An important contributor to this research field is James March (1991), who introduced a distinction between the two different organizational learning modes of exploration and exploitation. Exploration aims at overcoming disruption by competitors by continuously searching for new knowledge and capabilities. Furthermore, this will give companies the opportunity and necessary competences to enter new markets, to develop new products and

to improve their business processes (March, 1991; Raich and Birkinshaw, 2008; Tushman and O'Reilly, 2013).

To succeed with this process, organizations will experience a need for autonomy, experimentation and flexibility (March, 1991; Tushman and O'Reilly, 2013). In contrast, exploitation sheds light on incremental innovation (Andriopoulos and Lewis, 2009) to the extent that organizations compete in markets with mature technologies. Moreover, it focuses on leveraging existing knowledge by continuously improving and refining current competencies, products and processes (March, 1991; Raich and Birkinshaw, 2008; Tushman and O'Reilly, 2013). In order to succeed with exploitation, efficiency, control and security are needed (March, 1991; Tushman and O'Reilly, 2013).

Nonetheless, the literature on organizational ambidexterity emphasizes that it is difficult to cope with the challenge of managing the inherent tension between exploration and exploitation (March, 1991; Tushman and O'Reilly, 1996; Raisch and Birkinshaw, 2008). This can be explained by the fact that exploration reduces the speed of improvements in the organization and that exploitation makes experimentation less attractive (Levitt and March, 1988). Therefore, exploration and exploitation have a trade-off relationship (Andriopoulos and Lewis, 2009; Sinha, 2015), and most organizations tend to focus more on one of them (i.e., myopia). Commonly, organizations overestimate exploitation and underestimate exploration (Levinthal and March, 1993). The reason why exploitation is favoured can largely be explained by the fact that it ensures short-term success in which the return is positive, imminent and predictable. In contrast, exploration is ineffective in nature as the pursuit of new ideas, markets and technologies will have less certain outcomes, longer time horizons and a more diffuse effect in which the return will be uncertain, distant and often negative (March, 1991). If the organization does not manage to balance the two inherent tensions and overemphasizes one of them, it will be insufficient in the long run. Hence, several researchers have stressed the importance of balancing exploration and exploitation to secure both short-term and long-term success (He and Wong, 2004; Andriopoulos and Lewis, 2009; Tushman and O'Reilly, 2013; March, 1991; Teece, Pisano and Shuen, 1997).

2.2 Digital transformation

Digital transformation can be defined as "a change in how a firm employs digital technologies to develop a new digital business model that helps to create and appropriate more value for the firm" (Verhoef et al., 2021, p. 889). Digital transformation has emerged as an important research topic in recent years because the entrance of new digital technologies has forced incumbent firms in different sectors to transform their business. The interest in the field has resulted in different research directions (i.e., information systems, marketing and strategic management) in addition to a complex and unstructured research field (Holand et al., 2019). Therefore, it is important to distinguish the term digital transformation from related concepts such as digitization and digitalization. Digital transformation describes the changes that digital technology have on the business model at an organizational and ecosystem level. Hence, *digital transformation* has a direct impact on the whole organization, specifically the creation of value (Holand et al., 2019; Henriette et al., 2015). In contrast, *digitization* is the conversion of analogue information into a digital format at the activity level in the organization, and *digitalization* relates to the process level in the organization in which digital technologies can be used to improve existing business processes (Holand et al., 2019; Verhoef, 2021).

Research on digital transformation has been addressed according to four different aspects: (1) characteristics, (2) drivers, (3) impacts and (4) transformed areas. First, the behaviour of digital transformation has been characterized as complex, radical, disruptive, evolutionary and continuous. This may be confusing as some of these characteristics are contradictions, but Morakanyane, Grace and O'Reilly (2017, p. 438) assert that "While digital transformation is referred to as a radical change more than as an evolutionary process, we believe an evolutionary process is a more inclusive term that captures the fact that digital transformation evolves with time, and whenever this evolution takes place, the impacts bring about a radical change to the organization." Second, Verhoef et al. (2021) have identified three external drivers for digital transformation: digital technology, digital competition and digital customer behaviour. However, Kane et al. (2015) insist that digital

capabilities are important as well, in addition to other factors such as strategies and culture. Third, the impacts of digital transformation are the effects that the organizations experience. Value creation represents the ultimate impact that organizations strive for in the process of digital transformation (Morakanyane et al., 2017). Fourth, extant research suggests several impacted areas in the process of digital transformation (e.g., Piccinini, 2015; Matt et al., 2015), but the key areas are acknowledged as operational processes, business models and customer experiences (Westerman et al., 2014; Morakanyane et al., 2017). A focus on these areas engages transformation in every aspect of the organization (Henriette et al., 2015).

To summarize, organizational ambidexterity and digital transformation are two different concepts. However, both concepts are related to learning and innovation and are necessary for long-term survival in the contemporary business environment. Organizational ambidexterity is important because it ensures a balance between exploration and exploitation in the organization, and digital transformation is valuable because it changes the business model in line with new technological innovations. Thus, it is fair to assume that an increased understanding of how organizational ambidexterity can be achieved when embarking on digital transformation processes can provide an organization with a higher success rate in its digital transformation endeavours.

