X SINGEP
Simpósio Internacional de Gestão, Projetos, Inovação e Sustentabilidade
International Symposium on Management, Project, Innovation and Sustainability
ISSN: 2317-8302
CYRUS Institute of Knowledge MAKE A DIFFERENCE
CIK 10th INTERNATIONAL CONFERENCE

CAMINHOS DA INOVAÇÃO DISRUPTIVA DIGITAL

DIGITAL DISRUPTIVE INNOVATION PATHS

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Nota de esclarecimento:
O X SINGEP e a 10ª Conferência Internacional do CIK (CYRUS Institute of Knowledge) foram realizados de forma remota, nos dias 26, 27 e 28 de outubro de 2022.

Agradecimento à orgão de fomento:
"This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES)

CAMINHOS DA INOVAÇÃO DISRUPTIVA DIGITAL

Objetivo do estudo
Esta revisão sistemática da literatura tem como objetivo identificar os caminhos da Inovação Disruptiva Digital em diferentes contextos de mercados.

Relevância/originalidade
Este estudo oferece uma visão integrativa sobre a Inovação Disruptiva Digital apresentando um framework para potencializar novas perspectivas para o desenvolvimento de modelos de negócios inovadores e para o futuro da teoria da Inovação.

Metodologia/abordagem
Revisão sistemática da literatura de 34 estudos na área de 2015 a 2021.

Principais resultados
Os resultados sugerem duas perspectivas diferentes sobre a inovação disruptiva digital, uma seguindo a construção de sistemas de alerta disruptivos e outra seguindo a consciência da disrupção empreendida estratégias de negócios digitais

Contribuições teóricas/metodológicas
Contribuir para as teorias de inovação disruptiva e capacidades dinâmicas oferecendo uma visão holística dos caminhos da inovação em diferentes aspectos do negócio.

Contribuições sociais/para a gestão
Promova uma compreensão mais ampla de como a inovação disruptiva pode alcançar modelos e estratégias de negócios.

Palavras-chave: Inovação Disruptiva, Inovação Digital, Revisão Sistemática Literatura, Capacidades Dinâmicas

DIGITAL DISRUPTIVE INNOVATION PATHS

Study purpose
This systematic literature review aims to identified Digital Disruptive Innovation paths in different contexts of markets

Relevance / originality
This study offers an integrative view about Digital Disruptive Innovation presenting a framework to potentialize new perspectives for innovative business models development and for the future of Innovation theory.

Methodology / approach
Systematica Literature review of 34 studies in the field from 2015 to 2021.

Main results
Findings suggest two different perspectives about Digital Disruptive Innovation, one following disruptive warning systems building and other following consciousness of disruption undertaken digital business strategies

Theoretical / methodological contributions
Contribute to the disruptive innovation and dynamic capabilities theories offering a holistic view of innovation paths in different aspects of business.

Social / management contributions
Promote a broader understanding of how disruptive innovation can reach out business models and strategies.

Keywords: Disruptive Innovation, Digital Innovation, Systematic Literature Review, Dynamic Capabilities

DIGITAL DISRUPTIVE INNOVATION PATHS

1. Introduction

Competitive economic contexts require continuous changes in strategic, organizational, and managerial approaches, oriented towards disruptive (or revolutionary) development of products, services, processes and digital platforms are an example of the materialization of digital Disruptive Innovation (DI) (Karimi and Walter 2015). A status quo of chaos and fragmentation about DI has caused misunderstanding, increasing the probability of this concept becoming just a business buzzword (Nagy, Schuessler, and Dubinsky 2016).

Despite of lively debate in the literature, there is a convergence between researchers about Dynamic Capabilities (DC) effects on digital DI in resources selection, identification, and reconfiguration, as well as on flexible and dynamic business creation in response to business disruption. In this sense, both digital DI and DC substantially contribute to value creation to obtain sustainable competitive advantage (Alberti-Alhtaybat, Al-Htaybat, and Hutaibat 2019; Helfat et al. 2009; Kranz, Hanelt, and Kolbe 2016; Teece 2018).

This research aims to understand how digital DI can walk through different market contexts and how DC supports it. Developing and obtaining new insights, DC and digital DI are integrated in this analysis to answer a research question about What are the potential paths for Digital Disruptive Innovation to businesses and academic research?

