

OSLOMET

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**A bibliometric analysis deconstructing research on
Digital transformation strategy**

**Master's thesis autumn 2020
Oslo Business School
Oslo Metropolitan University
Master's program in business administration**

Preface & Acknowledgments

This master thesis marks my final phase of the two and half year master`s degree in the study program “Master of Science in Business Administration” at OsloMet Metropolitan University in Oslo. With a high interest to learn about the combination between strategy and digital transformation, I took upon the journey to write this study; “A bibliometric analysis deconstructing research on the Digital transformation strategy”. The amount of knowledge I have gained on this topic is beyond what I expected, and has become a field of study I would love to continue with in my career. With both the topic and method being new area of study for me, it has been a challenge to understand the depth of this complex transformation companies are expected to or are engaging in. However, I am thankful for the amount knowledge, writing skills in English language and lessons I have learned throughout writing this thesis.

I am sincerely grateful for my family for their prayers and care during this writing process. And I would like to thank my supervisor, Professor Karl Joachim Breunig, for his time and guidance, and for giving me this opportunity to write such unique and interesting approach to a master thesis.

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27. November 2020

Abstract

The emerging phenomenon Digital transformation strategy (DTS) is an ongoing area of research in the digital transformation domain. Recent studies have contributed to the topic DTS, with various aspects and subfields. However, there are still unclearness to the topic overall. Therefore, the purpose of this study is to explore the structure of digital transformation strategy research domain, to understand its current state of development, and to explore the influence of internal perspective of resource based view (RBV) and external perspective of positioning strategies on DTS. This study utilized a bibliometric method to deconstruct prior research on the structure of Digital transformation & strategy. A collection of 184 articles was extracted through a structured literature review applied with bibliometric analysis, which further reduced the collection to 19 core articles. The findings support the previous views of the topic being fragmented across to sectors and other fields of study. However, the findings also reveal that a value creating DT strategy occurs from reconfiguration of resources and capabilities, to achieve optimal benefit of a DT. Moreover, the traditional generic strategies are gradually being replaced by the network based platforms with a customer centric view for value creating strategies and for gaining competitive advantages.

Keywords: Bibliometric analysis, Digital transformation strategy, Digital transformation, Resource based view, Strategic positioning

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1. Introduction

The rules of the game have changed for the strategists! With the recent COVID-19 pandemic, Digital Transformation (DT) or digitalization is coming across as a vital consideration for the alignment with external and internal environmental forces occurring from this sudden wave of crisis for many companies. This is especially seen in the health industry where an overwhelming number of patients are crashing the systems, pressuring organizations to enable digital technology driven systems and tools to support the society's needs. For instance, we see how the worldwide increase use of digital technologies is helping to fill the gap of the face-to-face interactions between customers and workers (Kane et al., 2020). However, DT is a complex endeavour, thus an organizational strategy is essential to achieve its targeted digital business transformation vision and goals. The focus of a DT is to transform organizations to digital format, and aims to improve a company's operations and services, to ensure viability and to protect its competitive position. Digital transformation strategy (DTS) is overall a general concept, however some researchers have defined it more specifically. According to Matt et al. (2015), DTS is a business-centric perspective concept that seeks to integrate the entire coordination, prioritization and implementation of the many independent threads of DT in an organization, and is defined as a blueprint that supports companies in governing the transformations. The future is about making new growth strategies and business models (Rogers, 2016), especially for traditional and established companies undertaking an DT. Although start-ups are dominating most industries today, for other companies to survive, it is a matter of high level of adaptation and improvisation of the internal and external environment (Perkin, 2018). To maintain or even create new competitive advantages in this hyper competitive world today, requires a continuous and prolonged assessment of the environment across different industries. Thus, a balance between internal and external views of an organizations environment for the transformation, plays a significant role in developing a DT strategy. Theoretically, from an internal perspective, the well-known resource based view (RBV) is still a trending phenomenon, which mainly argues that competitive advantages are to an extent determined by the uniqueness of the resources and capabilities a firm attains, and for the creation of a strategy (Barney, 1991; Mahoney, 2000). And from an external perspective, the firms can strategize positioning through generic strategies (Porter, 1985) within a market or an industry from exploitation of these resources and capabilities, to gain competitive advantage, thus complementing the RBV.

With digital technologies dominating most traditional resources & capabilities and the strategic positioning strategies, questions remain to which extent these theory perspectives are applied to a DTS. Therefore, to understand this aspects effect on DTS, I carried out a revered search by collecting previous published studies on DTS, based on the digital transformation and strategy related terms.

Two main reasons are addressed for the research of this topic. First, there is an inadequate research on the general concept of digital transformation strategy overall. Digital transformation strategy is still an emerging topic in the strategic management field. According to Korachi, (2019), prior literature search shows that studies on DTS is fragmented across other disciplines, e.g. in context with other specific sectors, concepts, terms or cases. Further, the author recommends that more investigations on this field could be conducted by both academics and practitioners. Second, through a review on this topic, I observed a no single study on the distinction between the internal perspective of the resource based view (RBV) (Mahoney, 2000; Barney, 1991) and external perspective of strategic positioning (Porter, 1959) as a combined influence on a digital transformation strategy. Therefore, this research aims, first to understand the relationship between DT and strategy through previous studies, and to further identify the influencing internal and external factors on digital transformation strategy. And lastly, to recommend further research agendas. Given the reasons, this study aims to answer the following research questions: *What do prior research reveal about the relationship between digital transformation and strategy? And how does the internal resource based view and the traditional external positioning view influence the digital transformation strategy domain?*

To retrieve previous published publications on DT & strategy, I used the platform Web of Science (WOS). A bibliometric method was performed by utilizing science mapping, containing structured literature review aided with bibliometric analysis, to deconstruct the scope of the published articles by filtration and visualization techniques. By synthesizing multiple published studies, the research questions were resolved with a great estimate contra using single study. From an experiment with different search phrases on Web of Science, the resulting word combination were *digi* AND (transform* OR "Digital transformation") AND strat**. After several restrictions on WOS and exclusion of unrelated categories, the search resulted in a collection of 184 articles. Furthermore, I used an open source software called VOSviewer for the bibliometric analysis to visualize the relationships among the authors,

journals, co-citations, terms etc., with title, abstract and content analysis, to select high-quality core articles. The scope was narrowed down to **20** core articles. The clarity of DTS and identification of the factors are extracted from studying these core articles. For this study, I will discuss digital transformation from mostly an organizational and firm/company (interchangeably used in this study) oriented perspective, and analyse the external and internal perspective factors which influence a digital transformation and its value creating strategy for competitive advantage. This paper is structured as follows. First, I will present the theoretical literature, and describe the methodology process. Second, I will present my findings and then discuss the answers to my research questions. Finally, I will conclude and propose a few future agendas.

2. Theoretical literature

In this section I will first briefly describe the main components of the theories related to DT strategy. First, the main fundamental ideas and conceptualizations of strategy, resource based view (RBV) and strategic positioning, all, in context with value creating strategy. And lastly, the basic understanding of what digital transformation is and the overall components required in a transformation. The main section is split into four parts as follow; strategy, internal perspective, external perspective and digital transformation.

2.1. Strategy

From my theoretical literature review on this field, numerous definitions and conceptualization of strategy are presented by several authors, scholars and researchers. Nevertheless, Mintzberg et al. (1998) suggested that strategy requires five definitions to cover the nature of strategy as plan, pattern, perspective, position and ploy (p. 9). Most early studies as well as current work focus on Mintzberg et al.'s three approaches, realized (deliberate), unrealized and emergent strategy, in context with the evolving patterns in both the organization and the changing environment (Mintzberg et al., 1998, pp. 9-11; Barney et al., 2016, pp. 40-41; Perkin, 2018, p.134). However, David et al. (2017) addressed some central issues for this century, that while Mintzberg and his followers focus on subjective imagination, insist informality and takes on strategic planning as an emergent process, the strategy scientists in the 21st century focus on objective analysis, more formality and use the term "deliberate process" in context with emergent strategy (pp.374-375). Further noting that

with the complex and intense competition in today's business world, there are less room for error and strategists must decide for themselves their procedure, yet rely on research data, competitive intelligence and analysis in formulating strategies. According to Barney et al. (2015), the strategic management process is a sequential set of analyses and choices, which creates the likelihood to generate a good strategy based on competitive advantage (p.26). Strategic management is highly based on integrating intuition and analytical thinking in decision making, by both leaders and employees (David et al., 2017, p.25). That is, the mind-set of the person who knows the business and absorbs the environment to further integrate that knowledge by using analysis and research data to formulate strategies effectively. Managers' absorptive capacity to assimilate new personnel, knowledge and technology is a required capability (Penrose, 1959; Mahoney, 2000, p.116). It is also consensus among researchers and authors that communication across the organization is the key to any strategy development. It is important to note that all strategic decision and development is virtually impacted from global and international issues, whereas the strategic management process activities are impacted by business ethics, social responsibility, and environmental sustainability issues (David et al., 2017, p.43).

2.1.1. Internal perspective

Strategy as a perspective concerns and views the grand vision of an organization and its changing environment by relying on both the internal and the external environmental analysis (Mintzberg et al., 1998, pp.11, 16). From the internal perspective to help firms increase the value of their resources and capabilities, the resource-based view (RBV) is emphasized in this study (Barney et al., 2015, p.86). RBV was first introduced by Edith Penrose in 1959 in her book, "The Theory of the Growth of the Firm, to understand firms' growth from her "resources approach" on research process and research product (Mahoney 2000), where she "described the relation between an individual firm's resources and its production of final products" (Teece, 2019, p.16). RBV have since been extended, summarized and received renewed attention by numerous authors such as Barney (1991), Grant (1995), Wernerfelt (1995), Mahoney, (1995), Hamel and Prahalad (1994) and Webster (1994) (Hooley et al., 1998, p.98). In 2000, Mahoney summarized the fundamental ten arguments or ideas of her approach, and further introduced a modern approach to the ideas (pp.113-114), as a natural blend of RBV, commitment, dynamic capabilities and the knowledge-based view (p.119). The main ideas by Penrose (1959) highlights that firms' growth come from the dynamic

process by interaction between management & resources, the importance of human volition, services as drivers of firm heterogeneity, interaction between human resources & material resources, teamwork experience & organizational capital, the '*Penrose effect*' regarding managerial capability, expansion with excess capacity of resources & market frictions, entrepreneur & innovation, firm diversification for sustained competitive advantage and lastly, continuous change and experimentation for productive opportunities (pp. 113-118).

In one of the extensions by Barney (1991), the resource-based view on how to gain competitive advantage examines the connection between a firm's internal characteristics and performance (Barney, 1991, p.101). Competitive advantage occurs from a process of how resources, for example assets, capabilities, processes, knowledge, humans etc., are managed and applied within a firm. For firms to formulate and implement strategies to improve efficiency and effectiveness, the assessment of this process is important aspect for creating a strategy (p.101). Barney (1991) defines that a firm has a competitive advantage (CA) when they implement a value creating strategy that is not simultaneously being implemented by other firms, current or potential competitors (p. 102). Furthermore, a firm has a "sustained" competitive advantage (SCA), where these other firms are unable to duplicate the benefits of the value creating strategy a firm develops (p. 102) as the physical and human resources complement and reinforce one another (Mahoney, 2000, p. 114). The VRIO model is the primary tool utilized by firms to measure or analyse the resources or capabilities they possess in order to gain SCA. The model contains four essential attributes a firm resource must have to entitle a resource or capability as a SCA; a) Valuable, b) Rare c) Imperfectly imitable and d) Non-substitutable '(substitutability). Furthermore, the model takes on the assumption that a firm's resource may be heterogeneous and immobile, which Barney (1991) argues firms should focus on to obtain SCA (pp.103). Penrose stated that the services of the resources provide the uniqueness for firm heterogeneity, and firm diversification where "the type of competence together with the market position" can lead to SCA (1959; Mahoney, 2000, pp.114, 117). Not all resources can hold the potential of SCA, and that for a long period of time due to competition and imitation. Unused productive services can introduce new combinations of resources and can be a source of innovation, as well as organizational innovation for firm growth (Penrose, 1959, p.85; Mahoney, 2000). Penrose also noted that "*the continual change in the productive services and knowledge within a firm along with the continual change in external circumstances present the firm with a continually changing*

productive opportunity”, pointing to experimentation as an important component for competitive process (1959, p. 150; Mahoney, 2000, p.118).

