At The Intersection Of Digital Transformation And Dynamic Capabilities

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Abstract: *Given the transforming power of digital technologies, digital transformation (DT) is driven by strategic direction for developing dynamic capacity (DC) that enables organizations to respond to these environmental challenges. This article aims to identify the current state of academic literature on DT and DC and thus identify and analyze its knowledge base through bibliometric analysis and quantitative content analysis. The research is based on the Web of Science. Digital technologies such as the Internet, cloud, digital technologies, AI, blockchain, and IoT are the most referenced. Industry studies such as e-banking, governments, SMEs, manufacturing 4.0, the role of IT departments. The role of innovation and external perceptions of innovation is highlighted in several articles. In general, they try to explain how resources, capabilities, and management technologies are needed to respond to the environmental challenges that put business models to the test. There is an open field, with much collaboration between authors and countries, and without a reference researcher, as well as a still robust link with new information technologies, strategic renewal, digitization, resources, capacity, and knowledge*
Key Word*: Digital Transformation, Dynamic Capabilities, Systematic Review.*

I. Introduction

In times of radical change, such as the moment we live due to the COVID-19 pandemic, the strategy acquires a high degree of importance. Other new organizational forms also gained prominence during this period, including the explosion of home office tasks and other collaborative arrangements. The role of corporate offices is questioned, and the massive distribution centers shaped large urban centers' peripheries. Terms such as dark stores, an on-demand delivery platform that allows quick access to consumer goods such as supermarkets, make them take on the concept by supporting their online business in non-pandemic times. Authors as El Sawy, Malhotra, Park, and Pavlou (2010) describe digital transformation (DT) as a "confusing, complex and chaotic phenomenon" consisting of an increase in environmental turbulence, the speed of organizational change, and the intensification of the omnipresence of digital technologies.

Organizations are mainly undergoing a minute change in all aspects of administration, departments, whether by layoffs or reassignments, new roles as much not seen in the world of business and governments. Organizations must adapt and explore changes in their business environment while seeking new opportunities by developing these transformations through technological, organizational, or strategic innovation. To survive and thrive under significantly changing conditions, companies must develop their "dynamic capabilities" (DC) to create, extend, and modify how they seek economic sustainability.

All this suggests that, in the recent past, many traditional corporations' performance has left much to be desired. The crisis of confidence in many traditional business models has been the answer, which many companies worldwide have embarked on significant shakeups to transform their corporate culture and strategies.

This article aims to identify the current state of this academic literature on DT and DC and thus identify and analyze its knowledge base through bibliometric analysis and quantitative content analysis. Focusing on DT and DC as research themes and their state of the art will sometimes be treated as constructs or a theoretical perspective. Previous studies have used bibliometric analyses for the theme, including De Mendonça and Andrade (2018) on DT in Portugal; Gerster's research (2017) deals with DT and information technology (IT).

Fernandes, Fleury, and Silva (2019), in a literature review, describe the relationship between DT and DC development by organizations and point out the progress of research on the subject that primarily incorporates strategic direction for the development of DCs that allow companies to respond to market disruptions in the digital age. Among the elements necessary for this transformation are, among others, the construction of an innovative culture, capture, and analysis of data, an interactive workspace with a greater flow of knowledge between teams, more agile decision-making that helps the development of DC for DT.

Cruzara and Frega (2018), in a review of the Literature of DT and industry 4.0, point out that this will cause significant changes in organizations, especially the integration and complexity scenario promoted by the combination of several technologies that previously acted separately. The authors warn that one of the great

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difficulties of this transformation process is its technological basis, mainly addressed in computer science and engineering, while the area related to business and management is neglected.

This research is motivated by two research questions: (1) What recent contributions have guided the research agenda to DT & DC? (2) What emerging themes in the literature are likely to prepare the scenario for future work? This article is structured as follows: A theoretical review on DT &DC in the next section. In section 3, the method and how the data is described, there is an explanation of the research terms adopted to recover the data and tools used to analyze them. Section 4 provides the results of the analyses. Finally, section 5 presents the results of this article, concluding the feasibility of DT & DC and a discussion on the limitations of studies for new research and other promising approaches.

II. Theoretical Background

DT is one of the search terms in vogue. With COVID-19, many companies were driven to accelerate this DT, even for the sake of survival. Bernardes, Borini, and Figueiredo (2019), in a special issue editorial on innovation, highlight DT's issue in particular topics on industry 4.0 (I4.0), the management of smart cities, and knowledge-intensive services. Another editorial by Nadeem, Abedin, Cerpa, and Chew (2018), emphasizes the importance of digital strategy and organizational capabilities in its success. The authors point to its addition to the automotive industry, banking, telecommunications, healthcare, oil and gas, and manufacturing sectors.

An understanding of DT involves capturing the value of innovation in the digital economy, as a considerable portion of leading innovative companies to have a business model emphasizing artificial intelligence (AI) and digital platforms and the generation of new models, and the disruption of established markets (Lichtenthaler, 2018).