Findings pointed out two different paths for digital DI, one following is disruptive warning systems building and other is consciousness of disruption undertaken digital business strategies. This research has not only the function of analyzing theory and its integration with other models and factors, but also providing predictive guidance for the recognition of digital DI and DC support when seeking a response to disruption.

This systematic literature review offers an integrative view about digital DI by presenting a framework to potentialize new perspectives for innovative businesses development and the future of DI theory. The paper is organized in sections about theoretical foundations view, methodological approach, findings presentation, and discussion to introduce an integrative and dynamic framework for future agenda.

2. Theoretical Foundations

DI theory tries to explain why mature incumbents with satisfactory executive and management skills lose market dominance. Thus, the attention to business community from the academia made DI a research topic for strategic management and innovation theories as well. Therefore, a new way of thinking about new businesses, ways of achieving success and helping historical incumbents to achieve developed and sustainable business rise in the literature (Shang, Miao, and Abdul 2019).

Recently, when integrating different approaches to define DI, Si and Chen (2020) propose some DI characteristics: (a) satisfy a process and not some specific results; (b) initial objective is to focus on new or leading-edge markets and (c) develop products and services finding value that in general is inferior to existing ones in performance attributes, (that is, they are good enough, cheaper, simpler, better, and more convenient. Furthermore, digital DI does not only develop along existing technological trajectories (Bergek et al. 2013; Christensen et

al. 2018; Christensen and Rosenbloom 1995; König, Schulte, and Enders 2012) as attributes of products and services, it continues to affect business through consumer needs satisfaction in gradually penetration of conventional markets (Crockett, McGee, and Payne 2013; Govindarajan and Kopalle 2006).

In contrast, failure to respond to digital DI might threaten firms' survival, as they often fail to introduce disruptive ideas into business: (a) by only allocating resources to products that fit the existing business models, portfolio of skills at your disposal, or resource gaps to bridge; (b) by the inertia to innovation resulting from rigidity routine and focus on core and existing business processes to compete; or yet (c) due to value network in which they are inserted in which "customer competence" is lacking in demanding a new market or not favoring their entry into new products and/or services (Christensen et al. 2018; Si and Chen 2020; Teece 2018).

In this context, the state of the literature seems unsatisfactory given the lack of a clear agreement on why historical incumbents are not able to deal with digital DI and how there are contradictory explanations about whether such incumbents, for whatever reason, are unable to see disruption unfolded or just react to it (Riemer and Johnston 2019). In addition, the number of articles on digital DI increases annually from multiple perspectives, such as concepts (Schmidt and Druehl 2008); characteristics (Husig, Hipp, and Dowling 2005); types (Balen, Tarakci, and Sood 2019); determining factors (Wan, Williamson, and Yin 2015; Yu and Hang 2008); performance (Karimi and Walter 2015); and business innovation (Kranz, Hanelt, and Kolbe 2016). Although, external environment plays a crucial role in digital DI but it continues to receive less attention (van den Broek and van Veenstra 2018) and should be noted (Li, Porter, and Suominen 2018).

Reflecting on studies and definitions of DI theory some key points stand out: (a) as disruption is a relative phenomenon, it can be disruptive to an incumbent and at the same time considered a sustainable innovation by other market participants (Yu and Hang 2008); (b) historical incumbents may not necessarily be replaced and they possible will continue their business in only one market niche (Schmidt and Druehl 2008; Yu and Hang 2008); and (c) while some scholars argue that Christensen's DI concept is a post-hoc theory unable to provide predictions (Danneels 2004; Tellis 2006), others suggest that this type of innovation can provide predictive information (Govindarajan and Kopalle 2006; Schmidt and Druehl 2008). In this sense, competitors are able to identify incumbents who can develop DI reinforcing that incumbents can predict whether or not a market is ready to be interrupted (Si and Chen 2020).

According to Si and Chen (2020), disruption is not merely defended by technology outcomes, and it is not an event but a process. Emerging technologies development including big data and blockchain, as well as new social and technological scenarios have been further investigated recently, which clearly shows that more researchers have noticed changes striving to study these guidelines (Si and Chen 2020). Some scholars have indicated that one of the important reasons why managers have doubts about digital DI is because of a chaos surrounding the concept (Dogru, Mody, and Suess 2019). Therefore, digital DI faces its own dilemma, as its central concept and basic connotations have been widely misunderstood causing frequently incorrect application (Dogru, Mody, and Suess 2019; Si and Chen 2020).