2.1.2. External perspective

In contrast to the internal strategy perspective, the trends and events outside a firm creates various type of consumer, further influencing firms to create different types of products, services, and strategies (David et al., 2017, p.39). Barney et al., (2016) defined a firm's strategy as a theory based on a set of assumptions and hypotheses about “*how to gain competitive advantages*” by creating more economic value than the rival firms (pp. 26, 30). How competition in an industry will evolve is unpredictable and unforeseeable, consequently, a firm's strategy needs to be consistent with the actual evolution of competition in an industry to generate a competitive advantage (p.44). Strategy as position talks about firms locating their products in specific markets, which points to Porter`s reiteration on creation of unique and valuable positions with different set of activities for the creation of a strategy (Mintzberg et al., 1998, p.13). Thus, from an external strategy perspective for gaining competitive advantage the three (or four) generic positioning strategies are highlighted in this study (Porter, 1985). Porter (1985, p.11) argued that competitive advantage comes from a choice of positioning within a market or an industry, from either a low-cost strategy by being cheaper, a product differentiation strategy with differentiated better products or services of higher value, or both, separately in the form of a focus strategy in a niche market. Mainly, these strategies argue that core competencies require scale and operational efficiency to become low cost producers, or the ability to create innovative products and services to gain competitive advantage (Gupta, 2018, p. 21). According to Hooley et al. (1998), a competitive positioning for a firm is to serve their chosen targets more effectively than competitors by “*ensuring a fit between the chosen market targets and the competencies & assets the firm can deploy*” (p 105-106). Therefore, the authors suggested there are different number of ways firms can position themselves, and proposed six main dimensions to the classification of positioning with price, quality (or grade), service, tailoring (one-to-one marketing), benefit differentiation or innovation (p.106). Further noting that these dimensions help us understand the competitive behaviour of modern companies in a more realistic way by analysing the resources and capabilities underlying firms` strategic postures (Hooley et al., 1998, p. 113). The dimensions, including Porter`s, are somewhat contradictory. For example, producing costly high-quality products but charging low prices for the customers, would not

be profitable for a firm in the long-run. Thus, substantiating Porter's view on a recipe of strategic mediocrity and below average performance, when trying to achieve several positioning in one go (Porter, 1985, p.12). In a recent study done by Islami et al. (2020), low-cost strategy proved to be destructive for firm's industry in the long-term. When competitors imitate the low-cost strategy of similar products or services, they also bring displacement of consumers from one firm to another. In contrast, a firm that pursues differentiation strategy increases their firm performance and brings profit from having competitive advantage by the uniqueness of their resources or services. Thus, emphasizing differentiation strategy as the ultimate option for competitive advantage in both short and long term period. Although extensive research has been carried out on this area, in his book, Gupta (2018) argue that a firm need to rethink its core competencies and its competitive advantage as the rapid development of technology is expanding the scope of a business, defining its competition more broadly and blurring industry boundaries more rapidly than ever (p.21). Therefore, the author argues that competitive advantage in the digital era of business transformation comes from a more customer-centric strategy (p. 21-22). For example, in the case of Amazon, who started off as a low-cost player, gained unique advantages through a deep understanding of customers and their demand patterns.

2.2.Digital transformation

As we moved from the third industrial revolution to the fourth industrial revolution (formerly termed, Industry 4.0), a change occurred as the development of information and communications technology (ICT) moved to complementing the computers with data and machine learning (Rojko et al., 2017, pp.79-80). The main idea of Industry 4.0 is to exploit the potentials and opportunities of new highly-advanced technologies, concepts and transformation processes (Rojko et al., 2017, p.80). Thus, the Industry 4.0 movement also means transformation of organizations to the digital format (also known as, Digital transformation or digitalization) with the current trend of using automation technologies such as CPS, IoT, Artificial intelligence, Big data, Cloud computing, integration of technical, and smart production of products (Sony, 2019). Digital transformation is defined as "*the transformation and reinvention of the resources, priorities and processes of a company in order to be fit for purpose in a digitally empowered world.*" (Perkin et al., 2018, p.51). Two necessary conditions are required for the realization of a digital transformation of an organization. First, digitization, which refers to the encoding of analog information into

digital formats, thus adding new capabilities to non-digital artifacts, and second, digitalization by leveraging the digitized data to digital technologies, to further improve or transform business processes or business models for value creation (Yoo, 2010, pp.7, 8). Adner et al. (2019), divided these conditions into three core processes underlying DT as representation, connectivity and aggregation, to understand the transition to “*hyper customized, predictive, self-improving technologies*” (p.254). By interacting and reinforcing with each other, by duo, these processes create new business models, produce new functionality and opportunities for value creation and capture, increase consumer analytics and have produced intelligent social media platforms such as Facebook and LinkedIn (p.255). Moreover, an interaction between all three have created developments such as self-driving cars, Internet of Things (IoT) and music platforms such as Spotify.

The fundamental changes which occurs from a reinvention of how a firm operates is based on the strategy, both tangible and intangible resources, policy regarding the right actions, and processes e.g. the formal and informal way in which the work gets done (Christensen, 2012; as cited in Perkin et al., 2018). Several authors have argued that digital transformation is more about strategy, upgrading your strategic thinking, people and organizational process as whole, rather than technology itself and upgrading the IT architecture (e.g. Kane et al, 2015; Rogers et al., p.239, Perkin et al., 2018, p.137; Gupta et al., 2018). Most of the authors emphasize “digital strategy” as the concept for the strategy process enabling the digital transformation of an organization. Kane et al. (2015) stated that a clear and coherent digital strategy drives digital maturity. Digital maturity is the product of a strategy, technology, culture and leadership, and a measurement of a firm’s capabilities. The authors found that the power of DT strategies lies in its scope & objectives, skill building, collaboration and conceptualization of how digital technologies impact the business. Moreover, a great strategy also arises from the digital agenda that is led from the top, and emphasizes that taking more risk is the key on the note that to embrace failure is a prerequisite for success. According to Gupta (2018) most companies fail to make digital strategy an integral part of the business strategy by embedding it into operations and connecting it with every aspect of the company to achieve transformative results. (pp. 2,5). According to Roger (2016) a good strategy for digital transformation requires deep understanding of customers' needs, competition, how to utilize and integrate data, ways to innovate and how to create value for customers continually (pp.4-10). In contrast to the traditional value of physical assets, today, data and customer base are considered the most profitable assets today (Gupta, 2018, p. 27). Data is the next domain

of digital transformation and a vital part of how businesses produce, operate itself, differentiate itself, manage and utilize information (Rogers, 2016, p.5). Data can be replicated, used without diminishing its value, and has a network effect where it becomes more valuable the more data is collected. To meet the customers' needs, a broader business scope is required to build new capabilities through for example extension of the business by skills of what the companies are good at, or even working backwards through first looking at what customers need (p.28). Sustained competitive advantage in today's connected world mainly comes from connected and complementary product offering and network effects of creating platforms to increase consumers switching costs (Gupta, 2018, p.22).

3. Methodology

The research approach I chose for this study is bibliometric deconstructing analysis (w/ WOS, VOSviewer, Microsoft Excel). The article by Zupic et. al. (2015), *Bibliometric Methods in Management and Organization*, was used as a guideline to understand this method in several areas. However, different techniques were used to retrieve publications. The article by Zuptic et al., has rich & coherent theory on bibliometric method, giving a great comprehension for conducting this method. For the visualization, I used the articles by Van Eck et. al. (2010; 2016; 2019), who developed the visualization program "VOSviewer", as guidance to understand the visual interpretation and evaluation process.

3.1. Bibliometric method

Scientific methods of science for studying science was proposed by Dereck J. de Solla Price in 1965 (Boyack, Klavans, & Borner, 2005; Zupic, 2015). While traditional methods such as meta-analysis seeks to synthesize empirical evidence from quantitative studies (Aguinis, Pierce, Bosco, Dalton, & Dalton, 2011; Zupic, 2015), bibliometric methods employ a quantitative approach for the description, evaluation and monitoring of published research. These methods have the potential to introduce a systematic, transparent and reproducible review process and thus improve the quality of reviews. The bibliometric method for this study was divided into two parts; structured literature review (SLR) and bibliometric analysis, with several iterative stages within. SLR is the qualitative method approach which handles diversity of studies and methodological approaches (Schmidt, 2008; Zupic et al. 2015). The approach is used for systematically extract publications from databases (e.g. Web of Science and Scopus). With a combination of bibliometric and SLR, science mapping is

introduced as a macro focused quantitative method with the aim to examine the structure and development of how disciplines, fields, specialties and individual papers are related to one another (Boyack & Klavans, 1999; Zupic et al. 2015). Simply put by Zupic et al.; “*The aim is to create a representation of the research area’s structure by partitioning elements (documents, authors, journals, words) into different groups. Visualization is then used to create a visual representation of the classification that emerges.*”

3.2. Structured literature review stages

A thorough structured literature search was done to reduce the scope of publication, with the purpose to find a collection of articles on DT and strategy, and with the aim for better visualization analysis process. For the overall restrictions, I used an iterative approach to both, attain and obtain, the right articles linked to DT and strategy. Below a description of each stage is written for a clear comprehension of the bibliometric method process I have performed. The components of the structured literature review are follow:

- *Selection of database & graphic viewer*
- *Screening and data extraction for compilation*
- *Identification of terms & keywords, setting the time frame and other criteria*
- *Data screening - Restrictions & Adjustment of criteria*

Selection of database & graphic viewers

I chose Web of Science (WOS), one of the well-known peer-reviewed literature database, as the main source for retrieving publications in the structured literature review. Web of science is the information and technology provider for the global scientific research community developed by Thomad Teurters Cororation (<https://clarivate.com/webofsciencigroup/about-us/>). The website provides trusted research database, analytics, unparalleled insights and workflow tools we need to deliver scientific discovery and increased innovation. Compared to the two other larger databases, Google Scholar and Scopus, reviews on WOS indicated that this platform contains high quality literature (as they require high standard papers).

Furthermore, for visualization I used a free available program called VOSviewer (Visualization of similarities), developed by Nees Jan Van Eck and Ludo Waltman. Unlike commonly used programs such as SPSS and Pajek (overlapping label problem with these), VOSviewer gives attention to the graphical representation of bibliometric maps and have the capability to display large maps containing moderately large number of items (e.g. 100 items

or more) (Vaan Eck et al., 2010). Additionally, the program was easier to interpret and evaluate the data with its clear viewing capabilities. The program helps to construct and examine, e.g. maps of authors or journals based on co-citation data or keywords based on co-occurrence data, in full detail.

Screening and data extraction for compilation

One of the crucial stages of bibliometric methods is how to limit the scope of the study and evaluate which articles to include in the final/core collection. The limitation of the scope was based on terms chosen for this study, with the importance of having the search include them in the publication titles, abstracts or keywords. The purpose was to assess/extract a collection of 20-40 high quality based core articles on digital transformation & strategy to understand their relationship and to find the building blocks. To make sure unwanted publications did not affect the result of bibliometric analysis and reduced the validity of the results, I performed a rigorous data screening process on WOS to clean up the data. Primary information such as categories, titles, type of documents, publication years, and other criteria for restrictions, adjustments and relevancy was reviewed on WOS. Furthermore, bibliometric analysis with co-occurrence of keywords was performed in VOSviewer for identification of keywords and their relevance to the topic. The method measures words that frequently co-occur in documents and uses the words in the documents to construct a similarity measure, and helps to understand its cognitive structure (Börner, Chen, & Boyack, 2003; Zupic et al., 2015)

Identification of terms and keywords, setting the timeframe and other criteria

My search strategy for identification of words, included keywords and terms representing the topic DTS. The main keywords, Digital, transformation and strategy, was abbreviated with the use of the asterisk symbol into, digi*, transform* and strat*. For example, searching with digi* retrieved articles that included words such as digital, digitization or digitalization etc. I further included the search with strat* to narrow the field of digital transformation with strategic terms and covered concepts or terms such as strategy, strategic, strategical etc. Moreover, “digital transformation” was used to include the exact phrase of this concept. The limitation of the scope was based on these terms, with the importance of having the search include them in the publications titles, abstracts or keywords by the authors. Thus, I excluded the use of the title string search. I performed several tries to attain the most valuable and accurate search result on WOS. A search of using each term in row under topic on WOS, identified over 26 000 publications. However, this search divided the set of terms into articles

including one nor the other terms, making the process of a thorough assessment process from WOS impossible. Also, with a high risk of losing influential articles from different categories. The final search was performed under the search string topic in one line, ordered: *digi* AND (“transform* OR Digital transformation”) AND strat**. WOS identified 2 036 publications. The language was set to English as the universal language and to avoid bias. Document types were set to finding article, editorial material, review, proceedings paper, book reviews and book chapter. To find quality articles on the basic understanding of digital transformation, I limited the timeline to the last decade, covering a 10-year period from 2010-2020. To support this limitation, I highlight the connection between Industry 4.0 with Digital transformation described in my theoretical literature, as Industry 4.0 was originated in 2011 in Germany (Rojko et al., 2017). However, to validate this restriction on time range and to ensure valuable articles were not lost, a co-occurrence of keywords on VOSviewer was performed by downloading articles from 2009 to 1991 in one data. “Digital transformation” was not a keyword in any of the clusters and strategy had irrelevant to little connection to the management & business field. Additionally, a quick scan through the top highly cited articles on those years, also revealed inapplicable publications with adequate connections for this study.

Data screening - Restrictions & Adjustment of criteria

Overall, the restrictions of keywords and timeframe setting, resulted in 1510 publications. I further did a category restriction by using two techniques/approaches; bibliographic keyword co-occurrence analysis on VOSviewer and qualitatively by reading titles and/or abstracts on WOS. I applied the techniques to two categories; categories containing 40 or more publications, and the categories below 40 publications. First, keyword co-occurrence was performed for categories with 40 or more publications to visualize categories connection with digital transformation and/or strategy. The number of thresholds was adjusted for each category, and with the basic tools on VOSviewer, the keywords in the clusters were analysed based on their connection with Digital transformation and strategy. The categories associated most with the main operators of my overall searches & analysis in this field of study was business, management and information science library science. However, I excluded the last one after examination of keyword association with the titles, and applied the qualitative reading approach rigorously on this category. The articles in the relevant categories were scanned through to exclude any titles that had irrelevance to the topic before I added them into the main data collection (marked list on WOS). Second, the discarded categories from

VOSviewer analysis and the categories with publications below 40 were sorted by times cited, and reviewed by the qualitative approach to evaluate relevancy of all the articles. Moreover, I observed multidisciplinary works while analysing each category as many of the significant publications were under the same categories, making the progress of collecting articles easier using the refining and exclusion criteria in categories on WOS. The number of publications before analysis resulted in 184 articles on September 1, 2020, which was applicable to this study.