Digital Transformation

DT is a broad term and can refer to digitization (modest initiatives such as creating a digital service or migrating from the mainframe), modernizing by some technology, usually IT, or moving toward the development of new business models, usually digital, so it is chaotic as described by El Sawy et al. (2010). Thus, the term is part of a simple "digitization" to a "digital business transformation." For an initial illustration of the theme, we have the works of Perides, Vasconcellos, and Vasconcellos (2020) that present that recent technological advances are revolutionizing behaviors and habits in society with new services and products based on these new digital technologies. For Sánchez and Zuntini (2018), there is a profound change in which the world moves from the industrial era to an era based on intelligent and connected products, causing profound impacts in organizations and society itself, as defined by Perides et al. (2020).

For Perdomo and Lemos (2019), the digital economy era has significantly impacted the business world. The authors also cite exponential technologies, the Internet of Things (IoT), mobile, cloud computing, and AI, in which companies adapt and reinvent themselves to sustain their growth or survival. Perdomo and Lemos (2019) call on the reconfiguration process based on new technologies to adapt to the digital economy of digital transformation.

Mendonça, Andrade, and Souza Neto (2018), similarly, describe the use and importance of what they call elements of DT (IoT, Big Data, and AI) as support of DCs. Andrade and Gonçalo (2019) work with analytical capabilities that can be leveraged from the DT strategy and point out the innovation capacity, strategic DT, and analytical capabilities, whether these dynamics or absorptive as the basis of DT. Liu, Wang, and Zhang (2021) shoe the role of industrial big data in promoting DT with a theoretical framework, what the authors call "organization drivetrain." The authors identify three affordances of industrial big data in the organization, namely developing data-driven customized projects, provisioning equipment-data-driven life cycle services, establishing databased trust, and determining affordance actualization actions driven by technology and market.

Lin, Sheng, and Jeng (2020) develop a DC-based maturity assessment framework through combinative capabilities towards innovative manufacturing transformation. In addition, the study incorporates dynamics capability into the maturity model assessment developed by the Singapore Economic Development Board for empirical analysis and identification of critical capabilities with influencing factors, which are included in a framework to fill the research gap.

Concerning this DT, Perides, et al. (2020) state that traditional organizations need to tailor their processes and products quickly. To complicate this equation, Cintra, Braga, Rapini, Santos, and Barbosa (2019) pointed out that there is no consensus on technologies related to I4.0 and DT to constitute a new consolidated dominant paradigm. Instead, they point out that there is evidence of an insurgent technological revolution related to the new General Purpose Technologies (GPT), among which it is possible to include I4.0 and DT technologies.

Baptista, Meirelles, and Albertin (2019), who highlights the assimilation of knowledge of agile practices in project management (e.g., scrum) as a critical aspect of the innovation process DT in organizations, present another view of DT. This requires teams aligned with the organization's culture, with new processes and routines with improved project delivery time efficiency improvements. Finally, Warner and Wager (2019) recall that DT

is an ongoing process of using new digital technologies in the day-to-day life of an organization and that it recognizes agility as the central mechanism for the strategic renewal of an organization's (1) business model, (2) collaborative approach and, eventually, (3) culture.

In Monteiro and Pinto's (2019) research, a program transformation model was used based on acceptable innovation practices, policies, and dissemination models complemented with program management approaches. Through the documental analysis and the data of administrative services obtained, the authors confirmed a progressive DT.

Parviainen, Tihinen, Kaariainen, and Teppola (2017) point out that digitization has been identified as one of the prominent trends that change society and business. Digitization causes changes for companies due to the adoption of digital technologies in the organization or operating environment.

Karimi and Walter (2015) cite the role of the Internet and digitization that have fundamentally changed traditional print media companies' traditional operating models. The concepts of disruptive innovation work in explaining the success, or not, of companies in responding to disruptive innovations and the role of dynamic capabilities in responding to digital disruption.

Borgers, Chesbrough, and Coins (2018) use open innovation (OI) to formulate innovation policies that include DT with a critical trend.

Hess, Matt, Benlian, and Wiesbock (2016), in research conducted with senior German executives, face the challenge of dealing with the opportunities and risks of the strategies. Kathan, Matzler, and Veider (2016) analyze the sharing economy's potential in producing a long-term transformation in consumer behavior and how this change can affect business models. Finally, Agarwal, Gao, DesRoches, and Jha (2010) treat the North American health system and the enormous potential for improving quality and reducing health costs.

Trantopoulos, von Krogh, Wallin, and Woerter (2017), in work on Swiss companies, highlight the vital role of IT for innovation in companies and connection to external sources (data access systems and network connectivity) as customers, competitors, universities, and consultants, for the innovative success of companies. In DT's context, the study results demonstrate how companies should coordinate strategies for providing external knowledge with specific IT investments to improve their performance in innovation.