3. Method

Systematic reviews must follow fundamental phases for the quality and methodological rigidity, as they aim to identify the state of knowledge on topics, constructs, relationships,

theories and results that already exist (Snyder 2019). This systematic literature review carried out in the Scopus database. The content analysis took place from supporting of Atlas.ti software for structuring and evaluating the constructs raised by reading articles that met predefined criteria, whose central basis were the codes and dimensions indicated in the model. Yet, Iramuteq software was used to obtain quantitative analyzes of the linguistic corpus to reinforce the semantic analysis of the reviewed articles.

The chosen Scopus database is because of its collection of abstracts and citations from scientific literature through peer-reviewed, therefore relevant, and solid for extracting research of this nature. Keywords "disruptive innov*" AND “digital*” AND "dynamic capabili*" are applied to access the scientific papers on digital DI. The quotation marks define the research object and the application of the asterisk (*), after wording to follow the research fundamentals based on Boolean algebra to achieve greater coverage of these research fields. The word “AND” is to search from the correlation between the themes since the aim is to research on digital DI under a dynamic perspective of capabilities.

The search enables a literature scan, resulting in 29 initial articles, which meet the search criteria, and having as a filter the option "articles" and the language "English", as well as the period of 2015 to 2020. This entire pre-determined time covers the existing literature to meet the research question. After reading the abstracts, three papers are discarded as they do not relate to digital DI and DC, remaining 26 articles. Under discussion with experts and professors in the area four new relevant papers are incorporated, and, in the end, 30 articles are analyzed and interpreted.

In summary, the protocol of this systematic literature review have the following procedures: (a) the definition of Scopus database as a research source; (b) the design of searching keywords, which starting with the creation and validation search criteria and the selection of articles; (c) the critical content analysis carried out through an electronic spreadsheet matrix as well as Atlas.ti software support for the structuring and evaluation of the constructs in all articles and whose central base are the codes obtained from the theoretical foundations; and (d) Iramuteq software usage, in order to obtain quantitative analyzes of linguistic corpus to reinforce the semantic analysis of the articles. All the steps sustain our theoretical framework and answer our research question.

4. Findings

By reviewing the theoretical and empirical lens, it is possible to know different views of authors and conceptual trends on digital DI (Si and Chen 2020; Skog, Wimelius, and Sandberg 2018), in addition to realizing the applicability and peculiarities of these complex themes in different sectors of the economy. The core elements of CD (Helfat et al. 2009) employed in building change and transforming businesses in response to digital DI served as an additional perspective for this systematic literature review.

The view on the paths that digital DI can take place to a contemporary analysis keen on bringing a multilevel influence of factors of DI, digital disruption and empirical applications of DC in the same context (Kumaraswamy, Garud, and Ansari 2018; Petzold, Landinez, and Baaken 2019; Shang, Miao, and Abdul 2019; Si and Chen 2020; Skog, Wimelius, and Sandberg 2018). Most articles on these topics are relatively new in the literature, with a highly relevant exponential impact on society, due to their ability to demonstrate how organizations develop relationships with markets and their partners stablishing new habits to response to disruptions

(Karimi and Walter 2015; Salvador, Simon, and Benghozi 2019; Waye, Verreynne, and Knowler 2018; Yeh and Walter 2016).

In the linguistic analysis of the articles through the descending hierarchical classification (CHD), four classes appear interconnected: (1) digital ecosystems transforming different actors; (2) dynamic capabilities explore the way in which these actors reconfigure their resources; (3) innovation theory establishes directions and organizes concepts; and (4) business model bringing digital disruptive innovation to a context of businesses (Figure 1).

Dynamic capabilities and its main transformational elements (Class 1) represent the main technical and evolutionary resources involved in disruptive innovation network (Class 2), connecting to digital ecosystems which is the medium in which digital disruption manifests itself, and where DC find their home to increase the power of digital transformation (Class 3). Still in this direct link (from Class 3), digital ecosystems and their main transformational actors who carriers DC involved in the network of disruption. On a second level are the ramifications related to business model (Class 4), that is, where the paradigm shift exists, and the transformation takes place assuming notorious evidence and scientific relevance given the empirical applications of CD in digital disruptive innovation.