3.3. Analysis

In the final stages, the aim was to find the most 15-20 influential articles on digital transformation & strategy from the 184 articles retrieved. Before the content analysis, I performed descriptive and bibliometric analysis to extract values, statistics, charts and visualization graphics of different variables for the articles with the help of the programs Microsoft Excel and VOSviewer. The collection of articles was downloaded from Web of Science with relevant records/items (e.g. titles, authors names, citation count, abstract etc.) and imported into Microsoft Excel where I distributed them in different sheets and under different columns. And for VOSviewer, a file with a full record was exported from WOS. A descriptive analysis was done with the use of Excel, where the data downloaded from WOS was used to create statistics and charts of visual representation on the topics growth and additional information in tables.

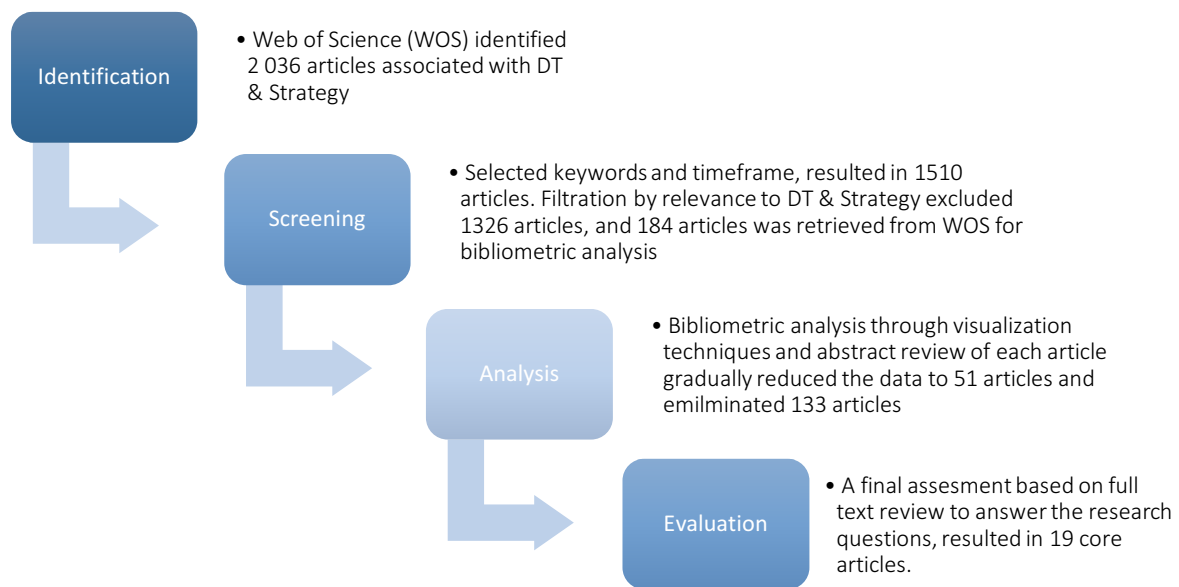
3.3.1. Bibliometric analysis

To evaluate and analyse the association among the 184 publications, I used different bibliometric methods to attain the final core articles and evaluate the relationship between digital transformation (DT) and strategy (Zupic et al. 2015; Van Eck et al., 2019). First, I performed bibliometric coupling on documents to link two or more documents together where both cite a third/same document, indicating that their work treats a related topic or field of study. This method was performed to detect outliers of articles, to identify where the subfields of the topic on DT and strategy are distributed and further as a part of the selection process of the core articles. Moreover, I performed keyword co-occurrence and co-citation on authors & references with the use of thesaurus file to gain perspective on highly co-cited studies, books & authors amongst the collection. I created thesaurus files to clear out any duplicates, similar words or irrelevant information attached to names or words that gave

overlapping problems on VOSviewer. Instruction on how to make thesaurus files was done with the use of VOSviewer manual (Van Eck et al., 2019).

3.3.2. Selection of core articles

The content analysis consisted of reading the abstract for every article and rating them from a degree of A to C. The values extracted from articles records (e.g. citations) and subfields cluster colour from bibliographic coupling helped me to evaluate the relevance while reading the abstracts. It is to be noted that the most impacted articles among the collection has high citation scores. However, the content might be irrelevant to answer the research questions. Hence, a well thorough evaluating and comparison process was performed to attain the influential articles. The analysis gradually reduced the collection to 51 articles, and after a final evaluation from comparison of content, the last outcome I extracted was 19 articles.



Model 1: Summary of the final results from the compilation process to the collection of core articles

4. Findings

In this section I will present my overall findings from both the bibliometric analysis and content reading relative to each other along with substantiating information from my theoretical literature.

4.1. Bibliometric analysis

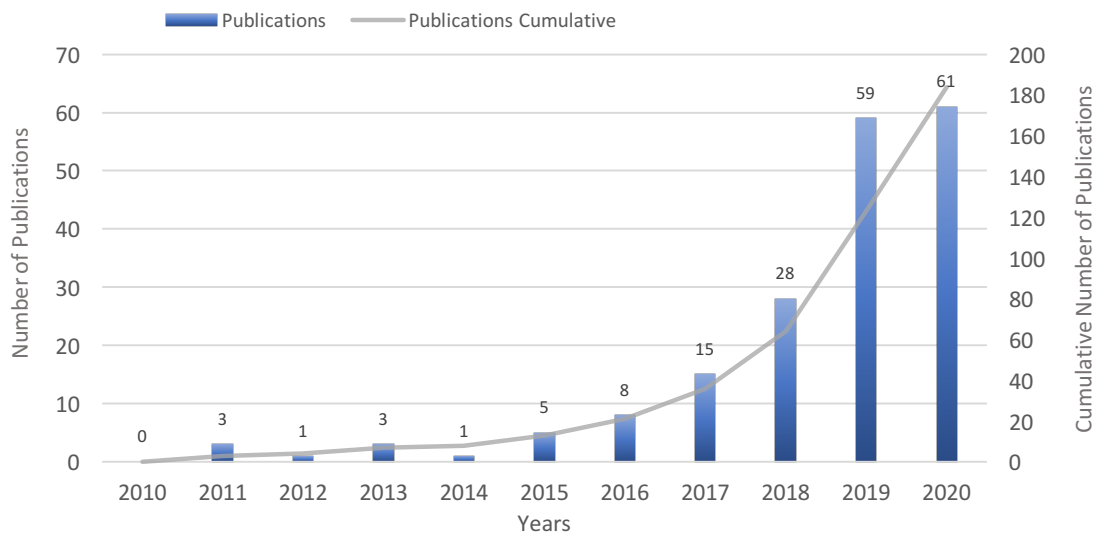


Figure 1: **Bar** chart of the digital transformation & strategy topic trend (N=184 articles)

Figure 1 shows the 184 publications on the topic digital transformation & strategy, distributed over the past decade. As displayed on the bar chart, the topic started fluctuating in the initial years with very few publications, before it gradually increased from 2015 to 2018. This indicates that there was a lack of publications on this topic in the early years, although the combination of digitalization and strategy studies has existed for a few decades. Organizations might have considered integrating technologies with their existing strategies in the past (e.g. business strategy, or IS/IT strategy under functional level strategy). This also might be explained by the fact that the concept “Digital transformation” attained more awareness amongst scholars and academics in 2011 during the presentation of “Industry 4.0” in Germany (Rojko et al., 2017). Thus, these concepts might have not been as commonly used before recently. Furthermore, during the past two years the number of articles on the topic increased dramatically. It is evident that the rapid exploitation of technology in organizations have significantly changed the traditional view on strategy by exploring and integrating the digital strategy concepts. This is clearly reflected in this literature trend today as the interest on the topic among the academics and scholars have increased. With only a few months left of the year 2020, the amount of papers on this topic peaked to the highest in August, indicating more research papers could be in process and published by the end of the year. Overall, a rapidly increasing trend is visible from the accumulated number of publication lines.

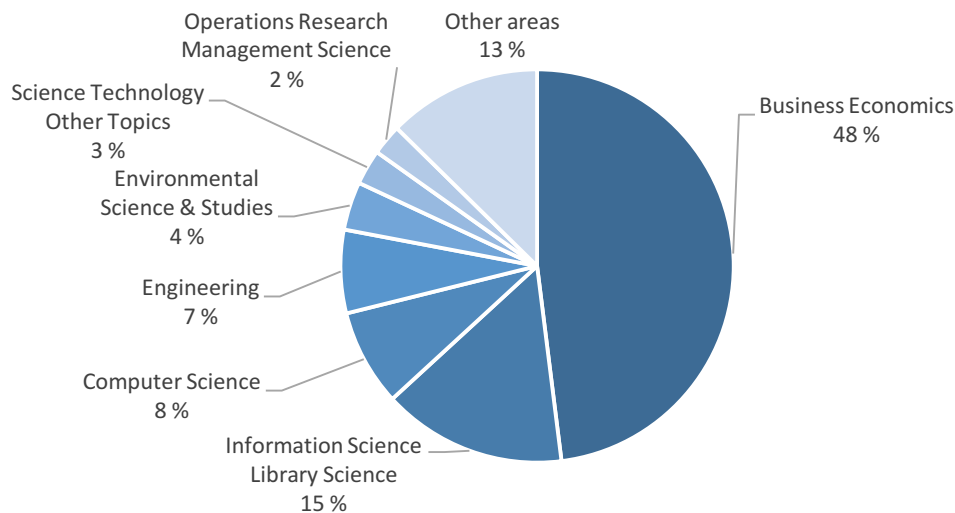


Figure 2: The publications research areas from Web of Science data

Figure 2 displays the different research areas of the 184 publication, where an article has been classified by Web of Science with one or more areas. Majority of the publications are grouped in business economics as one of their research area on Web Of science, with a total of 48 percent. The growth on this topic is increasing (figure 1) and mainly in business economics, as 133 articles were classified in this research area. However, since Digital transformation affect the entire organizations, different research areas or fields on the link between Digital transformation and Strategy are studied, either combined or independently. For example, a total of 34 percent of the publications included research areas such as information science library science, computer science, engineering and environmental science & studies. For instance, one of my core article by Korachi et al. (2019), belonged to the computer science research area only. The articles introduced an integrated methodological framework based on IT governance components for building a digital transformation strategy. Moreover, from my review of the publications data and abstract review, indicated lack of study on environmental sustainability, which substantiate the 4 percent of the publications including this area of research in context of DT strategy. As the world is aiming for an eco-friendlier globe, any digital transformation alignment with sustainability related aspects, could indicate an importance study mix for future research. Thus, suggesting more research in this area with DTS. The “other areas” of 13 percent, belonged to various fields with less than five occurrences, overlapping with other areas. These were for example, public administration, communication and operations research management science.

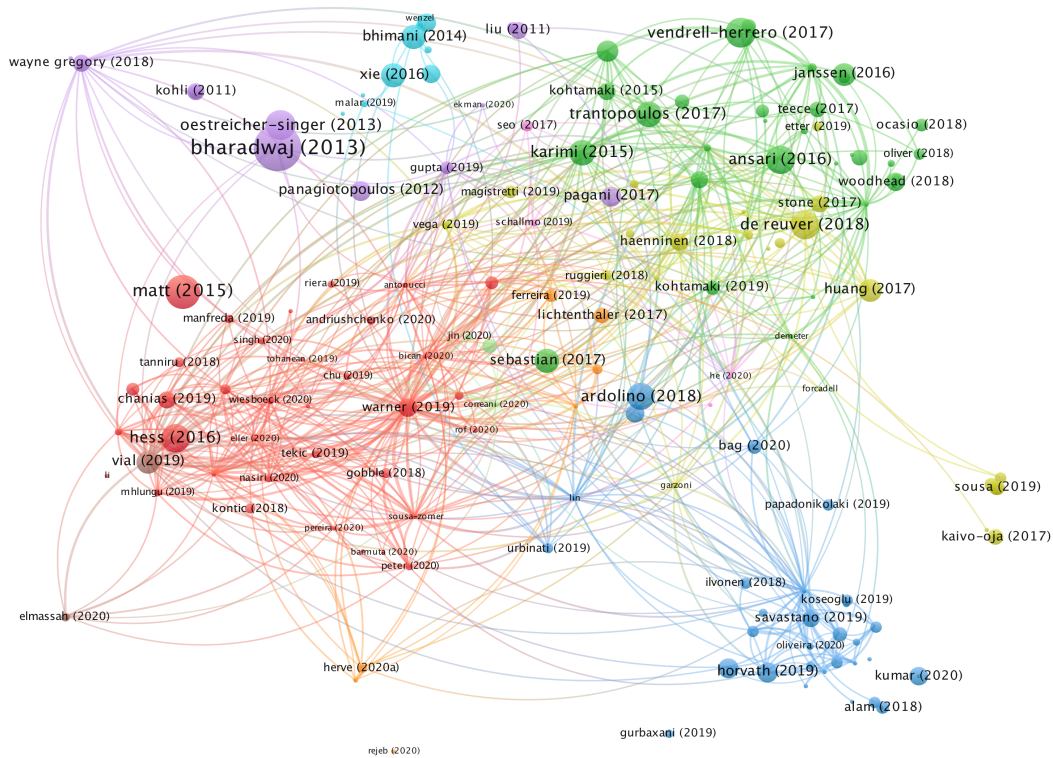


Figure 3 - Bibliographic coupling of 184 articles

Bibliographic coupling on documents was performed straightforward on VOSviewer with only adjustment with decreasing the maximum lines for better visual. First, I detected the outliers which is the distant documents with little to no connection with figure 2, and excluded them as they showed irrelevancy after review. The size of the circles represents the number of citations. The smaller the distance between two documents, the stronger the relationship with high similarity. The colour represents similar themes among the publications on DT and strategy. Based on the abstract review of the articles, an appropriate theme label was identified for each cluster colour. Overall, the clusters are intermingled. The red cluster represented research on strategy developments in the digital transformation domain followed with study in context with dynamic capabilities. Articles in the green cluster focused on DT and strategy in context with digital disruption and digital innovation. The blue cluster is somewhat separated from the other clusters and is focused on Industry 4.0 and acknowledges how strategy also plays an important role in Industry 4.0/DT implementation in manufactures. The purple cluster focused on strategy and business transformation on a more general based level in public sector, community and society. The light blue cluster focused on how big data and strategic changes causes value creation in organizations and firms. And lastly, the yellow, orange, brown, pink and light green clusters are intermingled among other clusters with focus on combination two or more of the mentioned themes. The

core articles for this study revealed to have the most influential publications in the red and green mainly, and one from the purple cluster, two from each the brown and the blue clusters as they reflected relevancy to answer the research questions.