Singh and Hess (2017) work with so-called Chief Digital Officers (CDOs) as new executives at the top management level of companies undergoing a DT. They point out the types of roles, skills, and competencies they should have for each type of function.

For Andal-Ancion, Cartwright, and Yip (2003), the potential for new IT to transform business is often not realized because organizations do not have clear guidelines on when and how to use them better with no strategic alignment with IT. Finally, Hansen and Sia (2015) address mobile and social media's impact, in which organizations need an online presence to reach customers and the challenges arising from this hybrid environment, such as omnichannel retail.

Parviainen et al. (2017) developed a DT model that consists of four steps, starting with the company's positioning in digitization and the consequent definition of goals, then analyzing the current state of the digitization goals. Then a roadmap to achieve the goals is defined and implemented in the company.

Felsberger, Qaiser, Choudhary, and Reiner (2021) investigates the impact of the implementation of I4.0 with specific emphasis on DT on the sustainability dimensions of European manufacturing industries. The authors propose a framework to identify the implications of I4.0 on the reconciliation of the firm's existing and new DC, competencies, and market requirements to achieve competitive advantage.

Gurhan-Canli, Sarial-Abi, and Hayran (2018) review a paper on branding, culture, and globalization from a behavioral perspective. The authors identify conceptual gaps in the literature and discuss new realities in the macro-environment (e.g., political issues, DT, environmental concerns) that can affect the interaction between culture, brands, and consumers globally.

Sebastian, Ross, Beath, Mocker, Moloney, and Fonstad (2017) show us that new digital technologies present opportunities and threats in organizations' cases on DT journeys. The authors identify two digital strategies: customer engagement and digitized solutions, which provide a DT path. The authors also describe how a company with a traditional business model can combine these elements to navigate its DT.

Sherer, Meyerhoefer, and Peng (2016) work with institutional theory to explain electronic health records' adoption in outpatient medical practices. In this way, it sees the impact of the institutional effect of government policies and industry standards on the adoption of critical technologies. The healthcare industry is highly institutionalized, subject to multiple regulatory forces, professionalism, and network externalities that can influence adoption decisions.

Dremel, Herterich, Wulf, Waizmann, and Brenner (2017) in a German case study on substantial organizational transformation and new organizational structures and business processes when using big data analytics capabilities. The authors present recommendations for how traditional manufacturing organizations can successfully introduce big data analytics and master organizational transformations.

Schallmo, Williams, and Boardman (2017) present facilitators and DT's definition and introduce a structured approach in phases, activities, and results. The main findings are that while DT is a widely known concept, it lacks a structured approach to business models DT.

Szalavetz (2019), in an article that researches advanced manufacturing technologies as a facilitator of innovation for DT, reducing risks related to the decentralization of research and development (R&D).

Kohli and Johnson (2011) work with companies in traditional sectors, oil, and natural gas, which are typically lagging behind digitization but are facing pressure to cut costs and perform digitization. Kronblad's (2021) dissertation on the impact of digitalization in the legal industry.

Bjorkdahl (2020) discusses 26 leading manufacturing firms' digitalization efforts, the difficulties encountered, and how they can be handled. It shows that many firms are far from ready to benefit from digitalization and are mainly focused on achieving greater efficiency through digitalization rather than pursuing a growth agenda. This imbalance is because of the difficulties of identifying profitable configurations of competencies, assets, and data generated from digital technologies, orchestrating them, and exploiting them in an agile organization.

Powell, Horvath, and Brandtner (2016) rely on data from the online and offline presence of non-profit brick-and-mortar organizations in the San Francisco Bay Area to illustrate how a DT shaped these organizations identify some new methods that can be used to study organizations using web pages. The authors develop three perspectives on sites from an organizational perspective: identity projects, tools, and relational maps.

Digital Transformation and Dynamic Capabilities

In this section, our focus will be on DC, so terms such as resources or capabilities can be handled in specific contexts but in an introductory way. Resource in the broadest sense is anything that the organization can attract to achieve its goals. A resource is a tangible, intangible, or human asset upon which the organization can sustain itself in a narrower sense. The organization's resource base includes tangible, intangible, and human assets (or human resources) and capabilities to control or preferential access.

Capacity can be operational or dynamic and refers to performing a particular task, function, or activity. This refers to the ability to perform a task, function, or activity in at least a minimally acceptable manner. DC is the organization's ability to create, extend, or modify its resource base purposely and consists of standardized and poorly practiced activities. Dynamic management capacity refers to managers' ability to create, extend, or modify the organization's resource base.

DC plays an essential role in reacting flexibly to an increasingly rapidly changing environment. One of the possible DC definitions refers to the firm's ability to quickly integrate, build, and reconfigure internal and external competencies addressed to the environment. For example, organizational skills change and denote management and organizational processes or current learning patterns through practice and learning assets or through firm-specific assets constituted in individual integrated clusters or groups to change the organizational resource base. DCs can also open up new strategic alternatives or paths for the firm.