In this sense, the literature explores business transformation under DC perspective in different ways, emphasizing resources identification, assimilation and reconfiguration (Kranz, Hanelt, and Kolbe 2016) as new attributes to products and/or services innovation through digital DI to leverage competitive advantage (Gholampour Rad 2017; Karimi and Walter 2015; Zach, Nicolau, and Sharma 2020).

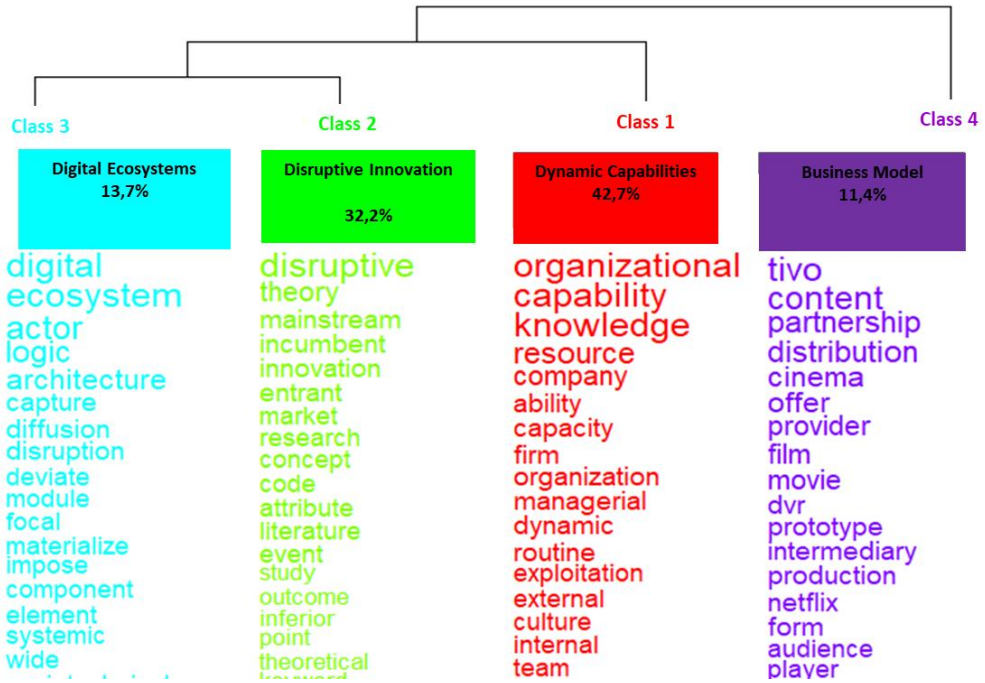

Figure 1. Linguistic Descending Hierarchical Classification

Findings (Table 1) suggest two different digital DI paths, one is disruptive warning systems building and other is consciousness of disruption undertaken digital business strategies. These paths are represented in the framework (Figure 2) where each study appears with its

respective ID in both table and figure. However, some gaps have already highlighted for a more detailed view of organizational hierarchy structures (Kamel and Watfa 2018); DI processes (Radnejad and Vredenburg 2019), alliances (Ansari, Garud, and Kumaraswamy 2016); and environments that are more conducive to digital DI prosperity against internal resistance points (Kranz, Hanelt, and Kolbe 2016).