No.	Title	Author	Year	Journal	Citations
1	Digital Business Strategy: Toward a Next Generation of Insights	A. Bharadwaj et al.	2013	Mis Quarterly	41
2	Agency theory: An assessment and review	K. M. Eisenhardt	1989	The Academy of Management	25
3	Digital Transformation Strategies	M. Christian et al.	2015	Business & Information Systems Engineering	23
4	Dynamic capabilities and strategic management	D. J. Teece et al.	1997	Strategic Management Journal	23
5	Firm Resources and Sustained Competitive Advantage	J. Barney	1991	Journal of Management	20
6	Options for Formulating a Digital Transformation Strategy	T.Hess et al.	2016	Mis Quarterly Executive	20
7	How Smart, Connected Products Are Transforming Competition	M. Porter et al.	2014	Harvard Business Review	19
8	Explicating dynamic capabilities: the nature and micro foundations of (sustainable) enterprise performance	D.J. Teece	2007	Strategic Management Journal	18
9	Digital Infrastructures: The Missing IS Research Agenda	D. Tilson et al.	2010	Information Systems Research	18
10	Digital Innovation Management: Reinventing Innovation Management Research in a Digital World	S. Nambisan	2017	Mis Quarterly	17

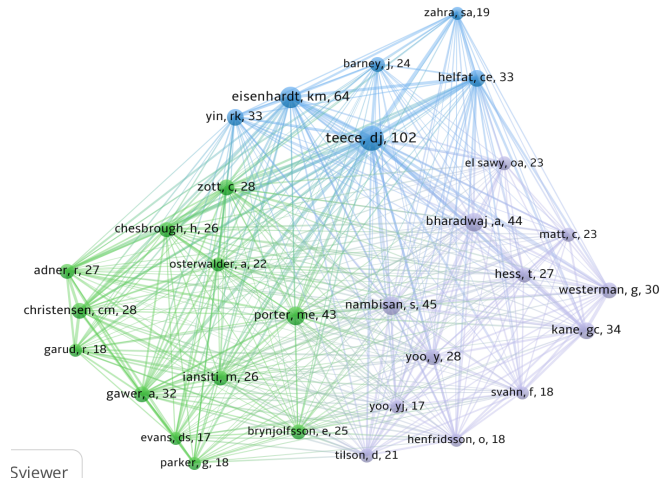


Table 1: Network visualization map with co-citation of references & Figure 4: Network visualization map with co-citation of authors

Figure 3 shows the 30 most highly co-cited, active and frequently used authors among the collection of publications, with a number of co-citation beside their names. From an examination of the authors name, indicated that the authors work belonged to strategic management literature and innovation field overall. The subtopics were strategy, innovation and management theories linked with digitalization, organizational change and innovation in a rapidly changing and highly competitive market. Moreover, the 10 most influential and co-cited references are displayed in Table 1.

From a review of the authors in the purple cluster, their work indicated study on digital technologies, digital transformation, IS literature & strategy. Three of the articles listed on the table are amongst my core articles. First, the article by Bhardwaj et al. (2013) on first place on the table, “Digital business strategy: Toward the Next generation of insights”, which has the highest co-citation of 41 times and is the most cited amongst the collection of 184 publications with a total of 439 citations on Web of Science. Second, the authors Christian Matt and T. Hess’s collaboration on two articles listed on 3rd and 6th place on the table, which also had the highest cited articles in my collection with 149 and 84 citations, respectively. Their close correlation will be explained in the content findings.

Moreover, the figure substantiates some of my theoretical literature review and the content findings in this study. Some of the author's work proves to be essential for the construction of a digital transformation strategy by how each plays a pivotal role in the strategy making process and its outcome. For instance, from the blue cluster, theories associated with internal strategy perspective are emphasized. From my theory chapter, the literature work and the authors by Penrose and Mahoney (2000) are absent, however Barney J., is visible in the middle, pointing to his extension theory on RBV & competitive advantages. Teece DJ's (102 co-citations) and Helfat's (33 co-citations) several works on understanding dynamic capability & firms' capability to adapt in the rapidly changing environment are highlighted in this cluster. Nevertheless, Eisenhardt K.M's. (2000) is emphasized in this cluster with the most citation count with a total of 64 co-citations. The three authors high contribution to the DT strategy topic is supported my findings. Dynamic capability can contribute to explain how firms build and sustain competitive advantage for DT (Vial, 2019), and how it can be used to study the mechanisms that enable firms to engage with DT to further enable strategic renewal (Vial, 2019; Warner et al., 2019). From the green cluster, some of the authors are associated with the external theoretical perspective such as Porter's works, with 43 co-citations, on positioning strategies & the five forces (1985) to gain competitive advantage from an environmental analysis. Moreover, reviews of other authors such as Gawer A., Chesbrough H., Christensen C., and Iansiti M., revealed diverse study on platform or business ecosystem linked to innovation, open innovation and disruptive innovation merged with digital technology and strategy theories. In addition, an internal yet external customer oriented (or centric) theories by Osterwalder, with 22 co-citation, on the business modelling concept and development of the canvas template is visible. Further, combined with innovation and business model, Christopher Zott with 28 co-citations is emphasized with high correlation to the blue cluster. Especially, his entrepreneurial strategy and business model design & innovation studies, indicates a linkage to DT strategy topic. This also supports one of my content findings from a case study done on digital transformation of SMEs (Bouwman et al., 2019), which revealed that companies experience higher performance level when more resource allocation are applied to business model experimentations and innovation. From my theory section, Adner R. is also visible to 27 co-citation on his work on the Industry 4.0 concept.

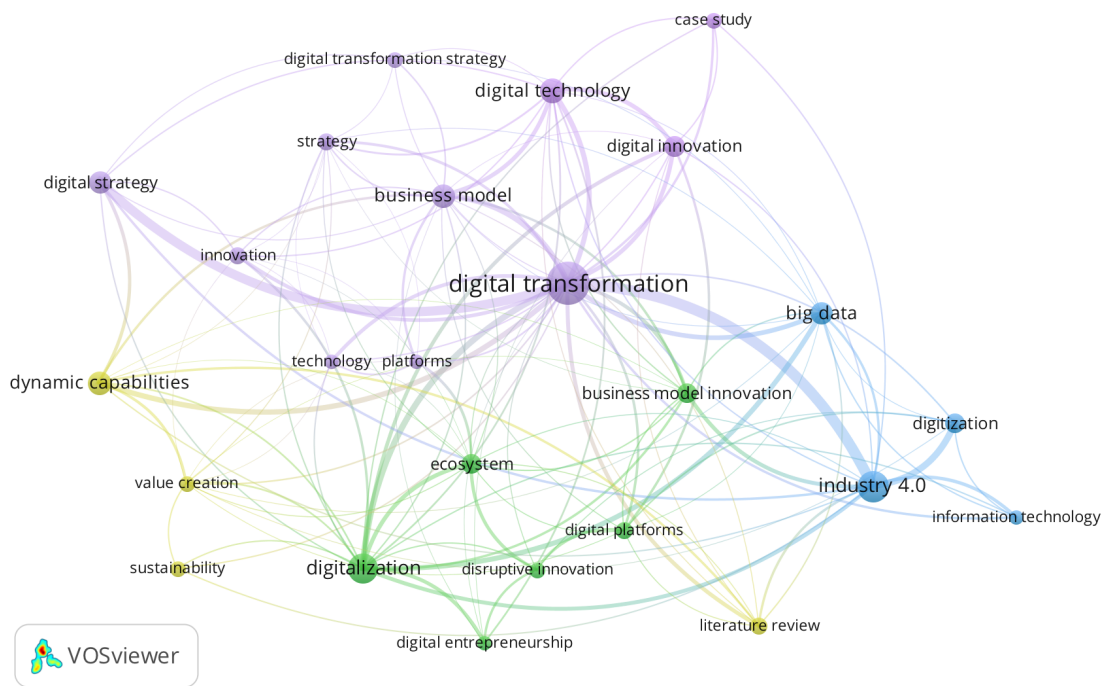


Figure 5: Network visualization map of keyword co-occurrence

A network visualization of keyword co-occurrence captured connections between the keywords by high thematic relevance. I chose to use full counting (Perianes-Rodriguez et al., 2016) of authors keywords and a threshold of 4, which identified VOSviewer identified 25 keywords (of 630 keywords) and four colour clusters. The circle size represents total number of co-occurrences of keywords in all the publications, (the larger the more occurrences) and the thickness of the lines indicates the total link strength between two keywords relative to the strength with other keywords (Van Eck et al., 2019). The list of the keywords with its number of occurrences and number of total link strength are displayed on table 2.

Keyword	Occurrences	Total link strength
digital transformation	59	92
industry 4.0	27	47
digitalization	24	47
digital technology	15	33
dynamic capabilities	14	18
business model	13	29
big data	12	20
digital strategy	11	16
digital innovation	10	20
digitization	9	16
business model innovation	8	20
ecosystem	8	23
digital platforms	6	14
innovation	6	12
literature review	6	12
strategy	6	22
case study	5	6
digital transformation strategy	5	7
disruptive innovation	5	8
sustainability	5	4
value creation	5	19
digital entrepreneurship	4	10
information technology	4	8
platforms	4	10
technology	4	11

Table 2: Occurrences and Total link strength of keywords

The main keyword, digital transformation (DT), can be seen in the purple cluster containing the most co-occurrence of 59 times and total link strength of 92. The surrounding words mainly belong to DT topic with various concepts and terms, yet most of them associated with *digi**. This cluster has a few words related to the internal environment of firm linked concepts such as *business model, strategy, innovation and technology*. Important words for this study such as *competitive advantage and resource-based view* are absent in this figure, indicating more research on these topics could be emphasized, with the knowledge on how important these concepts are for the strategy formulation and implementation processes and overall competitive advantages from a DT. The absence might also be explained on the fact from figure 1, bar chart, since the high trend on this topic only started off a few years ago, and a lot of research is yet to occur on topic of DT strategy. The main concept for this study, *digital transformation strategy*, with only 6 co-occurrences, is displayed at the top and is only linked to words such as *strategy, business model, digital technology, DT, digital strategy and big data*. This indicates that although most of the words on the figure are important for the DTS concept, not all have linkage and have given importance to in most of the publications, given the authors choice of main keywords. Arguably, the link strength between DT and digital strategy (DS) are stronger than to DT to DTS, which indicates that digital strategy is more frequently used with DT, which supports my content finding as most articles highlight or use this concept for the DT link to strategy. Also, with no linkage between DTS and literature review or case study, indicates this combination of pure study on DTS has not been studied to this degree among the 184 publications. However, I noticed from my review of the publications and abstract reading, there are empirical research and case studies on DT and strategy combined in relation to other fields of studies.

The figure has somewhat similarity to the identified bibliometric coupling subtopics. The green cluster displays words and themes associated with some of the external environmental factors such as *ecosystem, digital platforms and disruptive innovation*. However, *positioning* related strategy concepts mentioned in the theory is absent. My content finding indicated most DT strategy focused on internal firm specific concepts rather than outer, and there was a lack of focus on strategic positioning. However, most researcher refer to DTS as a business-centric concept (Matt et al., 2015), with a huge focus on the internal environment transformation aspect to formulate and implement a strategy. The yellow cluster shows the term dynamic capabilities with 14 co-occurrences along with the words value creation and sustainability. Which is an interesting mix with the perception that dynamic capability

focuses on the three capabilities (sense, seize and reconfigure) a firm should obtain to address the changing environment (Vial, 2019). While the two other words can be interpreted as environmental responsibility a firm should have in their creation of value. Indicating *maybe* DT strategy could give importance to this topic mix. The aforementioned fact on the important view on sustainability, further support this area of research as sustainability only have a co-occurrence of five amongst the 184 publication. Nevertheless, one of my content findings, by Ukko et al. (2019), found that sustainability is foremost neglected in most DT strategy (use of the concept “Digital business strategy” (DBS) in their study) studies. Further revealing that sustainability serves as a vehicle that facilitates the relation between DBS and financial performance for an organization, and noting the importance of obtaining information on sustainability of the business to reshape strategy. On the other side, *literature review* in this cluster can be seen on the bottom in the colour cluster, with strong link to DT. Only one of my core article had a fundamental and general study on DT with the inclusion of the digital transformation strategy related concepts (Vial, 2019).