Pavlou and Sawy (2010) see dynamic capabilities as a source of competitive advantage and, more emphatically, the work of Kane, Palmer, Philips, Kiron, and Buckley (2015) that declare that it is the strategy, not technology, which drives DT. Other authors such as Karimi and Walter (2015) show that the theory of disruptive innovation, or rupture technologies, provides explanations for the success, or not, of organizations in responding to disruptive innovations. The authors verify the role of DCs in the performance of the response to digital disruption in which the first-order dynamic resources that are created by the alteration, expansion, or adaptation of resources, existing processes, and values of a company are positively associated with the construction of digital platform resources and that these features affect the performance of the response to the digital disruption.

DCs can be seen as firm processes, which use their resources to maintain and create market changes. Some DC include product development routines, alliance, procurement capabilities, resource allocation routines, knowledge transfer, and replication routines. We may also include creating market changes in response to exogenous changes and these dynamic capabilities to operate in rapidly changing environments.

Michaelis, Rogbeer, Schweizer, and Ozleblebici (2021) extend DC research by examining the underlying and fundamental concepts of capabilities, resource allocation, fungibility, and environmental change concerning value creation appropriation (VCA). The authors introduce two boundary conditions that suggest that environmental change and fungibility between current and DC determine whether resource allocation leads to VCA in dynamic environments and creates future capabilities.

Schauerte, Feireisen, and Malter (2021), in work about the TV industry and DT building on resource-based theory, the authors examine which sets of market-oriented and internal strategic resources are necessary. TV companies can create unique advantages by leveraging synergies between linear and video-on-demand services.

In a longitudinal case study, Demeter, Losonci, and Nagy (2021) examine the resource alteration underlying the DT in manufacturing. The authors rely on the adaptation aspect of theory, and their analysis shows

how and why a factory adapts its resources and DC during DT. The work revealed four stages of the DT through the DC lenses for components of adaptation (sensing capability, absorptive capacity, integrative capability, relational capability).

Sousa-Zomer, Neely, and Martinez (2021), investing in the literature on DC and DT, conceptualizes and investigates the relevant antecedents of an essential DT capability - and its effect on the competitive advantage of firms for large US companies. The study identifies three main micro-foundations that, when combined, build a digital transforming capability (digital-savvy skills, digital intensity, and context for action and interaction); besides, the study tests the relationship between DT capability and firm performance.

The concept of organizational ambidextrous complements the theory of DC and postulates to construct different skills. For example, O'Reilly and Tushman (2008, 2013) treat ambidextrousness as a dynamic ability to solve what Christensen (2000) called innovators' dilemma.

Ciruela-Lorenzo, Del Aguila-Obra, Padilla-Melendez, and Plaza-Ângulo (2020) present digitization by intensive IT use in the different stages of the value chain of a Spanish farmer' co-op industry. They present a review of the evolution of major digital technologies, such as IoT, robots, AI, big data, and Blockchain, among others. Second, they describe digital innovation in the farmer's co-op industry to help them in the decision-making process and, finally, a digital diagnostic tool to measure farmer's co-op's digital innovation.

In a conceptual paper, Barlette and Baillette (2021) address the capabilities offered by big data analytics (BDA) in the context of the Industry 4.0 revolution. The changes required to exploit BDA's full capabilities, particularly at the organizational level, are considerable. The paper highlights several organizational changes to enhance a company's agility and leverage BDA to achieve enhanced performance in turbulent contexts.

Wiesbock and Hess (2020) show, concerning digital innovations in organizations that they manifest themselves over three concentric rings: 1) technology-oriented development and the different categories of implementation of digital innovations at the core, 2) the facilitators of digital innovations, and 3) governance of digital innovations.

Garbellano and Da Veiga (2019) The implementation of I4.0 required a renewal of the executive leadership team with the need for new young executives from other companies, and the new generation of entrepreneurs provided methodologies and commitment to promoting DT.

Mendonca, Andrade, and Souza Neto (2019) studied the relations between IoT, Big Data, and AI with DC in micro-foundations, with organizations located in Porto-Portugal and Natal-Brazil.

Braun and Sydow (2019) tell us that partner selection is essential for the success of Inter-organizational projects, targeting these partners' organizational capabilities, demonstrating how the DT process is taking place in different locations how this transformation contributes to the DC. It was observed that big data technology obtained the highest current performance percentage compared to IoT and AI technologies.

Riera and Iijima (2019) present the opportunities and threats that digital technologies such as SMACIT (Social, Mobile, Analytics, Cloud, and IoT) bring to organizations are increasingly being exploited by academia and industry. Therefore, it proposes a combination of IT and Organizational resources that can be the basis for achieving what they called business value with digital technologies or "Digital Business Value." This study expands DT's literature, mainly how DCs work together to enable the Digital Business Value.