3 Methodology

3.1 Research method

We conducted a systematic literature review aided by bibliometric analysis. A systematic review is a scientific investigation with a pre-planned method that involves a comprehensive search to find relevant articles and then uses explicit, reproducible criteria in the selection of articles for the review (Cook et al., 1997). Bibliometrics further indicates "the collection, the handling and the analysis of quantitative bibliographic data, derived from scientific publications" (Verbeek et al., 2002, p. 181). This method can be beneficial as it "extends the span of science by better linking efforts across research domains" and discovers "topical relationships, research trends and complementary capabilities" (Porter et al., 2002, p. 351). It can even cause the emergence of a new field of research (Fahimnia et al., 2015). Therefore, employing this method will contribute to the understanding of the existing body of knowledge for the given research field, provide a solid theoretical foundation and substantiate the presence of the research problem (Levy and Ellis, 2006).

3.2 Sample

The final search conducted in the Web of Science consisted of the search string Topic = ((Ambidext* AND Digit*) OR (Ambidext* AND Disrupt*) OR (Explor* AND Exploit* AND Digit*) OR (Explor* AND Exploit* AND Disrupt*)). Through this combination of keywords, we identified 1,338 articles, which were further used in a four-stage exclusion process. First, we excluded 2021 as a publication year and kept all the whole years to havethe opportunity to identify potential evolution in the field. Second, we excluded all papers in languages other than English to avoid misinterpretations. Third, we excluded all irrelevant document types and only included articles, reviews, proceedings, early access articles, editorial material, book chapters and book reviews. Fourth, to ensure relevance, we systematically excluded research categories consisting of unrelated information that did not contribute to our research agenda. This process consisted of two different selection methods based on the number of articles within the category.

For categories consisting of 25 or more research articles, a bibliographic co-occurrence analysis with a threshold of three was performed using the software program VOSviewer to identify relevant keywords. By examining the various clusters, we revealed if the category was focused on both organizational ambidexterity and digital transformation. To ensure that we did not overlook high-impact articles in the discarded categories, we read the abstracts of the 15 most relevant research articles for each category. For categories consisting of fewer than 25 research articles, all of the abstracts within the category were read to secure suitability. The exclusion process reduced the number of included academic articles to 279 papers.

3.3 Analysis

Our analysis progressed in a three-stage process. First, we conducted a descriptive analysis of our findings to assess the development of the topic and to identify which scientific disciplines and publication outlets contributed knowledge that informed our study. Second, to secure a systematic and objective review, a bibliometric analysis was conducted with the VOSviewer application. By using the framework of science mapping, we constructed networks and were able to identify relevant concepts linked to terms such as "ambidexterity" and "digital transformation". Subsequently, we examined different clusters and identified central articles to ensure thematic relevance. Furthermore, the bibliometric analysis aimed to condense the number of publications to provide a sample of highly relevant core articles upon which we could base our content analysis. Third, we conducted a content analysis whereby the selected articles were coded and mapped in Microsoft Office Excel to look at similarities and differences to investigate the link between ambidexterity and digital transformation. Therefore, this analysis provided us the opportunity to make replicable and reasonable assumptions by interpreting the selection of the textual material.

For the descriptive analysis, we exported the final search from the Web of Science database to an Excel file. After the removal of all irrelevant data in Excel, all articles were represented by their authors, title, journal, document type and publication year. As the publication year was missing for documents categorized as early access, we manually filled in the year of the early access publications. Additionally, we included the SCImago Journal
& Country rank by adding two columns: Scientific Journal Ranking (SJR) quartile and SJR indicator, which "expresses the average number of weighted citations received in the selected year by the documents published in the selected journal in the three previous years" (SCImagio, 2021). We added a third column for the journal category (i.e., Business, Management, Economics, Technology, Library and Information Science, Multidisciplinary and Organizational Behaviour). In order to assess the appropriate value for the journal category, we first visited the website of the SCImago Journal & Country Rank and each journal's website to ensure the journal discipline. When all columns were populated with values, we transformed the .xlsx file into a .txt file and uploaded it to Microsoft Power BI to create visual illustrations of the final data search.

To obtain a better overview, we exported all 279 articles into a txt. file and applied the opportunity to visualize the dataset and to identify clusters of interrelated articles. To obtain more trustworthy clusters, we created a thesaurus file that merged similar terms, e.g., "organizational ambidexterity" was replaced with "ambidexterity". We chose not to merge terms such as "exploration" and "exploitation" with the term "exploration and exploitation" as these terms theoretically can be used in different ways. A co-occurrence analysis was first conducted to identify the most relevant terms in our dataset, followed by a co-citation analysis that was conducted to provide an understanding of the relationship between the references. Furthermore, a bibliographic coupling was initially performed to find the most influential articles; however, this step ended up being a tool to narrow down our search to 141 articles.

To further limit the number of articles in our literature review, we read the abstracts of all 141 articles to ensure thematic relevance and selected the ones that contributed to answering our research question. Every article was scored on its relevance to the research question on the following scale: (A) Relevant; (B) Borderline relevant; and (C) Irrelevant. During this process, the articles that did not contain information about the concepts of organizational ambidexterity and digital transformation were discarded, e.g., articles regarding organizational performance, optimization and specific attributes to technology. This selection resulted in seven papers. In order to assure that we did not exclude any relevant papers, we carefully read all abstracts of the 23 articles published in 2021 within the final search. After the assessment, we decided to include two of the articles in our further analysis as they could contribute to answering our research question. Nine relevant articles remained for the content analysis; these articles were read thoroughly and coded in Excel to give an overview of the literature. After coding the articles, we analysed the collected information to find common features.