Furthermore, the blue cluster displays words related to the *Industry 4.0* topic such as *big data, digitization and information technology*. The strong link between DT and Industry 4.0, indicates that both topic is highly connected among the other concepts and the size of the circle indicates a lot of publications in both topics with respectively, 59 and 27 co-occurrences from authors keywords. However, the content analysis of the DT strategy articles on firm related aspects of this study, revealed no mention of industry 4.0 in their studies. As stated in the theory section, Industry 4.0 provides the digital technologies and functionality firms need to accomplish a DT. Thus, indicating maybe study on this area should be emphasized in context with DT strategy to provide in-depth understanding of the technologies themselves. However, Industry 4.0 is mostly related to digital transformation of manufacturing, thus the concept itself used in these publications are related to DT strategy for manufactures.

4.2. Content analysis

In this section I will present the insights of my findings from the core articles content review. The sections are divided into following three parts; digital transformation & digital transformation strategies, internal RBV and external positioning.

The overall content analysis of the core articles revealed that a number of researchers have made significant contributions to this field, where most of them have emphasized the importance for further research on this topic as the study on the connection between digital transformation and strategy is diverse. The topic appears to be fragmented as the researchers point of view on the general DTS concept is varied, and to some degree limited under the type of firm, level of digital maturity, country, cases, specific topics or sectors. Yet, a bridge on the connection between digital transformation and strategy growth over the years is visible on the influence of resource based view and strategic positioning.

4.2.1. Digital transformation

As the Digital transformation (DT) trend is growing and getting stronger (Mugge et al., 2020), Tekic et al. (2019), acknowledges the many diverse perspectives on DT, describing it as a multifaceted phenomenon that has different aspects/implications for different organizations. For example, DT is a holistic form of transformation for pre-digital organizations, where fundamental changes occur both at an organizational and industry-level (Chanas et al., 2019). Even leaders in various industries use the concept DT inconsistently to describe different activities or operations with the use of technologies, thus exposing a general misalignment and divergent opinion of this topic (Warnet et al., 2019). Through a review of a large amount of extent definitions of digital transformation, Vial (2019) developed a valid definition of 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”* The given definition relates to the concept of digitalization (Hess et al., 2016), which includes the “broader individual, organizational, and societal contexts, acknowledges enhancement of DT even if unrealized, and uses in its core, the digital technologies provided by Bharadwaj et al. (2013) (Legner et al., 2017:301; Wacker, 2004:39; Vial, 2019). On the other hand, Warner et al. (2019) conceptualizes the scope of DT as *“an ongoing process of strategic renewal that uses advances in digital technologies to build capabilities that refresh or replace an organization's business model, collaborative approach, and culture.”*

4.2.2. Digital transformation strategies

Chanas et al.'s (2019) case study, emphasized the transition from deliberate managerial planning to emergent strategies in contemporary IS strategy research which led to informal

planning process and actual strategy making activities. The use of technologies (Matt et al., 2016) is the main factor that triggers the creation of a digital transformation strategy (Vial, 2019). The main finding of DTS is the interchangeable use of digital strategies on the topic of DT, to understand the many strategic corners of the organizational transformation to digital format. First, the traditional Information Technology (IT) strategy focuses on the efficient management of the IT infrastructure and application systems within a firm and treats technology in isolation, thus, when companies incorporate digital technologies into IT strategy, it does not equal a digital strategy (Matt et al., 2015; Hess et al., 2016). However, the aforementioned study by Korachi et al. (2020), somewhat contradict this statement, and suggested an integrated methodological framework based on IT governance components for building DTS with two systems, the digital strategy building system blocks which provides organizations specific guidelines, and the digital strategy evaluation system to evaluate the results and progress of the DT and improve DTS continuously. The “*Digital strategy*” concept is commonly used by the researches in my core articles to explain their research area to study DT and strategy (Sebastian et al., 2017; Schallmo et al., 2019; Mugge et al., 2020; Correani et al., 2020; Yeow et al., 2018). Sebastian et al. (2017) defined digital strategy as “*a business strategy, inspired by the capabilities of powerful, readily accessible technologies (like SMACIT), intent on delivering unique, integrated business capabilities in ways that are responsive to constantly changing market conditions*”. The authors further note that a digital strategy guides leaders’ efforts to create new value propositions given the definition. A digital strategy is valuable only if it drives resource allocation and capital investments. In contrast, Schallmo et al. (2019) proposed their own definition, “*a digital strategy is the strategic form of digitisation intentions of companies. The short and mid-term objectives are to create new or to maintain competitive advantages*.”. However, in their study the digital strategy is understood as a part or as an equal of the corporate strategy and dependent on the digital maturity. However, while the research by Sebastian et al. (2017) consisted of DT of entire companies, Schallmo et al. (2019) focused on the strategy making process as whole or as a part of the companies. Schallmo et al. (2019) also found different approaches to developing a digital strategy used amongst companies, such as traditional processes, selected agile procedures, or a combination of traditional or static techniques with agile/dynamic techniques.

In 2013, Bharadwaj et al. argued that it was time to rethink the role of IT Strategy, from alignment of a functional-level strategy directed by business strategy (subordinate), to a

fusion between IT strategy and business strategy into the concept “*digital business strategy*” (DBS). DBS arises from a resource based view and the dynamic capabilities and is defined as “*an organizational strategy formulated and executed by leveraging digital resources to create different values*”. This concept is also highly emphasized by several researchers from my core articles (Bhardwaj et al., 2013; Kontic et al., 2018; Vial 2019; Ukko et al., 2019; Nadeem et al., 2018). Researchers have even highlighted the DBS concept in their literature section, making it a new strategy chapter for strategists in today's businesses. The scope of DBS focuses on the corporate scope and raises performance implications of IT strategy to drive competitive advantage and strategic differentiation. DT is the DBS in action as DBS is only the blueprint that can lead to DT (Nadeem et al., 2018). However, DBS only indicates a firm's vision for future digital business models without any guidelines on how to transform the organization (Matt & Hess et al., 2015; 2016). As a result, a standalone company-wide business strategy called “*digital transformation strategy*” (DTS) came to light (Henfridsson and Bygstad, 2013; Chanias et al., 2019; Matt et al., 2015; Hess et al., 2016). DTS is defined as “*a blueprint that supports companies in governing the transformations that arise owing to the integration of digital technologies, as well as in their operations after a transformation.*” (Matt et al, 2015). DTS is separate from IT strategy, however, as DTS cuts across various organizational strategies, it should be aligned with them. Simply put, IT strategy is a system centric roadmap, while DTS is a customer oriented and business centric roadmap for the journey of achieving digital transformation. This concept is trending amongst several scholars/researchers from my core articles (Matt et al.,2015; Hess et al., 2016; Wang et al., 2020; Jin et al., 2020; Korachi et al., 2010; Tekic et al., 2020; Chanias et al., 2019; Correani et al., 2020). Digital transformation strategy is even defined differently, however some use the standalone business centric DTS concept by Matt & Hess et al. (2015; 2016). A case study of a pre-digital company called AssetCo's digital transformation with the use of IS strategizing, strategy-as-practice literature (structuration theory) and DTS, revealed several distinctions between DTS and information system (IS) strategy. First, DTS affects the entire organization under development such as the social structure with rules. Second, it is developed by different stakeholders and crafted “bottom-up” by opening strategy processes. Third, it requires distinctive governance (Chanias et al., 2019). Thus, providing somewhat support that the scope of this concept takes on more than digitization of resources, acting as a “*unifying concept for integrating all coordination, prioritization and implementation efforts of a firm's digital transformation efforts*” (Matt et al., 2015). An interesting finding of DTS in a pre-digital company's actual implementation is that one version of DTS eventually led to

another version of DTS, as new social structure (rules and resources) enabled new business processes (Chaniyas et al., 2019). Mostly due to the structural properties not being stable. Digital technologies exploitation benefits organizations, however, they also change and transform products, services, operation processes, organizational structures, management concepts and even reshape the entire business model (Matt et al., 2015). To structure these changes in strategy, a digital transformation framework was introduced with four common dimensions, use of technology, value creation, structural change & financial, and eleven questions, independent of industry or firm. It supports the organizations in the assessment of their current abilities and the formulation of a digital transformation strategy.

Furthermore, some more findings revealed several important aspects related to the concept DTS. First, DTS is a strategic issue rather than technical, and comprehensive changes are required in the four dimensions by Matt et al. (2015) (Wang et al., 2019). Second, given the definition of what a strategy formulation is, a framework of building blocks developed to ensure consistency between implementation and formulation of DTS, proved that strategy formulation should identify elements of a business model that must be modified according to the new strategy and the scope of the digital transformation (Correani et al., 2020). Given the strong interconnection between strategy and business model, implementation of a digital strategy or a DTS also means rethinking and reshaping its business model to support the DT of one or several business models of the companies (Matt et al., 2015; Correani et al., 2020; Shallmo et al., 2019). One of the challenges with DTS also proved to be failing to have consistency between formulation and implementation. However, Correani et al. (2020) further suggested that their framework did not consider much focus on the external environment and how firms respond to changes from outside. Third, the actual practices from a case study proved that the development of DTS should be continually revised and reinvented with new approaches and practices such as agile approach consisting of trying and failing (Chaniyas et al., 2019). DTS crafting, processes and activities was discovered as a highly dynamic process involving iterating between learning and doing in terms of digital strategy making.

4.2.3. Internal RBV analysis

One of the key factors to determine a firm's potential to become a digital organization is investment (Kontic et al., 2020). Correani et al. (2020) found that to implement DTS, their three company case studies relied on internal data sources such as web/apps and IoT devices

connected with products, and external data sources such as social networks, ecosystem and third parties (e.g. consultants, installers, insurance companies or original equipment manufacturer). In addition, it revealed that internal sources were used to capture the most critical data such as inferring additional insights from external partners.

Resources

When investing in DT, value focus such as the firm's main product line and size of the firms are mentioned as crucial dimensions for the transformation (Matt et al., 2016). For example, the integration of digital technologies into products is one of the key drivers of DT, as they support existing products and services or reengineers processes (Hess et al., 2016). For established or traditional companies, DT resources are mainly based on new and existing resources in the companies. From the case study by Chantias et al. (2019), realization of new, digital products and services had a bottom-up approach with use of digital innovation and collaboration with start-ups. And further a top-down approach with guidance of top management was used for digitization of existing products and services, the main lines of the business. The sources of value creation and capture for future vision of a DBS in context to DT, focus on leveraging physical and tangible resources from strategic management (Bhardwaj et al., 2013). Strategy and resource management affect each other, where resource management is a central activity within a firm (Mugge et al. 2020). The main resources utilized for digital transformation is the digital technologies or IT, which enables new business opportunities, supports requirements, improvements and can even solve various business issues for firms (Hess et al., 2016). Customers can be distinguished between existing customers, where expanding customer base can increase in revenue streams, and new customers which is enabled from availability of new data and information (Correani et al., 2020). Customers can also be both internal such as a firm's other business units, and external such as end users, with respect to the company.

The use of technologies such as SMACIT (Sebastian et al., 2017) changes the value creation with opportunities for current or existing products and service portfolios, and addresses the ability for a firm to exploit the new technologies, and contains the strategic role of IT for a firm and its future technological ambition (Matt et al., 2015; Hess et al., 2016). In the context of DT, a combination of technologies is relevant. The internal perspective relies on necessary and central DT resource enablers such as increased flexibility of the IT infrastructure and

extensive data usage in terms of big data (Chaniyas et al., 2019). The resource, data, is mostly the enablers of DT by a process of constant refreshing and collection of new data for feedback loop which further enable firm capabilities for a successful implementation of a DTS (Correani et al., 2020). Diffusion of digital technologies comes from established and widely used technology solutions, new technology solutions, or as an innovator by creating and introducing these solutions into markets (Hess et al., 2016). For example, new digital technologies can build a strong ecosystem and develop property standards by restricting competitors access to customers. However, Vial (2019) states the importance of first defining the attitude towards technology and their aim from its use. For example, to determine if firms want to become a market leader for competitive advantage in terms of technology usage or focus on established standards with the aim to fulfill business operations. In the case of SMEs that undertake digital transformation, studies revealed that these companies performed better as they allocated more resources and spent more effort on BM experimentation or on strategy implementation, which led to higher firm performance (Bouwman et al., 2019). This case study also highlights the presence of equifinality (*identifying various configurations of causal conditions to produce the outcome*).