Table 1. Contribution of researching about Digital Disruptive Innovation

ID	Author	Main Contribution
1	(Ammirato et al. 2019)	Redesign of operational processes, better orchestration of software resources (artificial intelligence, machine learning and customer experience).
2	(Ansari, Garud, and Kumaraswamy 2016).	Systemic view of DDI can affect various relationships within an ecosystem taking positions that limit hostility and retaliation from incumbents and progressively establish symbiotic relationships with them.
3	(Beltagui, Rosli, and Candi 2020)	Redirect capabilities can help business ecosystems that take advantage of new technologies.
4	(Christensen et al. 2018)	To reinvigorate academic interest in DDI, several underexplored topics should be highlighted such as response strategies, performance trajectories, and innovation metrics to guide future research.
5	(Dedehayir, Ortt, and Seppänen 2017)	Innovation ecosystem reconfiguration manner is likely to depend on the design attributes of products, as well as the type of disruption experienced.
6	(Felício, Caldeirinha, and Dutra 2019).	DDI develops itself in organizational cultures with a flexible structure to create new routines, absorb knowledge, and inspire teamwork dynamics.
7	(Foss and Saebi 2018)	Business Model and Business Model Innovation (BMI) are fundamentally about the architecture of firm's value creation, delivery, and capture mechanisms.
8	(Gholampour Rad 2017)	Exploiting DI doesn't happen without reconfiguring resources. Dynamic organizational resources are the main cause of competitive advantage and recognition of disruption by managers.
9	(Guo et al. 2019)	The nature of DI is multidimensional. Measuring disruptive potential consider three aspects, i.e., technological features, marketplace dynamics and external environment.
10	(Ho and Chen 2018)	A disruptive technological change does not necessarily render all technological competences embedded in the firm's products obsolete. The challenge lies in timely redefining core business and consistent execution of strategies
11	(Kamel and Watfa 2018)	Disruption requires managers to keep an eye open for new classes of technology, and strategic risks.
12	(Karimi and Walter 2015)	DC involve a long-term commitment to specialized resources which are critical in responding to disruptive technological change.
13	(Kranz, Hanelt, and Kolbe 2016)	DI requires gathering distant knowledge and experimenting with new ideas, absorptive capacity, and organizational ambidexterity to change.
14	(Kumaraswamy, Garud, and Ansari 2018)	Several perspectives on disruption such as evolutionary, relational, temporal and framing culminate in a performative (as opposed to a predictive) approach to thinking about the phenomenon.
16	(Molina-Morales, Martínez-Cháfer, and Valiente-Bordanova 2019)	The absorptive capacity dimensions significantly influence innovative performance being crucial for competitiveness. Its main contribution is the uneven effect of potential exploitative domains and realized in the early adoption of disruptive technologies.
15	(Müller and Hundahl 2018)	IT-led innovation of core activities will also affect core resources and vice-versa. Resources and activities form the backbone of firms, indicating that IT ensures successful business model innovation.

17	(Petzold, Landinez, and Baaken 2019)	DI is an outcome of emergent dynamics constituted by the timing of entry and synchronization of events and actions shaped by the adaptability of strategic actions.
18	(Pezeshkan et al. 2016)	DC support levels of disruptions depending on their nature, performance metric employed, and interaction with contextual or organizational variables.
19	(Radnejad and Vredenburg 2019).	Developing a potentially disruptive technical process innovation, includes 1) innovation strategy challenges, namely open vs. closed; 2) internal collaboration challenges; 3) Leadership challenges; 4) Challenges in managing public market expectations 5) Technical challenges and 6) Financial challenges.
20	(Riemer and Johnston 2019)	A total disruption cannot be predicted or considered predictable, but only detected at that moment as a basis for prescribing actions.
21	(Salvador, Simon, and Benghozi 2019)	The emergence of disruption suggests an irreversible structural change, in which incumbents will have to learn with new actors in ecosystems where all actors can find their place using ad hoc competitors and new strategies.
22	(Shang, Miao, and Abdul 2019).	The basic types of DI are divided into categories, namely, disruptive technological innovation, disruptive business model innovation and radical product innovation;
23	(Si and Chen 2020)	The key influence factors of disruptive innovation are individual level, firm level, industry level, Nation/Economy level and Network/Ecosystem level.
24	(Skog, Wimelius, and Sandberg 2018)	Digital disruption is likely to raise both opportunities and challenges for individual firms that seek to enter or remain within an industry through discovery, development, diffusion, and impact into ecosystem-level.
25	(Teece 2018)	Business models, DC, and strategy are interdependent. DC help to shape firms' proficiency at business model design. A business model influences DC and places bounds on the feasibility of strategies.
26	(Waye, Verreynne, and Knowler 2018)	Two of the most significant barriers to DI and change are the high cost of innovation projects and the regulations that affected markets.
27	(Xiao et al. 2019).	Exploring the relationship between IT resources and strategic renewal to manage DI shows that IT can be an active operator or just an operational resource in the strategic renewal process.
28	(Yeh and Walter 2016)	External innovations are a means of freeing business from some current services allowing to reconfigure existing resources for new innovative services.
29	(Zach, Nicolau, and Sharma 2020)	The lack of reward in stock market has not valued the incumbents' investments in innovation, possibly due to concerns about the return on that investment or regulatory issues.
30	(Helfat et al. 2009)	To survive and prosper under conditions of change, firms must develop DC to create, extend, and modify the ways in which they operate. This capacity is vital to business survival.
31	(Sultana, Akter, and Kyriazis 2022)	Strategic market agility is a key mediator between data-driven innovation capabilities and strategic competitive performance.
32	(Parker and Lawrence 2020)	Financial institutions may internationalize developing stages through a strategy of focused product differentiation based on disruptive innovation with cross-border partnerships for ease of market entry and experiential learning.
33	(Borchardt et al. 2021)	Enterprises that have focused on extremely poor and subsistence markets develop more disruptive innovation, aiming to reduce the final prices they charge consumers The primary focus of these enterprises is on maintaining ordinary capabilities.
34	(Schmidt and Scaringella 2020)	Firms' value proposition innovation-based activities regarding new offerings and channels fully mediate the relationship between dynamic capabilities and disruptive innovation