Kim and Kim (2018) analyze open innovation (OI) activity factors in the Korean information and communication technology (ICT) industry, focusing on cooperation network strategy and intellectual property management capability. The factors that influence technological innovation are OI elements, indicating the open technological innovation of the new ICT Industry.

Sanchez and Zuntini (2018) present a paper on established small and medium-sized enterprises (SMEs), describing a) external forces in the context of emerging technologies, b) appropriate strategies arising from an analysis of the value chain, and c) Resources and capacities of critical importance. The structure contributes to the understanding of how small and medium-sized enterprises respond to the DT process.

The research of Crupi, Del Sarto, Di Minin, Gregori, Lepore, Marinelli, and Spigarelli (2021) aims to understand if and how European digital innovation hubs (DIHs), in particular Italian firms, filling the role of knowledge brokers (KBs) can support the DT of SMEs by triggering OI practices.

Akter, Michael, Uddin, McCarthy, and Rahman (2020) explore digital business transformation through the lens of four emerging technology fields: AI, blockchain, cloud, and data analytics. Specifically, the study investigates the operations and value propositions of these distinct but increasingly convergent technologies. However, due to the dynamic nature of innovation, the potential for this hybridization, integration, recombination, and IT convergence has not yet been considered.

Wang, Feng, Zhang, and Li (2020) verified whether the DT strategy (DTS) could improve organizational performance and provide a comprehensive analysis for companies on the need to implement DT in the Chinese context and relied on the constructs of "Skewed conflict," "minority theory dissent" and "too-much-of-a-good-think." In addition, the study investigates the moderating role of cognitive conflict between DTS and performance.

Steiber and Alange (2020) note that the collaboration of startups for corporate innovation has reached a new level in the context of DT, in which collaboration with startups positively affects the transformation of companies' businesses. They present a three-step analytical process as a valuable way to understand better and improve case capacity and business transformations.

For Riasanow, Jantgen, Hermes, Bohm, and Krcmar (2020), DT continuously changes ecosystems, forcing established companies to reevaluate their value proposition. The paper examines DT's similarities in five platform ecosystems: automotive, blockchain, financial, insurance, and Industrial IoT (IIoT). The authors say scholars and professionals can use these clusters when analyzing or building a new platform ecosystem or transforming a traditional ecosystem toward an ecosystem of platforms.

The work of Schallmo, Williams, and Lohse (2019) offers an integrated approach to the development of a digital strategy consisting of six phases: external strategic analysis, strategic forecasting, internal strategic analysis, strategic principle, strategic options, and strategy formulation. In addition, the authors deliver four generic digital strategies within the integrated approach: 1) product provider, 2) service provider, 3) product platform operator, and 4) service platform operator.

Moi and Cabiddu (2021) present a new marketing capability defined as an Agile Marketing Capability for DT.

III. Material And Methods

We started this research with a brief report of the most recent DT publications with publications focused on business and management. For this, articles were consulted in the most traditional business and management areas, i.e., Web of Science and SCOPUS. However, for the analysis, only the Web of Science was used.

Based on the bibliometric principle that knowledge of disciplines is concentrated in only a tiny proportion of critical academic journals, we retrieved citation data from the Web of Science (Web of Science Core Collection, 2020) to conduct research and retrieve publication data. We were researching the entire central database to get all the scientific disciplines and areas that contribute to the research term "digital transformation" AND "dynamic capabilit*." The asterisk was used as a wild card character for a simultaneous search for capability or capabilities.

In the Web of Science, the use of a search sequence to search from the topic includes the title of the publication, abstract, author, keyword; this resulted in 38 hits from the Web of Science. We researched all articles on DC and DT between 2011 and 2020 without applying restrictions to the study area. For example, articles in "business," with 23 articles, or "management," with 11 articles, were selected from databases. In addition, articles related to IT, economics, manufacturing, and environmental studies were kept for analysis—all searches conducted on October 26, 2020.

Text mining, such as content analysis, for understanding data from a document arrangement, was used in this research, a procedure known as "bag of words" (Joao, 2017) with the author's keyword record and designed to discover insights into the content. We perform a pre-processing step with preliminary research on the Web of Science and analyze its outputs (for example, each word's frequency, a correlation between words, and the association between words). According to the results and applied a set of techniques to reduce the problem of dimensionality, i.e., convert the text into lowercase, remove numbers, punctuations, extra white spaces, stop-words terms, and stemming (a heuristic process that cuts the ends of words and often includes the removal of derivational slots).

Quantitative content analyses were performed using hierarchical cluster analysis, Euclidean distances, and the correlation between words. A more in-depth analysis of the keywords was conducted through the statistical language R, coded especially for the search, and with the use of the respective packages (e.g., tm, SnowballC, wordcloud, bibliometrix, among others) that examines a text counting the frequency of the most mentioned 'keywords' and representing them sometimes in 'word cloud' or other algorithms. Analysis procedures (hierarchical cluster, co-occurrence networks) and data (countries, authors, and journals) were performed.