4 Findings

The descriptive analysis revealed an exponential growth in the number of publications per year related to research on the link between organizational ambidexterity and digital transformation (Figure 1), potentially reflecting the growing need for managers to know how to deal with technological developments.
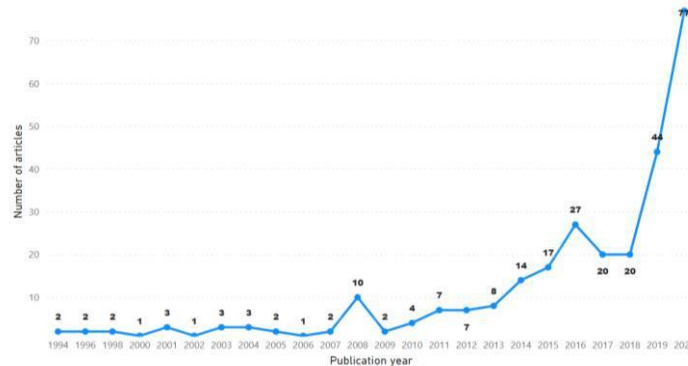

Figure 1 Development in publications per year related to research on the link between organizational ambidexterity and digital transformation (N = 279 articles)

Furthermore, despite the fact that this topic is an emerging field, over half of the articles were published in highly reputable journals when assessing our database according to the SJR quartile, with a high percentage in Q1 (Figure 2).
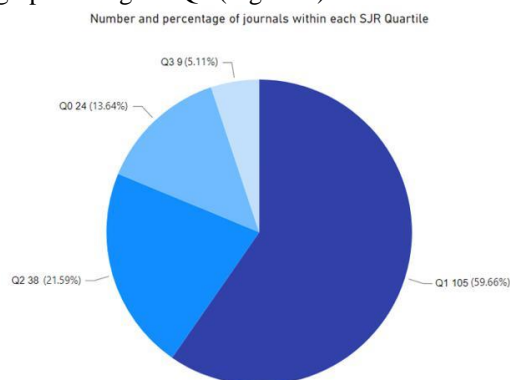
Figure 2 Number and percentage of journals within each SJR quartile.

As many journals are interested in publishing such articles, this analysis indicated that organizational ambidexterity and digital transformation may be strongly related topics. Moreover, the journals were spread across seven different categories, and 80% of the publications were published within the disciplines of technology, management and business (Figure 3).
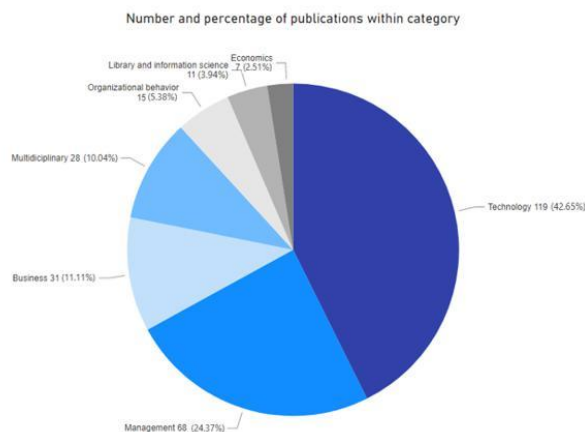
Figure 3 Number and percentage of publications within each journal category.

One explanation for this could be the rapid growth of new technologies and the emergent need to adapt to these changes as they affect consumers, organizations and society. As the discipline technology consists of approximately the same number of publications as management and business combined, organizational ambidexterity and digital transformation belong to separate research fields. However, as we categorized the journals based on subjective criteria, this could be considered as a limitation of our analysis.

The bibliometric analysis consisted of both a co-citation analysis and a co-occurrence analysis. The co-citation analysis (Figure 4) revealed that the red cluster could be connected to the research field of organizational ambidexterity. In contrast, the green cluster consisted of this cluster could be strongly related to digital transformation. Moreover, this analysis revealed that the two topics are only integrated to a limited extent in extant research.
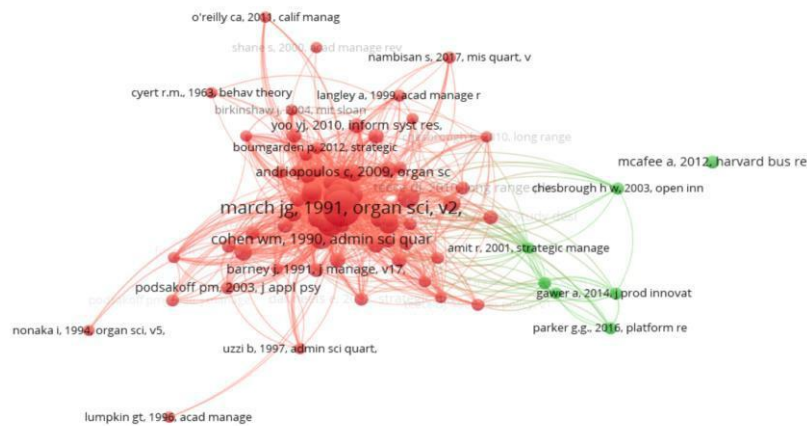
Figure 4 Network visualization of the co-citation analysis.