Assets: Sebastian et al. (2017) acknowledged two important complementary technology-enabled assets which the study of 25 companies needed to consistently deliver new digital services and successfully execute a digital strategy. First, an operational backbone which supports efficiency and enables operational excellence. Second, a digital services platform (DSP) to support business agility and rapid innovation of critical digital offerings for customers. Ambidexterity was found (Vial, 2019) as DSP must link up with and rely on an operational backbone to provide, for example, customer data, invoicing and related transaction processing services (Sebastian et al., 2017). Similarly, operational backbone needs the DSP to bring innovative new services to the market rapidly. Both assets are complementary, where they invariably must link with each other “*to deliver the efficiency, reliability, speed and agility that the competitive environment demands*”. Agility is often used to adapt to the changes in the environmental conditions. The two assets found are differentiated by the fact that both run on some form of cloud instead of technology, and both give rise to different sets of managements practices.

An ecosystem consists of developing new networks, partnerships and communities, and to understand and develop a digital ecosystem, system thinking is a discipline which helps

organizations to address the problems and challenges on a structure-level and link up with different stakeholders (Senge, 1990; as cited in Hoe, 2020). True customer value is believed to be delivered through collaboration across boundaries among partners. Digital ecosystem is crucial for survival in a digital world. Hoe (2020) found that from an external perspective, organizations could stay ahead of the competition by practices such as developing digital ecosystem through applying system thinking. As radical changes occur in firms' core capabilities from a DT, partners such as stakeholder, customer partnerships or digital partners, can support and supply them with obtaining new data, capabilities, knowledge and competencies needed in the process of DT (Correani et al., 2020). A study done by Nadeem et al. (2018) on e-commerce companies, revealed that there is an interrelationship between DT, DBS and operational capabilities (OC) where they share external collaboration of ecosystem of digital platforms in common. In today's world, external partners are important for co-creation of value and increasing the firm performance. For instance, in the Correani et al.'s (2020) case, Microsoft was a highly relevant player in the digital ecosystem as their knowledge and experience helped to increase the three companies (ABB, Vondafone and CHni) likelihood for DT success by supporting them to develop IT infrastructure to sustain the DT of their businesses. Thus, companies usually hire consulting firms to assist them in developing and deploying fit-for-purpose organizational capabilities for pursuing digital business strategy that further leads to digital transformation (Nadeem et al., 2018). However, they could often end up investing a huge amount in implementing digital technologies instead, and would still be unable to achieve effective digital transformation throughout the organization (Nadeem et al., 2018). Outsourcing the technological processes is another option. Both outsourcing and partnership can lower initial investments and distribute the risks more widely, however both always attach to the risk of losing a required competency and dependency on a third party. Therefore, to gain a competitive advantage for DT means to keep the processes and knowledge required for DT internally (Hess et al., 2016).

Clarity of the scope of DTS is important to be effective and avoid inefficiencies, for example, from Correani et al.'s (2020) three case studies the companies scope were for example creating value for customers through software and platforms enabled services, develop new services around predictive maintenance and intelligent logistics through the digitalization of its fleet, where both changed their business by creating digital platforms that collect data and leverage them to enable new high added-value services for their customers. Digital platforms are enabling cross-boundary industry disruptions, and thus inducing new forms of business

strategies (Bharadwaj et al., 2013). Digital platforms are used to collect data from external and internal sources from products, and further to provide services. Data transit via data platform to business to business (B2B) and business to customer (B2C) end customers and players in the ecosystem (Correani et al., 2020). One important aspect is the redefinition of value networks through one of three main mediation strategies, disintermediation strategy, a remediation strategy or a network-based mediation, which firms can implement when using digital technologies (Vial (2019). Customers have also become co-creators within the value network through for example social media. Thus, if firms choose to enable customer engagement with digital technologies, they also enable co-creation of value with the external environment and customers (Vial, 2019). Another change from DT is value creation occurring through digital channels by implementing digital technologies. Finding new sources of revenue through value creation is an indispensable element of a DTS, especially crucial, when designing new digital products and services (Hess et al., 2016). In the case of media companies, Hess et al. (2020), found that new revenue models may be needed to generate revenues from digital BMs extending their value-chain activities and generating transaction revenues, to remain competitive in the online world. Changes occur as well for the firm's sales and distribution and sales channels, for example by a creation of Omnichannel strategy or software coordination of activities across organizations (mostly in manufactures) (Vial, 2019). From Matt et al.'s (2016) case study on media firms, they found that content platforms as a technology enabled option such as social media platforms, was their major asset for interaction between users and thus profiting from their content. Scaling options are more based on alliances and partnerships, as shared assets with other firms come through as they assess their unique drivers of advantage in digital settings, in the business ecosystem across different traditional industry boundaries (Bharadwaj et al., 2013).

Leadership: For understanding the advantages in the digital industries, strategic leadership has become more necessary for digital transformation in traditional firms (Warner et al., 2019). One of the key factors to determine a firm's potential to become a digital organization, are proactive leadership (Kontic et al., 2020). When it comes to who oversees the transformation, Hess et al. (2016) suggested two factors; top management such as CEO, CDO or CIO to closely work together overall, and the commitment of the necessary people to the strategy. This also was suggested by Correani et al. (2020), on the need for new professional roles when revising the activities and processes. Vial (2019) talked about creating new leadership roles such as a new CDO position that foster a close collaboration between

different functional levels to influence a firm's organizing logic for the implementation of DT strategy (DBS), yet what the actual work of CDO consists of is not well known. Therefore, Vial (2019) suggested further study on the contributions of different leadership structures to better understand the implication of the new positions which also enables the building of dynamic capability. Although leaders are embraced to take on DT to conserve their competitive advantages (Hess et al., 2016), some firms have the wait and see attitude, due to managers' limitations on knowledge, tools, fear or the will to undergo such complex transformation (Mugge et al., 2020).

Companies also reorganize their IT units as integrators around services, which eventually reflects changes throughout the entire company, especially to enable new requirements for integration across vertical business units (Sebastian et al., 2017). With the use of technologies, managers are required to assess the role of their IT departments and how proactive and innovative they are in their approach to new technologies. (Hess et al. 2016). However, Chaniyas et al (2019) suggested that the IT department (essential stakeholder) may not be a core competency, and should not take the leading role of the strategy making of DT. DTS is a business-oriented, customer centric and transforms the whole organization, and not only the IT department with running operations (Matt et al., 2015). From Chaniyas et al.'s (2019) study case on the pre-digital company (AssetCo), they found there was a lack of competencies and willingness to drive any form of digital innovation there because of risk, stress and complexity to their system and security concerns. Yet, IT people do also have more expertise in understanding where and how new digital technologies can be used and how they would impact the business model (Bouwman et al., 2019). Technology led firms promote often bottom-up approach where small groups of employees conduct “*unofficial, unplanned-but-tolerated experiments that can result in identifying new pathways and more than just new technology-oriented digital transformation*”, and consist of hard-skilled professionals from the pre-digital era, however risk is associated with having conservative mind-set of employees and very risk-averse leaders as change is not easy as fear of failure and where companies from higher margins need time (Tekic et al., 2019). With a high demand of existing B2B vs B2C processes, gives employees experience of tension due to challenge of path dependence, legacy resources, cognitive limits, and identifications of being either B2B or a B2C, and relative to the latter, prioritising demands of customers (Yeow et al., 2017).

Digital mature organizations are most likely to create functional groups to enable DT (Mugge et al., 2016). Creating a cross-functional collaboration is an important element of DT (Vial, 2019). For substantial changes, it's recommended to create a separate unit that has an independence from the rest of the firm. This unit will have a relative degree of flexibility through innovation with access to existing resources in the firm. Another way is by creating a cross-functional team within the current firm. This would be reasonable if it does not cause drastic change to the existing products, processes or skills. A digital services platform relies on cross-functional development teams that apply user-centered design techniques to develop and assemble reusable plug-and-play business and technology components (Sebastian et al., 2017). Small cross-functional teams use iterative, agile methods to build and test new services with minimum viable products. For example, a Devops model for reducing cycle times for launching innovations which Amazon used to create new code every 11 seconds. However, practitioners should research under which conditions an organizational design performs better between cross and digital venture (Vial, 2019). In the case study by Chainas et al. (2019) , adaptive approaches were observed mostly in predefined settings such as cross-functional discussions or network meetings, where freedom to discuss approaches to strategy making that are open and creative were possible. Kontic et al., 2020 found that potential areas to improve in their DT study was collaborative learning in organization and employees' technology experience. Proud to be analog firms are often characterized by having risk-averse leadership style and selection of employees (Tekic et al., 2019). Business model led firms however have a strong leadership with a top-bottom approach based on strong communication, support and resolving interia.

Capabilities

Capabilities are the key ingredients in realizing a DBS, where managerial and operation capabilities are the main and necessary dimensions to actualize DBS and for creating financial performance (Ukko et al., 2019). Capabilities factors such as the firm's digital leadership, agile and scalable operations, digital enabled customer service unit (CSU) and digital artefacts, can present organizational capabilities required for pursuing the digital transformation to align with the changing external environments (Nadeem et al., 2018). Operational capability. in the digital era comes from how firms integrate, obtain and embed digitality across the business, its process, and strategy (Ukko et al., 2019). It requires explicit elements such as resources and practices. But also, tacit elements such as know-how, skill sets and leadership. As business operations get affected by integrating digital technologies,

complementing and combining existing capabilities are necessary for change. Exploiting unused technological capabilities can create economies of scale through innovation (Kontic et al., 2020).

Key factors such as digital-first mindset, digitized practices, empowered talent, data access and collaboration tools are important to become a digital organization (Kontic, et al., 2020). To develop a digital mind-set as part of an organization's digital culture, disciplines such as personal mastery, mental models, shared vision and team learning may be very useful (Hoe, 2020). However, a poor culture with the resistance to change can cause conflict with the leaders (Mugge et al., 2020). That's why for DT it is important to have a digital culture aligned with the firm's ambitions for a DT. Wang et al. (2019) emphasize that DT involves the ongoing strategic renewal of an organization's collaborative approach and culture. For example through, improving the digital maturity of the workforce as a dynamic capability and management innovations by building new digital governance capabilities to digitally transform internal collaborative approaches and with the importance to navigate innovation ecosystems emerging from radical business model innovation.

Managerial capabilities: One of the main capability needed to function in a firm is the managerial capability to support the development and implementation of digitality, (Ukko et al., 2019). *Leaders need to formulate and execute digital strategies, thus seen as a high-priority management challenge considering the complexity of DT that affects many or all segments within a company.* (Hess et al., 2016). Reaching the digital capabilities also means supporting each department (e.g. mainline functions of R&D, operations) and their goals with the overall organizational goals (Mugge et al., 2020). From a case study of E-commerce businesses, Nadeem et al. (2018) suggested that digital leadership, new roles and governance that facilitate rapid DT, should acquire more recently updated skills and competencies with introduction of new leadership roles. Managers' ability to utilize and operate with digitality throughout the firm such as in employees' skill sets and mind-sets, business strategy, workplace, and the crucial step of transition toward digitality as organizational culture are emphasized (Ukko et al., 2019). A good management team will increase with good knowledge of the digital tools, their DT strategy and digital skills in their digital environment. From the case study of DT projects in three companies with a strategic alliance, Microsoft, Correani et al., (2020) found that in one company, professional roles such as digital advisors and a new digital team was created within the existing IT unit. While in

another company, employees were upskilled to enhance their capabilities. Moreover, a neural network training unit was set up to enable operators to use the intelligent systems, and where the projects required employees to be able to train AI and conversation designers. Many of these views show that DT may lead to employees taking on new roles outside of their functions that affect decision-making processes (Vial, 2019).

It takes time for managers to identify and assess both existing technology capabilities such as training current staff, and new competencies such as hiring new employees (Hess et al., 2016; Chantias et al., 2019). As DT enables complex business problems, a digital mindset and analytical skills for digital workforces are needed (Vial, 2019). Thus, investment in training to give employees the necessary skills, for both existing and future workers for digital workforces are relevant to reach DT success and to give attention that measure the benefits of DT (Vial, 2019; Mugge et al., 2020). One of the crucial steps Hess et al. (2016) acknowledged is how managers plan to acquire and identify new competencies for DT such as hiring new employees. It is important to know that not everyone can be replaced such as trained employees (Mugge et al., 2016). However, to accompany employees through DT is a challenge itself as it extends beyond the domain of human resources (Karimi and Walter, 2015; Singh and Hess, 2017; as cited in Vial, 2019). Managers play a key role in managing conflict, by building a corporate culture for the encouragement of innovations, tolerance of failure and to allow each top management team member to own & express his or her own opinions with *rigorous collaboration* among members to reach a consensus (Wang et al., 2019).

Yeow et al. (2017) found that communicating a clear strategy from top management to all levels of the organization was important to avoid tension between the managers and employees. Mugge et al. (2020) strongly point out that communication greatly influences the success and speed of DT, thus the leaders should communicate the vision of the transformation and any changes that occur frequently and powerfully across the organization. Digital leaders should foster timely and open communication. In the case of AssetCo, CEO was the main driver who sharpened the profile of the organization in internal and external communication (Chantias et al., 2019). But not all those in management shared the mind-set of the CEO. Some were reluctant to change, believing that the organization lacked digital competencies and skills. Based on a study by examining 156 Chinese enterprise on the relationship between DTS theory (Matt & Hess et al., 2015, 2016) and the Top Management

Teams (TMT) conflict management theory, the U-shaped moderating model (the performance between pressure and performance) of Top Management Team's (TMT) cognitive conflict suggested that DTS improves organizational performance, indicating that enterprises should pay attention to different opinions of TMT members during the formulation and implementation of the DTS (Wang et al., 2019). Their study proved that to improve the DTS decision making quality and to improve organizational performance, it is vital for maintaining moderate cognitive conflict.