IV. Data Analysis and Result

The annual scientific production of 2011, 2015, and 2017 with only one article in each year in the analysis period: 2018 (4), 2019 (8), 2020 (11) with an annual percentage growth rate of 61.54%. The data for 2020 is incomplete. The data's primary information is the number of documents (38), 26 articles, and early access (12). Other document types as events, review articles, magazines, and books were excluded from the analysis. For the corpus of the analysis were used 150 author's keywords, the number of average citations per document (5,132), 106 different authors, only four authors of single authorship, which demonstrates the collaborative work that has 102 authors of multi-authored documents, the average of documents per author is still meager (0.358) which evidences a vast field of research ahead and extensive spraying, the number of authors per document is 2.82 and a collaboration index of 3, that is, a lot of potentials ahead.

As observed, authors often write articles with multiple authors, collaboration, then articles by a single author. Thus, it may signal a lower availability of secondary data, which is perceived by the vast majority of

theoretical studies, including literature reviews, case studies, and rare empirical studies. Besides, working in groups or networks yields greater credibility, which is essential for this new and growing field.

Because it is a new research theme, it is not appropriate to cut the most productive authors. Thus, as an example, we have only De Mendonça and De Andrade (2018, 2019) and Sanches (2017) and Sanchez and Zuntini (2018) with two articles each and following a myriad of authors with a single publication.

However, some studies show breath to be referenced in the field, hence analyzing the citations' primary manuscripts. We start with the work of Karimi and Walter (2015), which with 49 citations has the front in the field, followed by Vial (2019) with 19 citations, Liu, Chen, and Chou (2011) with 11 citations. Warner and Wager (2019), Chatfield and Reddick (2019), Korhonen, and Halen (2017), Sanchez (2017) authors these with at least four citations.

Other authors with Ghobakhloo and Fathi (2020), Bag, Wood, Mangla and Luthra (2020), Hsu, Tsaih, and Yen (2018), Lichtenthaler (2018), Latilla, Frattini, Franzo and Chiesa (2020), North, Aramburu and Lorenzo (2020), Wiesboeck and Hess (2020), Riera and Iijima (2019) have been demonstrating the joviality of the area as a survey with citations in the article's year of publication. As we can see, there is no concentration on a single author, which suggests that the field of research is open, especially in high-impact journals.

Note that the works of Karini and Walter (2015), Liu et al. (2011), Warner and Wager (2019), and Chatfield and Reddick (2019) are also the basis of the Web of Science as review articles and are among the most influential. Articles by Akter et al. (2020), Wang et al. (2020), Steiber and Alange (2020), and Riasanow et al. (2020) with articles in early access. About the works published in events and based on the Web of Science, only the works of Korhonem and Halen (2017) and Carcary, Doherty, and Conway (2016) have citations with four and only one.

The most cited work, Karimi and Walter (2015), focuses on the role of DCs in response to digital disruption with a case study. The Internet and digitization are fundamentally changing and disrupting the traditional models of operation of print media companies. This study clarifies the role of first-rate DCs in responding to DT. Information systems (IS) practice helps managers focus on the most promising factors to create first-order DC, build sinuous platform resources, and reinvent their core functions to accelerate digitization.

Liu, Chen, and Chou (2011) present e-banking projects' implementation and highlight DT's importance for organizations to survive and achieve a competitive advantage in a digital economy. Explores the DT development process through an e-banking project based on the concept of resource adjustment and features four dimensions: 1) external resource adjustment, 2) internal resource adjustment, 3) external capacity adjustment, and 4) internal capacity adjustment. It also presents eight critical factors needed for the successful implementation of an e-banking project.

Warner and Wager (2019) deal with the theme of strategic renewal through DCs for DT. The authors explore how incumbent companies in traditional sectors build DCs for DT. DT has been defined as using new digital technologies, such as mobile technologies, AI, cloud, blockchain, and IoT, by enabling business improvements, increasing the customer experience, simplifying operations, or creating new business models.

Chatfield and Reddick (2019) have developed a framework in which IoT-enabled DC in real-time sensing and response can stimulate DT for a data-driven smart government capable of providing public interest policies and services and value. Finally, a literature review was proposed in Sanchez's research (2017), formulating a framework that explains how resources, capabilities, and management choices are needed to respond to the new environment that puts traditional business models' sustainability to the test.

Other less cited or more jobs that are recent are Ghobakhloo and Fathi (2020), in a case study demonstrating how manufacturing SMEs can leverage their IT resources to develop the lean-digitized manufacturing system that delivers sustained competitiveness in the I4.0 era. Bag et al. (2020), in a survey of South African manufacturers, deal with the potential benefits of industry 4.0 applications in purchasing in a circular economy, and these are related to DT because it impacts the intention to optimize procurement processes.