However, the co-occurrence analysis (Figure 5) revealed that the keywords "ambidexterity" and "digital transformation" are related to each other, meaning that even though the two keywords are in different clusters, they can be seen in the context of each other. Therefore, organizational ambidexterity is in some way connected to what is already written about digital transformation. Furthermore, our findings reveal that "digital transformation" is a "hot" topic, with an average publication year of 2020. On the other hand, "ambidexterity" is frequently included in the publications with an average publication year of 2018.32. As ambidexterity is a concept that has existed for a long time, the late average publication year can be explained by an increasing interest in the concept in recent years. Thus, ambidexterity can also be considered as a relatively popular topic.
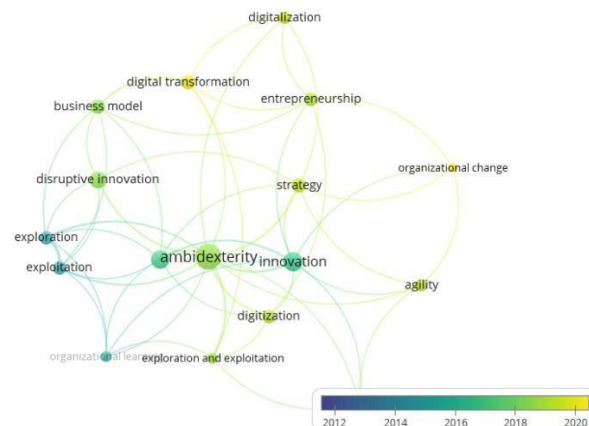
Figure 5 Overlay visualization of the co-occurrence analysis.

The content analysis of the final nine articles (Chan et al., 2018; Del Giudice et al., 2021; Magnusson et al., 2020; Mahmood and Mubarik, 2020; Molloy and Ronnie, 2020; Montealegre et al., 2019; Scuotto et al., 2019; Steiber and Älange, 2020; Wu et al., 2021) identified three dimensions (i.e., internal orientation, external orientation, and structural integration) that were addressed in the extant research related to organizational learning and digital transformation.

4.1 Internal orientation

Internal orientation addresses the involvement of employees in an organization. This involvement is necessary to succeed with the digital transformation as it is difficult for the management to carry out the digital transformation without the support of the employees. These articles highlight that it is important for an organization to include its employees in the digital transformation and that they get the opportunity to utilize their competence. In this way, organizations can benefit from resources they already possess. As internal orientation involves exploiting the existing human resources, this dimension can be linked to exploitation in the context of organizational ambidexterity. Our findings also indicate that organizations can facilitate exploitation based on the following three learning considerations: active communication, a decentralized structure and continuous learning. First, active communication facilitates good communication within the organization so that the employees feel they are part of the digital transformation. Second, a decentralized structure ensures that the organization involves the employees in an effective way. Third, continuous learning guarantees that the employees have the opportunity to continually evolve to remain relevant resources for the organization. Therefore, organizations must facilitate internal orientation as it emphasizes the importance of involving the employees in the organization.

4.2 External orientation

External orientation involves searching for new knowledge and capabilities outside an organization in order to manage the digital transformation. Sometimes internal expertise alone is not sufficient, and there is an explicit need to involve external stakeholders such as customers, suppliers, universities, or other businesses. By entering a collaboration with external stakeholders, an organization can obtain necessary expertise. If an organization does not acknowledge the need for collaboration and resists committing to a collaboration, it can limit its ability to respond to changing environments. As external orientation involves exploring new opportunities, this dimension can be linked to exploration in the context of organizational ambidexterity. Our findings indicate that organizations can facilitate collaboration and exploration with the help of at least one of the following three antecedents: partnership, network and internship. First, by entering a partnership, the organization can acquire value from the other party through shared knowledge and experiences. Second, by participating in networks, the organization can renew their existing base by gaining new insights. Third, by introducing internships, the organization can bring in people who possess the competence and capabilities they lack. Therefore, organizations should enter collaborations with external stakeholders.

4.3 Structural integration

Structural integration involves integrating internal orientation and external orientation. As these two orientations can be linked to exploitation and exploration, it can be difficult for an organization to balance the tensions between them simultaneously and achieve organizational ambidexterity. Most organizations tend to focus more on one of them; in most cases, exploitation is preferred as it ensures short-term success. However, to survive in the long run and to succeed with digital transformation, organizations need to prioritize both exploitation and exploration continuously. Our findings indicate that organizations can facilitate organizational ambidexterity in the context of digital transformation based on the following

three antecedents: knowledge sharing and knowledge sharing practices, a dual focus and a digital infrastructure. First, knowledge and knowledge sharing practices are necessary to integrate the acquired external knowledge with the internal knowledge to create value. Second, a dual focus in the management is important to ensure the operation of the business both today and in the future. Third, a digital infrastructure must be in place to integrate new technologies. Therefore, an organization needs to have a business model that allows it to adapt quickly to new changes in the market.