Digital maturity is a capacity to respond and to discover potential for a digital strategy process ability (Mugge et al., 2020), where Vial (2019) argues that DT can help to understand how firms can attain digital maturity, "as they design and maintain these higher-level mechanisms that enable adaptability through successive waves of digital innovation". Mugge et al. (2020) distinguished between digitally mature and digitally developing organizations in context with the transformation process. Both types of organizations invest in new technologies, new business, staff such as data scientists and even move their products and services to the cloud. However less digitally mature struggle with where and how to invest their resources. DM org. does not simply automate current business processes, but invests in new technologies to build new businesses. Digitally mature organizations revealed to align resources, both financial and human, with strategy (Mugge et al., 2020). In the AssetCo case by Chaniias et al. (2019), the strategic objectives required diverse resources built on the organizations digital competence such as skill-sets linked to digital economy and digital innovation. According to Tekic et al. (2019) the four presented generic strategies differentiation should help managers with their resource management allocation and the growth of new capabilities, creating a pathway to increased performance levels and higher returns on the upfront investment in DT. The authors concluded that digital maturity is a natural process achieved through commitment, investment and leadership, where digitally mature companies set realistic priorities and make digital maturity happen through hard work.

Furthermore, to build and sustain competitive advantages organizations should be more innovative. Kontic et al. (2020) acknowledged the complexity with innovation due to the changing customer needs, extensive competitive pressure and rapid technological change. In contrast to ordinary tasks, dynamic capability is emphasized in context with DT to strive in this environmental turbulence or competitive environment (Vial, 2019). The main idea is to

adapt to changes through sensing, seizing and transforming. Another capability proposed by Vial, is the integrative capabilities for DT to support digital platform and ecosystems. Moreover, how communication and coordination take place in the context of digital platforms and ecosystems is important to

4.2.4. External positioning analysis

Some believe it is no longer guaranteed for commercial success by being the first one on the market, rather how to innovate with lower costs, and how to retain talents (Kontic et al., 2020). Externally oriented strategies have its advantages as these strategies integrate competencies and data from outside by reshaping their business models to include key partners such as suppliers, distributors, customers and even other developers, from outside the boundaries of the enterprise (Mugge et al., 2020). For instance, Sebastian et al. (2017) found that companies articulated one of two types of digital strategy, customer engagement strategy or digitized solutions strategy. Customer engagement strategy revealed to achieve greater customers' satisfaction and loyalty by providing innovative superior, personalized and integrated customer experience, increased product integration and creation of integrated solutions, which in turn builds a competitive advantage. This strategy uses Omni channels for customers' and facilitates communication approaches. For example, customers can have access to their team or workers through video, text or email, leveraging social media to develop communities of patients in health sectors, or even investing data analytics to identify needs for personalized outreach. On the other hand, the digitized solution strategy, driven by R & D efforts, combines existing competencies with the capabilities offered by digital technologies to understand and point out where they could serve customers. This solution integrates a combination of products, services and data, with an aim to reformulate a firm's value proposition. By invariably collecting and using additional data (e.g. through sensors), this solution creates a recurring revenue form ongoing services rather than through sale of products. This breakthrough or shift is not an easy task and considered hard for established firms to learn and to handle (Mugge et al., 2020). Digitally mature organizations are emphasized in this area while this would be informative for digitally developing organizations on which initiation strategy to pursue. However, Sebastian et al. (2017) found that the best strategies guided both of their proposed strategies, as their strategic choices and operational decisions. Although their study revealed overall that there is a natural synergy between the two, they suggested that it is essential to commit to one digital strategy or the other as it pays off and helps leaders to make tough choices related to resources allocation.

Although, it did prove that success with the chosen strategy eventually also led to outcomes associated with the other strategy. Most importantly, their study revealed that it is easier to articulate a digital strategy than to execute it. On the other hand, Tekic et al. (2019) introduced a typology with four types of digital transformation strategies which differ in the primary motivation and target of transformation, leadership style, importance of skills like creativity and entrepreneurial spirit among employees, risks and challenges faced in the process, and the consequences of failure. The disruptive DT strategy belongs mostly to disruptors, newcomers to the industry/sector and typically start-ups with the aim to substantially change the value proposition in well-established markets (e.g. Amazon, Facebook, Alibaba). The other three DT strategies belong to established organizations or firms. The companies with business model led strategy, usually come from a competitive environment with the pressure to survive. The goal of this strategy is exploration of new opportunities by understanding new logic in doing business, observing similar successful companies in other geographical locations or in similar sectors such as banks or insurance. DT in such firm's fills in the tech gap only once the new business model is understood. Reside in B2C sectors and in industries with low barrier to entry such as retail, telecom or wholly digital such as media. Their objective of the digitalization is exploration of new opportunities through new or existing products, people and platform connections and optimization. Especially when they lead to creating completely new products and opportunities to become a platform or a valuable platform add-on. Technology led DTS aims to optimize by exploitation of existing resources inside existing schemes by using new technologies for optimization and cost reduction. Overall, they try to use digital technologies to solve discrete business problems, which offer positive results in the short term, yet where the improvement is limited and marginal. Proud to be analog DTS have goals to identify parts of a business that could be digitized to modernize their brand identity by mixing their rich heritage and tradition with modern lifestyles and desires, for instance through communication channels and quality controls. However, by not jeopardizing the core of the business that must stay analog. Brand is an asset, and innovativeness is a risk averse factor. The most valuable resources in these mainly B2C companies are products valued by customers because they are analog such as handmade, human inspected or built exclusively in small or large batches. Examples are chocolate, jewellery, suits, Rolex etc. Their business model assumes niche clients accept mostly robot--free or goods produced with little automation such as jewelry, chocolate and shoes. And finally, Schallmo et al. (2019) presented four generic digital strategies with a focus on digitalization and transformation of the business model. The

strategies focus on two dimensions, deliverables, such as material services or intangible services, and roles, such as creation of service or building a platform. The product provider and the service provider generic strategies focus on, respectively, provision of material services such as products and intangibles such as services and information, in either directly or on a platform or by a platform provider. The two other strategies are product and service platform strategy, where focus is on building and operating a product platform or a service platform. In both of these proprietary/third party intangible services are offered individually or as a bundle on a platform. However, in practice, the strategies can be combined, for instance an online retailer offering (product) insurance and financing (service) on the side. These generic digital strategies can support the classification of competitors and their digital strategy, and thereby create a distinct competitive advantage.

5. Discussion

In this section I will present the insight of my findings with respect to the theoretical literature to understand DT strategy, and the influence of internal and external views on digital transformation strategy.

That Digital transformation (DT) is more about a strategic issue, strategy itself, people and organizational processes, rather than technology (Kane et al., 2015) is supported and explained by many researchers, scholars and leaders through their studies. As the aim or purpose of a digital transformation (DT) is different for every company, so is the strategy making process. Especially depending on the business model and strategic vision of the company of a transformation to digital format. The high correlation between the three core articles from table 1 and the keyword relation regarding digital transformation and strategy proved to substantiate the content analysis on the connection between DBS, DTS and digital strategy. The main insight is that DTS studies are fragmented and require a considerable amount of research on this topic to understand how each component affects the whole transformation process. However, the amount of challenges of digital transformation's impact on the company's infrastructure and overall operations, have made organizations and scholars rethink and create new combinations of the traditional strategies. The traditional concepts such as business strategy, IS/IT strategy or corporate strategy seem to gradually disappear when talking about strategy in context with DT. Instead, the "digital strategy" concept is emphasized, however, it is interchangeably used by the researchers, authors and practitioners

with the trending phenomenon's "digital transformation strategy" DTS and "digital business strategy" (DBS). Even DT is interminably used by leaders. Only one study took upon the integration of IT governance to build a DTS. As DBS focuses on the corporate scope and proposes a future vision for the new digital business world, DTS focuses on a standalone business-centric strategy. The distinction between the three can be explained by the objective, scope and the several definitions introduced by the researchers. Digital strategy can be classified as the main concept, while DBS and DTS are more of a sub concepts. However, given the definitions of some researchers the scope of digital strategy is limited or even on corporate level, and focus is on digitization part of the products and business operations, and not fully on the transformation of an entire company. Thus, the concepts used for strategy in context with DT, is still its infancy. To date, most literature (books) emphasize "digital strategy" (Rogers, 2016; Perkin, 2018; Gupta, 2018) in connection to DT. Although the findings revealed other concepts such as DTS and DBS, the purpose of the transformation remains the same, although different approaches to developing a digital strategy are found. Overall, the research on strategy and digital transformation link is explained through different aspects of the topic with use of different theories, empirical studies, cases, concepts.

DTS proves to be a highly dynamic and iterative process, and requires a lot of thinking ahead when adapting to the rapid changes which occur over time. Mintzberg et al's (1998) conceptualization of the strategy concept to the five P's and strategy as a pattern split into three approaches, clearly still applies for digital transformation strategy (DTS). The belief that the twenty first century strategies have more objective analysis with more formal and deliberate processes, seems to not be the reality with making of a DT strategy. DTS making proved to actually move from deliberate managerial planning to emergent strategies, in context with IS strategy research, and increased attention is given to informal planning processes and actual strategy making activities with several episodes (Chaniyas et al., 2019). Thus, this study gives support to original Mintzberg's formation theorem as it applied for DTS, when it was eventually absorbed by the strategists who initially had the formal and deliberate planning processes. In the light sustained competitive advantage (SCA), how a DTS making transitioned over several episodes, transformations and even a new DTS under several phases (Chaniyas et al., 2019), highlights the uniqueness of a value creating strategy for each company (Barney, 1991). As the goal of the DT is to digitally transform a firm, firm heterogeneity focus could be applied in the stages of DTS making to obtain SCA. Even though guidelines on the initial steps can help managers and firms with making a DTS (Hess

et al., 2016), the actual answers, decisions, value and outcome of a DT, of course, varies. Therefore, as managers undertake such complex planning, the value creation of a SCA strategy can eventually occur throughout the process. Even new approaches to DTS making through agile and dynamic techniques consisting of trying and failing, could be of value. However, managers and firms should rely on research data, competitive intelligence and formulations strategy analysis in initial stages, as too many errors may be at cost in today's intense competition (David et al., 2017).

The bridge between strategy and DT in this study consists of resources and capabilities and how firms choose to utilize, reconfigure and integrate them to strategize a positioning. This in turn creates a value creating DTS, thus maximizing the benefit of the whole DT process. One of the main findings is the dynamic capability contribution to digital transformation through sensing, seizing and reconfiguring to attain a higher level of sustained competitive advantage (SCA). Operational capabilities which consist of ordinary tasks are gradually being replaced by advanced technologies, for example in the form of cloud. Thus, with the rapidly changing environment and economy affecting businesses, dynamic capability is viewed as the response or necessity for competitive survival through these capacities. For the most part it is all about timing when it comes to sensing and seizing the opportunities the market or industry should offer. The most influential resources for digital transformation are the digital technologies themselves. Data is considered of high value and as the enablers of DT. As data can be replicated and used without diminishing its value (Rogers, 2016), it is considered a dominant source for SCA. However, if the strategic resources, such as valuable data collected from customer engagement, are the same across all the competing firms, it cannot be a source of SCA. Thus, the timing can play a significant role as how fast a firm for instance collects customer data, and further applies it as part of its value creating digital transformation strategy. The more data collected, the more valuable the data is considered for firms to differentiate themselves from their competition and how they produce, operate, utilize and manage the collected information. The constant collection of data also creates a feedback loop which further enables firm capabilities for a successful implementation of a DTS (Correani et al., 2020).

From the external perspective with Porter's generic strategies, this study revealed there is little to no findings or mentions of these positioning strategies on product differentiation, low

cost or focus strategies for digital transformation directly. The main reason is that competition is no longer defined by industry boundaries or traditional products, but by data allocation and software integral to reach customers, in mostly all businesses. Rather, the findings emphasized externally oriented, yet customer-centric strategies such as customer engagement strategy with Omni channel experience and digitized solution strategy. In contrast to Porter's strategies with focus on product quality or low/best cost advantages, these strategies are highly focused on internal and external value creation by utilizing data, deep knowledge of customers' needs & their satisfaction and finding solutions for easier ways to gain customer data, which all in turn creates competitive advantages. Leveraging digital technology to build customer loyalty through facilitating communication between customers and a company proved to have a great estimate in profitability for firms. However, one can argue that the traditional strategies still apply within or beside these strategies, where data extracted from customer interaction creates low or differentiation strategies but with continuous change of how customers interact with the firms. Although Porter argued that focusing on more than one strategy was a recipe for strategic mediocrity and below average performance, these new types of strategies for DT have natural synergy and could be combined or even led by one another as an overall strategy (Sebastian et al., 2017). However, to help leaders to make tough choices with resource allocation, committing to one strategy overall is suggested, thus still complimenting Porter's view. Furthermore, in context with the type of business, strategies such as business led strategy, technology led strategy and proud to be analog led strategy, came through as a unique way to divide the DT strategies. However, they could be classified (Porter, 1985; Hooley et al., 1998). The disruptive DTS companies seem to position themselves with a rapid innovation strategy, as early adopters focusing on the new digital technologies and having nothing to lose as a start-up with agile approaches. The technology led DTS have a more focus on a low-cost strategy, thus focusing on the traditional approach to positioning by Porter. The business led companies, and proud to be analog companies focused on differentiation DT strategies yet DT not for positioning but to better themselves internally, as most of their products or services cannot be digitally reconfigured or changed. Thus, these companies have sustained advantages through the uniqueness of their products which for many companies is hard to replicate, pointing to VRIO. Moreover, the product and service provider strategies follow the traditional yet modern approach to differentiation or low cost by using their resources to position themselves. However, through platforms such as online businesses to gain competitive

advantage. These digital strategies create distinct competitive advantages as they try to focus on transformation through platforms.