A study on Canadian SMEs, North, Aramburu, and Lorenzo (2020) presents a dynamic approach to resources and DT studies to mitigate deficiencies in existing structures in IT-enabled business transformation. As a result, companies are better at identifying digitally based growth opportunities than profiting from them. For Pelletier and Cloutier (2019), a discussion is developed on the importance of relational capital in coping with DT's SMEs' challenges. Backed by an ecosystem of services increasingly immersed in DT, SMEs can access turnkey information technology (IT) applications, which can come for free but not worry-free.

Hsu et al. (2018) on the ambiguity of the role of IT departments that are vital to organizations' DT, that the role of IT departments in ICT-oriented organizations in DT has not yet been explored, and that although they play an important and proactive role in the early stages of organizational transformation and a dominant role in the development of ICT capabilities, they will not be able to take a leading role within organizations after the transformation is completed.

We are finalizing our analysis of the most influential articles, the work of Lichtenthaler (2018), who developed a meta-ranking of the most innovative companies in the world, highlighting the importance of external

perceptions of innovation and an innovation-based vision about the company's performance, including product, service, process, business model, management and organizational innovation. The article contributes to the research on the antecedents and consequences of innovation, illustrating the importance of innovation perceptions. Furthermore, it highlights the need to seek different innovation types, following the innovation-based view on performance with first and second-order innovations.

Likewise, no institution is dominant in this field. Instead, there are publications from several universities such as Aalto Univ (Finland), Arizona State Univ (United States), Bocconi Univ Int Business (Italy), Catolica Porto Business Sch (Portugal), Chalmers Univ Technol (Sweden), Chungbuk Natl Univ (Cré South Ia), Edinburgh Napier Univ (Scotland), Free Univ Berlin (Germany), Hangzhou Dianzi Univ (China), HEC (France), Hoppe Marine Gmbh (Germany), Int Sch Management (Germany), Inst Innovat Publ Purpose Ucl (England), ISCTE Lisbon Univ Inst (Portugal), Johannes Kepler Univ Linz (Austria), Katholieke Univ Leuven (Belgium), Korea Inst Sci & Technol Informat (South Korea), Lee Ming Inst Technol (Taiwan), Ludwig Maximilians Univ Munchen (Germany), Maynooth Univ (Ireland), Menlo Coll (United States), Natl Chengchi Univ (Taiwan), and Univ Wollongong (Australia).

Thus, production by countries is established, Germany leading with eight jobs, the United States with six, England, Italy, Portugal, and Spain with three each and Australia, Austria, Argentina, and Brazil with two jobs each. We also have a great collaboration in the area where only three works are individual as the works of Vial (2019), Sanchez (2017), and Lichtenthaler (2018), with good collaboration between authors and countries.

Table no 1- Word Cloud (Left); Hierarchical Clustering (Ward) of keywords (Right). Tested for Zipf's Law (3.371 – 0.706X)
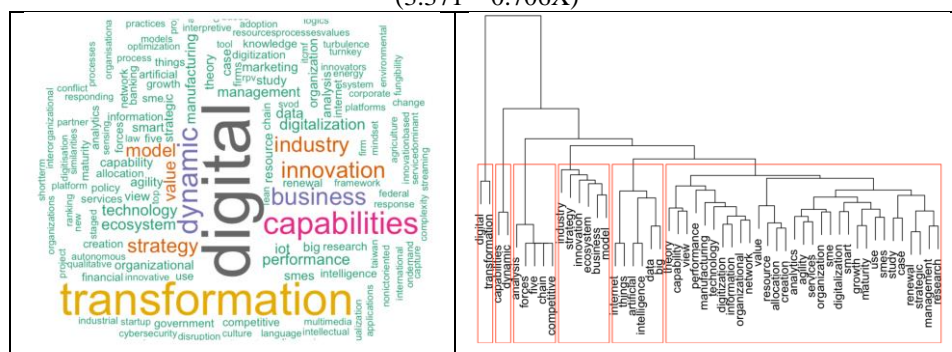

A word cloud (Figure 1 - Left) showed the frequencies of words (represented in parentheses) for digital (41), transformation (26), capabilities (16), dynamic (14), business (11), innovation (10), industry (9), strategy (8), model (7), value (6), performance (5), digitalization (5), technology (5), ecosystem (5), management (4), IoT (4), and capability (4).

The journals with the most significant impact in DC & DT research by the number of articles published without considering the impact factor (JCR) are Sustainability, Electronic Markets International Journal of Innovation Management, International Journal of Technology Management, Production Planning Control and, Management Decision with at least two articles each. Following several other journals with only one article, including Long Range Planning, Annals of Operations Research, European Journal of Innovation Management, Government Information Quarterly, Information & Society-Studies, International Journal of Conflict Management, and Journal of Enterprise Information Management, among others.