5 Conceptualization

The three dimensions with the nine identified learning concerns identified in the extant research illustrate how organizations must orient themselves to be able to use organizational ambidexterity to achieve digital transformation, as illustrated in Figure 6.
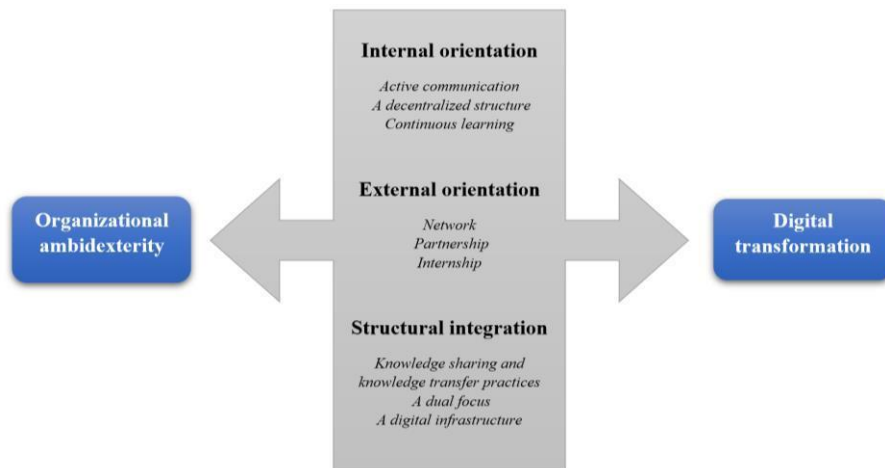
Figure 6 The conceptual bridge between organizational ambidexterity and digital

transformation.

Our findings indicate that the three learning considerations within internal orientation focus on the employees within the organization. Thus, we are offering the following proposition:

> *P1: In order to succeed with digital transformation, organizations must secure exploitation by facilitating active communication, a decentralised structure and continuous learning internally.*

Furthermore, our findings illustrate that external orientation consists of three learning considerations involving obtaining new knowledge and capabilities outside the organization. Hence, P2 is offered:

> *P2: In order to succeed with digital transformation, organizations must secure exploration by facilitating partnerships, networks and internships externally.*

Finally, our findings imply that the three learning considerations within structural integration must be present in order to integrate internal orientation with external orientation. P3 is therefore offered:

> *P3: In order to succeed with digital transformation, organizations must manage to balance the tensions between exploitation and exploration by integrating knowledge sharing and knowledge transfer practices, a dual focus and a digital infrastructure.*

We want to emphasize that all three propositions must be present to secure organizational ambidexterity and for the organization to succeed with the digital transformation in the long run. However, this can be difficult in practice as the propositions constitute contradictions, and the organization may only manage to facilitate some of them. An illustration of the relationship between the different dimensions are shown in Figure 7.
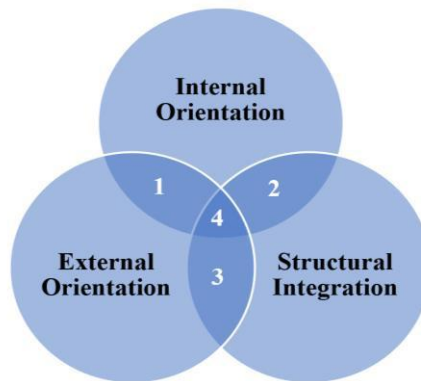
Figure 7 A Venn diagram of the relationships between the different dimensions.

An organization attempting to achieve digital transformation can be positioned at one of the four intersections shown in Figure 7. If the organization is located in intersection 1, it facilitates both exploitation and exploration. As the organization lacks integration mechanisms, it will be difficult to balance the tensions between these contradictions in the long run, which can lead to less cooperation, non-optimal use of resources and an unprofitable operation.

Furthermore, if the organization is located in intersection 2, it facilitates exploitation and possesses integration mechanisms. Therefore, an organization in this intersection will lack exploration, which is important for long-term success. Without facilitating exploration, the organization will have a shortage of new ideas and knowledge, have difficulties with following market trends and changes, and not be able to survive in the long run.

In addition, if the organization is located in intersection 3, it will facilitate exploration and possess integration mechanisms. The lack of exploitation will make it difficult for the organization to operate profitably because it does not utilize its internal resources optimally. Therefore, this can result in an inefficient use of resources, organizational inertia and an unprofitable operation.

Finally, if the organization facilitates all three dimensions, it will be located in intersection 4. This is the most optimal intersection point as the organization will succeed with its digital transformation process due to achieving organizational ambidexterity. Based on the fact that digital transformation constitutes an evolutionary process, being located in intersection 4 is something it must continuously strive for, as it can easily end up in intersection 1, 2 or 3 due to the challenge of balancing the tension of exploitation and exploration over time. To be located in these intersections can work in the short term, but if the organization does not strive to end up in intersection 4, it will be difficult to succeed with the digital transformation in the long run.

6 Conclusion

This study examined the extant published research in order to answer the research question: *How can a structured literature search utilizing bibliometric analysis of current published scientific research contribute to build a bridge between the concepts of organizational ambidexterity and digital transformation?* To investigate the bridge between organizational ambidexterity and digital transformation, we conducted descriptive, bibliometric, and content analyses. Our findings illustrate that there is a lack of research bridging these two concepts and that the field is immature and under development.