Overall, the traditional positioning strategies seem to take on digital platforms with an ecosystem approach to position themselves in context to DT. However, some companies, such as some retailers in the business model led companies, still focus on low cost strategy to gain more customers. This type of strategy required scale and operational efficiency (Gupta, 2018) overtime and does eventually lead to displacement of consumers from one firm to others, thus considered destructive overtime (Islami et al. 2020). Thus, a more focus of DT on differentiation strategy could be the optimal choice to increase firm performance and bring profit. The cause of these changes of strategy types and main focuses are most likely due to the expansion of the scope of a business where both the competition and the industry boundaries are defined more broadly than before (Gupta, 2018). Therefore, advantages come from these strategies with breakthroughs of business models that include key partners such as suppliers, distributors, and customers from outside the boundaries of firms. However, these changes are not an easy task for digitally developing organizations, especially even harder to face for established organizations with existing assets and stakeholders demands, as rapidly evolving technology causes disruptions and emerging business models creates uncertainties ahead. It is all about strengthening the core for these old firms, unlike start-ups who have an opportunity of starting from scratch with no debt, direct competition or assets.

To achieve sustained competitive advantage (SCA) in this today's business, comes from connection and complementary product offering (Gupta, 2018, p.22) mostly in platforms, such as the mentioned Omnichannel, and ecosystem. For established enterprises, the existing products and services in a firm creates an open door to create and extend their resources with the use of digital technologies. By using a top-down approach (Chanias et al., 2019) to digitize their products, they create new sources of SCA. However truly SCA products and services are created through a bottom-up approach (Chanias et al., 2019) through digital innovation and collaboration with start-ups, for example with connectivity, aggregation or interconnection approach (Adner et al., 2019). These processes create new business models, produce new functionality and opportunities for value creation. This type of firm diversification is a great way for firms to gain competencies that can lead to SCA, as stated by Penrose (Mahoney, 2000), where the type of competences comes from complementarity of products, but also product-market positioning and resource-based competition. The

important complementary technology-enabled assets to deliver new digital services and to execute a digital strategy are as operational backbones and digital service platforms. However, to which degree these assets are competitive advantages can vary across the firms. As all companies are most likely driven by these, however they do complement each other and together can deliver an efficient and a highly agile system which the environment demands.

Another way to achieve SCA, is by network effect of creating digital platforms, for example by collecting data from external and internal sources from products to further create complementary products. These mostly data transit through B2B and B2C to customers and players in the ecosystem (Correani et al., 2020). These platforms are enabling cross-boundary industry disruption causing companies to redefine their value network. However, opportunities also arise as digital technologies enable a co-creation of value with the external environment, for example by a disintermediation strategy (Vial, 2019) to enable direct change among e.g. customers, of a value network. Therefore, by creating digital platforms through networks with especially complementary products, firms obtain competitive advantage when they implement a value creating strategy. The positioning strategies through these platforms, as mentioned, are the trend today. Thus, a DT strategy focus on platforms increases the DT success regarding optimal benefits. Not all resources can hold the potential of SCA, and that for a long period of time due to competition and imitation. Thus, dynamic capability is emphasized in this area to strive to achieve or maintain SCA by continuous adaptation to changes in internal capabilities, competencies & resources, as well as external trends & events, and effectively create strategies that capitalize these factors

Furthermore, the internal environment in regard to collaboration between teams, people and especially leaderships is a dynamic process of management interaction with its employees for DT. The view on IT units is differentiated by the company's perspective on who should be in charge. Traditionally, IT units were the expertise in the area of technologies. Cross functional collaboration, however, should be emphasized as a core competency in companies to achieve a successful DT outcome. As all the functional departments leaders or heads come together to work on a DT strategy for instance, they increase the chances of including and coordinating across the entire company.

Although there are many companies still in its fancy and indecisive on transforming their old companies to new digitally driven entities, they do acknowledge the rapid growing digital

economy taking over most of the market position and crossing industry barriers. The chances of bankruptcy or low profitability in the long run are higher than ever. By sensing and seizing the opportunities to evolve, are for their own benefit and for the people to take the initiative to plan, strategize and transform in time. How firms utilize, reconfigure and organize resources and capabilities, and use the final products or services to position themselves in a market, industry or even across the industry boundaries, plays a pivotal role today in maximizing their competitive advantage and to gain the benefits of digital transformation and its value creating strategy.

6. Conclusion

Digital transformation strategy (DTS) is an ongoing area of research with an exponential increase of published studies mainly in the last two years. There is a necessity for an organizational strategy that aligns and supports the transformation process of an organization or a company to create competitive advantages from assessment of customers' data and demand. The predominant view of strategy as the main driver of DT, rather than technology itself, is highly emphasized. DT strategy is created through a comprehensive analysis of both the external and internal environment to attain a value creating strategy. The resource based view (RBV) ideas and extensions, and digital platform in ecosystem approach to positioning with a customer centric logic has an influential effect on DTS, which also increases the DT successful initiatives. The world keeps changing and for organizations to survive, they need to keep changing with it. A great example for why that is, is the recent sudden wave of COVID-19, triggering digital transformation or digitalization as an essential process for many companies to survive today. An organization can never rest on one solution. They must constantly cycle back and look for opportunities and seize them in time, and renew its strategies and the processes that implement them. Indeed, the best organizations build adaptation and improvisation right into their culture so it becomes their second nature to expect change yet again. Thus, strategy creation for DT will require more iteration and several episode phases in the rapidly changing environment. The DTS making is not a straightforward nor an easy task for any organization. It varies across type, size, maturity and scope of the organizations, where the top management (e.g. CEO, CIO) plays a central role through the whole DT strategy process. In this customer driven economy, it is necessary for organizations of all types, to find various ways in which they can improve the quality of the service they are providing for the customers. Thus, it is important that leaders conduct their

business in a way that amazes people with their products which most likely today, is technology driven.

Although DTS mainly focuses on a business centric approach to digital transformation, there are more to it. The general DTS concept, without any of its definition provided by the researchers, could be extended along the DBS and its future vision. Considerable amount of research in both internal and external environments are required, as both perspectives complement each other. A strong focus point for any DTS is being customer centric, following customers' needs and availability of products and services, rather than positioning through price. Not to mention the break of industry boundary conditions, creating network effects through the increasing use of technologies across the globe. The degree of competitive advantage of firms' resources and capabilities used in DT is varied, yet depending on their effort on how they reconfigure, modify, implement and utilize the digital technologies during their transformation which most likely will give them competitive advantage. Moreover, DTS could be complemented by other strategy perspectives, and other theories such as behavioral theory of firm.

Just as "9" is perceived from one company's point of view and a "6" from another firm's view on the opposite side, the strategic perspectives to digital transformation has a similar approach to how one can look at the emerging phenomenon "*Digital transformation strategy*". Competitive outlook may increase the chance for survival, however a well-defined and well-formed strategy from exploring positioning strategies used by other successful organizations and how they allocate resources can create advantages and opportunities a company can benefit from for a profound long-term success. Note, with the pandemic making peoples' everyday life difficult, it is more crucial than ever to think about digital transformation to some degree. As Penrose emphasized all the way back in 1959, "firms are institutions created by people to serve the purposes of people" (Mahoney, 2000). This could of course vary accordingly to the company itself and their perspective on this rapid changing environment caused by the global integration and exploitation of digital technologies. However, the rules of the game have unquestionably changed for the strategist, where they must find a way to strategize which works for their company.

7. Contribution

A holistic and comprehensive examination of digital transformation and strategy analysis is proposed. This study gives importance to the influence of some of the resource based view (RBV) and generic positioning theories on digital transformation strategy (DTS). As more of the strategy making pre-process and throughout the process of a DT, is focused on both the internal and external resources and capacities, the more benefit a company creates as the environmental changes occur. Thus, a value creating DT strategy can maximize and benefit company, by focusing on competitive advantages companies can create through dynamic capability.

8. Limitations

As for many research studies, limitations were noted throughout this study. First, this study was performed by a single student, thus the number of analysed works is limited and prone to a degree of bias. Second, this study aimed to investigate the overall DTS studies, thus most of the studies are restricted in context of countries, other domains, rules and regulations etc. Third, most study cases had focus on traditional companies, however there were distinctions between digital economy and traditional economy related companies. Fourth, IS literature was applied by several researchers in context with DTS, which this study did not focus on, referring to the theoretical literature. Fifth, the distinction between small, medium and large companies was not considered. Overall, this study contributes to a general view of this research area, with a somewhat higher degree of generalizability.

From the bibliometric method, several limitations were noted. First, use of only one platform (Web of Science). Second, highly cited articles versus newly published articles with low citations. Some of my core articles were recently published articles with few citation and less information, thus increasing the probability for spurious co-citation connections (Zupic et al., 2015). Third, assessment of articles as a reflection of the degree of one's prior knowledge and understanding. Fourth, the use of the concept “digitalization” was not included in my WOS search. Although the concept is interchangeably used with digital transformation, as different researchers claim it has the same meaning, this study separated this in the beginning and only included “Digital Transformation” connected terms and words. However, few of my core articles used the term digitalization. Lastly, the findings were mostly compared to the

theoretical literature by looking for conflicting and supporting findings, thus with respect to extant knowledge, the degree of reliability of my discussion is supported.

9. Future agenda

The emerging concept DTS, have opened new opportunities to study and develop new aspects of both the DT and strategy theories. Especially, with the digital technologies accelerating at a high speed amongst companies and even crossing traditional industry boundaries. For Digital transformation is an essential part to consider for many companies, with the environmental changes of high volatility, unpredictability and even today with COVID-19 pandemic. Thus, a study on digital transformation strategy & strategy making in context with the high volatile external environment is recommended, especially in established and traditional companies. Furthermore, the interchangeable use of/within both, the digital strategy and digital transformation concepts, creates another gap. A clarity of the DT and strategy related concepts could be emphasized in an independent study to steer clear of any confusion of which concepts discuss about an entire transformation and which talks about an integration of digital technologies as a part of an organization. Setting a clear concept, can help scholars and practitioners to use the concepts in the right context. The researchers focus was primarily on the internal factors, such as resource based view, for formulating and implementing DT strategy. There was absent of the external perspective of Industry 4.0. The complexity of Industry 4.0 could be aligned with DT and DTS in company or firm context. Thus, further analysis on this mix of topic could help organizations to understand the complexity of the digital technologies, which originates from the fourth revolution, and its interconnection to create transformation within the company or firm

Appendix I – Core articles

Author & Year	Article Title	Use of digital strategy concept
Bharadwaj et al., 2013	DIGITAL BUSINESS STRATEGY: TOWARD A NEXT GENERATION OF INSIGHTS	Digital business strategy
Hess & Matt et al., 2015	Options for Formulating a Digital Transformation Strategy	Digital transformation strategy
Matt et al., 2015	Digital Strategy and Digital Transformation	Digital transformation strategy

Sebastian et al., 2017	How Big Old Companies Navigate Digital Transformation	Digital strategy
Yeow et al., 2018	Aligning with new digital strategy: A dynamic capabilities approach	Digital strategy
Kontic et al., 2018	Strategy for Digital Organization: Testing a Measurement Tool for Digital Transformation	Digital business strategy
Schallmo et al., 2019	DIGITAL STRATEGY - INTEGRATED APPROACH AND GENERIC OPTIONS	Digital strategy
Chaniias et al., 2019	Digital transformation strategy making in pre-digital organizations: The case of a financial services provider	Digital transformation strategy
Warner et al., 2019	Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal	Digital transformation strategy
Vial 2019	Understanding digital transformation: A review and a research agenda	Digital business strategy/Digital transformation strategy
Ukko et al., 2019	Sustainability strategy as a moderator in the relationship between digital business strategy and financial performance	Digital business strategy
Bouwman et al., 2019	Digitalization, business models, and SMEs: How do business model innovation practices improve performance of digitalizing SMEs?	Digital strategy
Wang et al., 2020	The effect of digital transformation strategy on performance The moderating role of cognitive conflict	Digital transformation strategy, digital strategy
Jin et al., 2020	Digital transformation strategies for existed firms: from the perspectives of data ownership and key value propositions	Digital transformation strategy
Tekic et al., 2020	From disruptively digital to proudly analog: A holistic typology of digital transformation strategies	Digital transformation strategy
Gurbaxani et al., 2020	Gearing Up For Successful Digital Transformation	Digital strategy
Mugge et al., 2020	Patterns of Digitization A Practical Guide to Digital Transformation	Digital strategy

Correani et al., 2020	Implementing a Digital Strategy: Learning from the Experience of Three Digital Transformation Projects	Digital strategy
Nadeem, et al., 2018	Editorial: Digital Transformation & Digital Business Strategy in Electronic Commerce - The Role of Organizational Capabilities	Digital business strategy

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