We found an association between words (Figure 2), for the search for related words, in the thermo-document matrix (Pearson > 0.8): We found some associations related to DT; analysis + ecosystem + model + chain + strategy, highlighting aspects of value chains, ecosystem, and strategy. Another association between performance + industry + management + innovation + digitization + strategic, demonstrating the strategic importance of digitization and the industry's performance. Another association of DCs and their links with IoT, Internet, AI, and big data. It was not possible to verify the question of aspects related to cultural changes.

Table no 2- Association among words. Indicating all the words are inter-related. Frequency >= 4 terms.
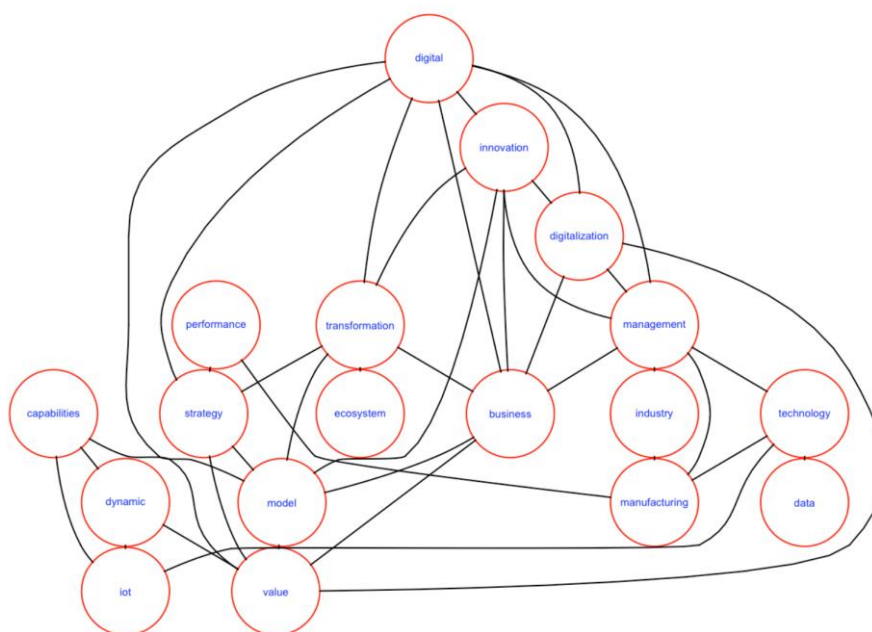
V. Discussion

Because dynamic capabilities relate to strategic changes, virtually any research topic involving strategic changes is linked to DC, and vice versa; this is no different when we relate it to DT. The literature review relates several papers on the evolution, or transformation, of the firm and the industry as a whole (e.g., print media, TV, legal). The evolution of the industry, in turn, reflects the evolution of companies, each of which may have DC, which, in turn, affects both the evolution of the company and the industry itself. DCs relate to a particular type of change, that is, to that which occurs through the change of the resource base of an organization, the work on DC is directly linked to the whole body of the literature on the resource-based view (RBV) and the knowledge-based view (KBV) intimately associated knowledge of the company.

The precise links between DC and DT as research areas offer additional research opportunities, whether conceptual or empirical. In the conceptual dimension, we present technical and evolutionary fitness concepts to unpack DC performance determinants.

Several possible groupings have been found as search paths. We will delete DT and DC to facilitate these directions. One linked to the technologies themselves, big data, IoT, AI, comes to prominence, and I4.0. Other avenues are studies related to digitizing information, performance, and structure of the industry: resource networks, innovation management, theories related to resources, capabilities, and knowledge. Business architecture, strategic renewal, organizational culture, and research are conducted with SMEs and specific industries, including traditional ones. Classic strategic services and models such as industry analysis (five forces) and value chain models. It is worth remembering that many of the studies are qualitative, whether through literature review, bibliometric surveys, in-depth interviews, case studies, and few surveys that result in quantitative analysis. These are open fields of research.

Some limitations of this study should be taken into account. First, the research results consisted mainly of articles from journals, but articles from congresses, dissertations, books, or book chapters were not addressed by the searches, although they also represent a part of the scientific discussion on DC & DT. Second, older publications may logically have received more citations in total over the years than newer ones. Third, no impact factors were used in the analysis of the data of this study. There are several other common criticisms of the Web of Science as a primary source of data for bibliometric analysis and, consequently, for text analysis, such as a bias about English-language publications and the impact factors' dependencies of the journals. Articles published in other languages tend to have less impact on the research front (this is the case with 100% English).

VI. Conclusion

In short, we have a multitude of opportunities to explore DC, more than enough to explore in the coming years. Research on the perspective of the analysis of its elements, naturally from a set of technologies, new managerial behaviors, skills, routines, processes, learning mechanisms, and knowledge governance. The aspects

of innovation rupture technologies, change management. It is essential to highlight that it is a process of knowledge and learning and that because it has the form of a spiral, it leads to work on time.

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