We provide two theoretical contributions in this study. First, based on the identification of nine core articles, we revealed how extant research has addressed three very different dimensions and nine associated learning considerations when describing how organizational ambidexterity contributes to digital transformation. The identification of

these three dimensions can function as a vantage point for further theory development bridging organizational ambidexterity and digital transformation. To aid this development, three propositions (P1, P2 and P3) were offered.

Second, our suggested Venn diagram illustrates the overlapping relationships between the dimensions. Organizations will often be located in one of the non-optimal intersections (1, 2 or 3) as it is in practice challenging to facilitate all three dimensions simultaneously. Therefore, it is important that organizations continuously strive to be in intersection 4 as it facilitates all the dimensions and thus a successful digital transformation. Overall, our contribution constitutes an exemplary starting point for those who want to conduct further research on this theme. In addition, it is a valuable contribution for managers as it will increase their understanding of how ambidexterity can be utilized in order to succeed with digital transformation.

References

Andriopoulos, C. and Lewis, M. (2009). "Exploitation-Exploration Tensions and Organizational Ambidexterity: Managing Paradoxes of Innovation." *Organizational Science*, 20 (4), pp. 696-717.

Chan, C. M. L., Yeow, A., Teoh, S. Y. and Pan, G. (2018). "Agility in Responding to Disruptive Digital Innovation: Case study of an SME," *Information Systems Journal*, 29 (2), pp. 1-20.

Cook, D. J., Mulrow, C. D. and Haynes, B. R. (1997). "Systematic Reviews:

Synthesis of Best Evidence for Clinical Decisions," *Systematic Review Series*, 126 (5),

pp. 376-380.

Del Giudice, M., Scuotto, V., Papa, A., Tarba, S. Y., Bresciani, S. and Warkentin, M. (2021). "A Self-Tuning Model for Smart Manufacturing SMEs: Effects on Digital Innovation," *Journal of Product Innovation Management*, 38 (1), pp. 68-89.

Duncan, R. B. (1976). "The Ambidextrous Organization: Designing Dual Structures for Innovation," *The Management of Organization Design: Strategies and Implementation*, 1, pp. 167-188.

Fahimnia, B., Sarkis, J. and Davarzani, H. (2015). "Green Supply Chain Management: A Review and Bibliometric Analysis," *International Journal of Production Economics*, 162, pp. 101-114.

He, Z.-L. and Wong, P.-K. (2004). "Exploration vs. Exploitation: An Empirical Test of the Ambidexterity Hypothesis," *Organization Science*, 15 (4), pp. 375-497.

Henriette, E., Feki, M. and Boughzala., I. "The Shape of Digital Transformation: A Systematic Literature Review," October 2015, 9th Mediterranean Conference on Information Systems. Researchgate Web site. https://www.researchgate.net/publication/301524030_The_Shape_of_Digital_Transformation_A_Systematic_Literature_Review, accessed April 2021.

Holand, A., Svadberg, S. and Breunig, K. J. (2019). "Beyond the Hype: A Bibliometric Analysis Deconstructing Research on Digitalization," *Technology Innovation Management Review*, 9 (10), pp. 38-50.

Kane, G. C., Palmer, D., Phillips, A. N., Kiron, D. and Buckley, N. (2015). "Strategy, Not Technology, Drives Digital Transformation," https://sloanreview.mit.edu/projects/strategy-drives-digital-transformation/, accessed March 30, 2021.

Levinthal, D. A. and March, J. G. (1993). "The Myopia of Learning," *Strategic Management Journal*, 14 (S2), pp. 95-112.

Levitt, B. and March, J. G. (1988). "Organizational Learning," *Annual Review of Sociology*, 14, pp. 319-338.

Levy, Y. and Ellis, T. J. (2006). "A Systems Approach to Conduct an Effective Literature Review in Support of Information Systems Research," *Informing Science: The International Journal of an Emerging Transdiscipline*, 9, pp. 181-212.

Magnusson, J., Khisro, J., Björses, M. and Ivarsson, A. (2020). "Closeness and Distance: Configurational Practices for Digital Ambidexterity in the Public Sector," *Transforming Government: People, Process and Policy*.

Mahmood, T. and Mubarik, M. S. (2020). "Balancing Innovation and Exploitation in the Fourth Industrial Revolution: Role of Intellectual Capital and Technology Absorptive Capacity," *Technological Forecasting and Sosial Change*, 160, pp. 1-9.

March, J. G. (1991). "Exploration and Exploitation in Organizational Learning," *Organizational Science*, 9, pp. 71-87.

Matt, C., Hess, T. and Benlian, A. (2015). "Digital Transformation Strategies," *Business & Information Systems Engineering*, 57 (5), pp. 339-343.

McKinsey & Company. "Why Do Most Transformations Fail? A Conversation with Harry Robinson," McKinsey & Company Web site, https://www.mckinsey.com/business-functions/transformation/our-insights/why-do-most-transformations-fail-a-conversation-with-harry-robinson, accessed February 2021.

Molloy, L. and Ronnie, L. (2020). "Sustaining the Life Insurance Industry in the Fourth Industrial Revolution: Building a Foundation for Change," October 2019, *Actuarial Society of South Africa's 2019 Convention, Sandton Convention Centre*, 20 (1)

Montealegre, R., Iyengar, K. and Sweeney, J. (2019). "Understanding Ambidexterity: Managing Contradictory Tensions Between Exploration and Exploitation in the Evolution of Digital Infrastructure," *Journal of the Association for Information Systems*, 20 (5), pp. 647-680.

Morakanyane, R., Grace, A. A. and O'Reilly, P. "Conceptualizing Digital Transformation in Business Organizations: A Systematic Review of Literature," December 2017, 30th Bled eConference Digital Transformation – From Connecting Things to Transforming Our Lives. ResearchGate Web site, https://www.researchgate.net/publication/321805933_Conceptualizing_Digital_Transformation_in_Business_Organizations_A_Systematic_Review_of_Literature, accessed April 2021.

Oxford University Press. "Ambidextrous," Oxford Learner's Dictionaries Web site, https://www.oxfordlearnersdictionaries.com/definition/english/ambidextrous, accessed April 2021.

Piccinini, E., Hanelt, A., Gregory, R. W. and Kolbe, L. "Transforming Industrial Business: The Impact of Digital Transformation on Automotive Organizations," September 2015, International Conference on Information Systems. ResearchGate Web site. https://www.researchgate.net/publication/281855658_Transforming_Industrial_Business_The_Impact_of_Digital_Transformation_on_Automotive_Organizations, accessed April 2021.

Porter, A. L., Kongthon, A. and Lu, J.-C. (2002). "Research profiling: Improving the Literature Review," *Scientometrics*, 53 (3), pp. 351-370.

Raisch, S. and Birkinshaw, J. (2008). "Organizational Ambidexterity: Antecedents, Outcomes, and Moderators," *SAGE Journal*, 34 (3), pp. 375-409.

SCImago Journal & Country Rank, "Help," SCImago Journal & Country Rank Web site. https://www.scimagojr.com/help.php, accessed April 2021.

Scuotto, V., Arrigo, E., Candelo, E. and Nicotra, M. (2019). "Ambidextrous Innovation Orientation Effected by the Digital Transformation: A Quantitative Research on Fashion SMEs," *Business Process Management Journal*, 26 (5), pp. 1121-1140.

Sinha, S. (2015). "The Exploration-Exploitation Dilemma: A Review in the Context of Managing Growth of New Ventures," *The Journal for Decision Makers*, 40 (3), pp. 313-323.

Steiber, A. and Älange, S. (2020). "Corporate-Startup Collaboration: Effects on Large Firms' Business Transformation," *European Journal of Innovation Management.*

Teece, D. J., Pisano, G. and Shuen, A. (1997). "Dynamic Capabilities and Strategic Management," *Strategic Management Journal,* 18 (7), pp. 509-533.

Tushman, M. L. and O'Reilly, C. A. (1996). "The Ambidextrous Organization: Managing Evolutionary and Revolutionary Change," *California Management Review*, 38 (4), pp. 1-23.

Tushman, M. and O'Reilly, C. A. (2013). "Organizational Ambidexterity: Past, Present, and Future," *The Academy of Management Perspectives*, 27 (4), pp. 324-338.

Verbeek, A., Debackere, K., Luwel, M. and Zimmermann, E., (2002). "Measuring Progress and Evolution in Science and Technology – I: The Multiple Uses of Bibliometric Indicators," *International Journal of Management Reviews*, 4 (2), pp. 179-211.

Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N. and Haenlein, M. (2021). "Digital Transformation: A Multidisciplinary Reflection and Research Agenda," *Journal of Business Research*, 122, pp. 889-901.

Westerman, G., Bonnet, D. and McAfee, A. *Leading Digital: Turning Technology into Business Transformation*. Boston: Harvard Business Press, 2014.

Wu, T., Chen, B., Shao, Y. and Lu, H. (2021). "Enable Digital Transformation: Entrepreneurial Leadership, Ambidextrous Learning and Organizational Performance;" *Technology Analysis & Strategic Management.*

Appendix B

Ambidexterity to overcome digital transformation challenges

A Bibliometric Review

By Marlene Bråthen, Elisabeth Doan and Karl Joachim Breunig

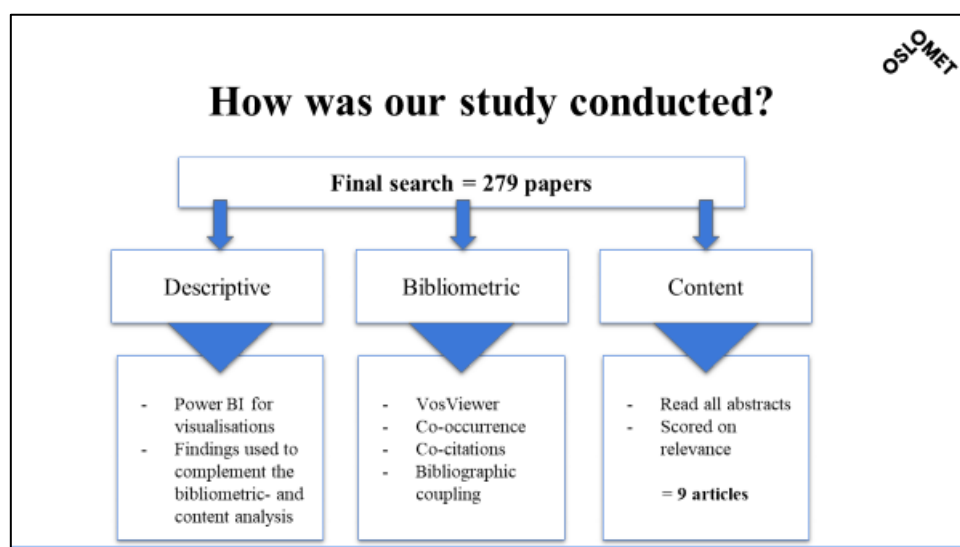Oslo Business School, Oslo Metropolitan University - OsloMet

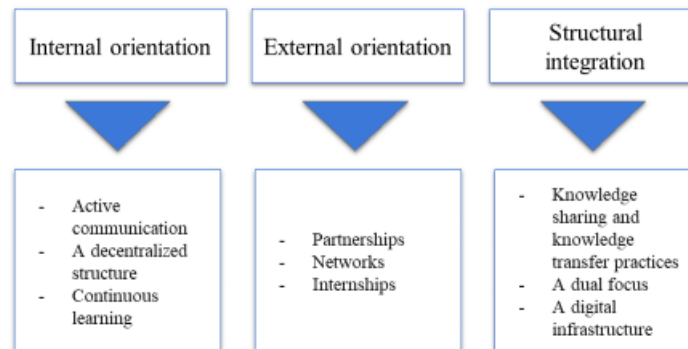---

The purpose of our paper

- Digital transformation (DT)
- Organisational ambidexterity (OA)
  - The ability to simultaneously handle explorative and exploitative learning
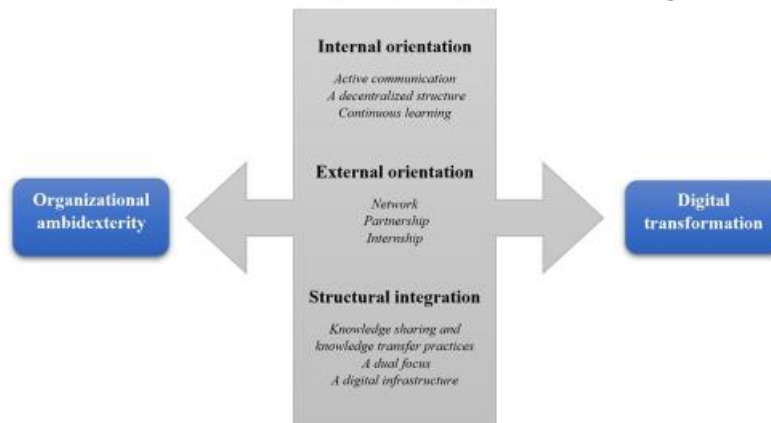- Little research addressing how OA are involved in achieving DT

Research question:

How can a structured literature search utilizing bibliometric analysis of current published scientific research contribute to build a bridge between the concepts of organizational ambidexterity and digital transformation?

How was our study conducted?

Final search = 279 papers

Descriptive	Bibliometric	Content
- Power BI for visualisations - Findings used to complement the bibliometric- and content analysis	- VosViewer - Co-occurrence - Co-citations - Bibliographic coupling	- Read all abstracts - Scored on relevance **= 9 articles**

What were our main findings?

Internal orientation → - Active communication - A decentralized structure - Continuous learning

External orientation → - Partnerships - Networks - Internships

Structural integration → - Knowledge sharing and knowledge transfer practices - A dual focus - A digital infrastructure

What did we learn from this study? 1

Organizational ambidexterity ← Internal orientation / External orientation / Structural integration → Digital transformation


What did we learn from this study? 2

P1: In order to succeed with digital transformation, organizations must secure exploitation by facilitating active communication, a decentralized structure and continuous learning internally.

P2: In order to succeed with digital transformation, organizations must secure exploration by facilitating partnerships, networks and internships externally.

P3: In order to succeed with digital transformation, organizations must manage to balance the tensions between exploitation and exploration by integrating knowledge sharing and knowledge transfer practices, a dual focus and a digital infrastructure.

What did we learn from this study? 3

Internal Orientation

External Orientation

Structural Integration

1

2

3

4
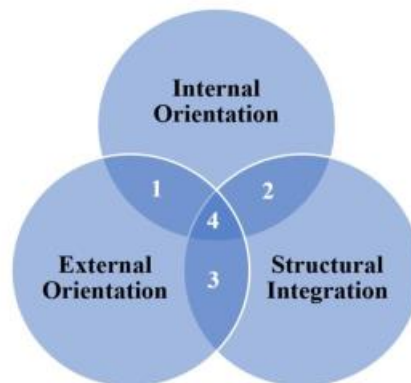
What can this paper contribute with?

- Provides a foundation for further conceptual integration of OA and DT

- Vantage point for further theory development

- Three propositions and a Venn diagram

- Valuable contribution for managers

Thank you for your attention!

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