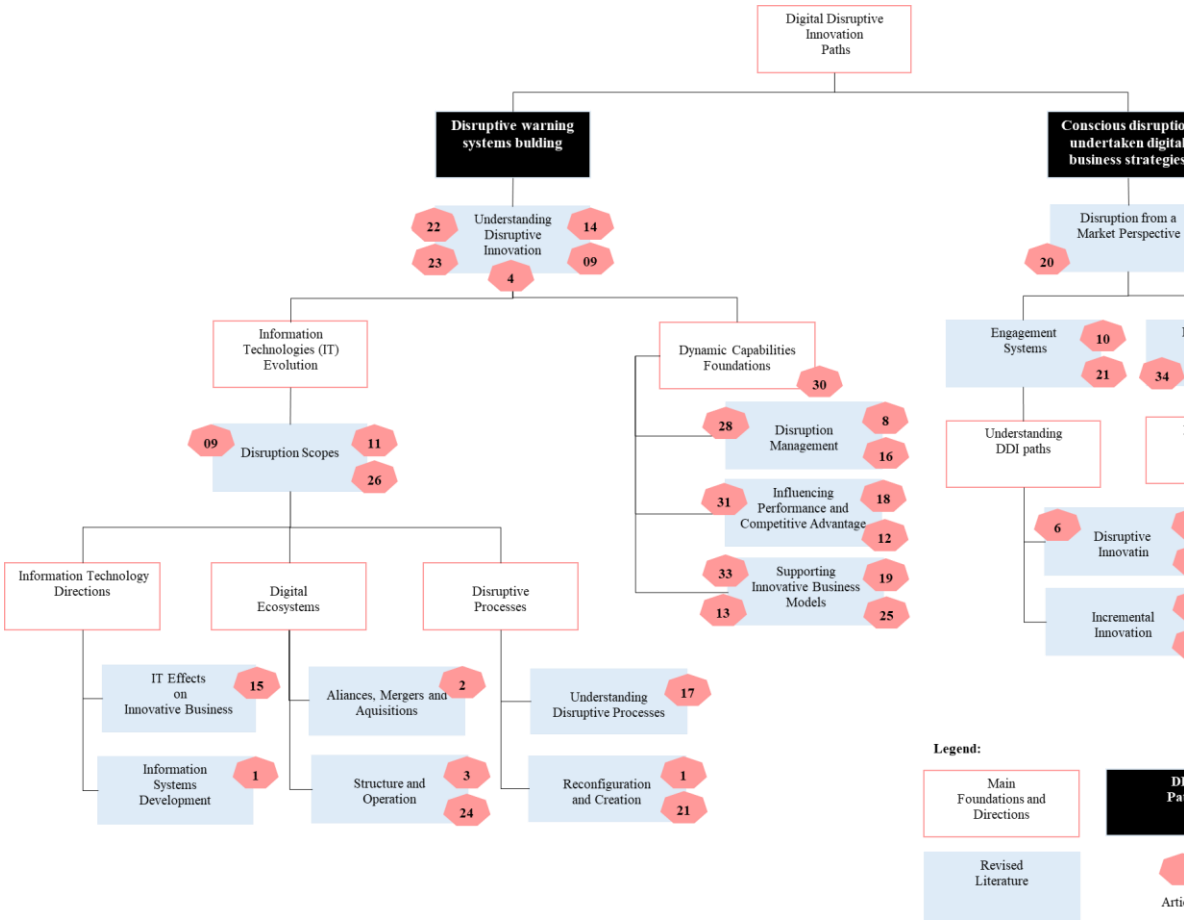

Figure 2. Systemic and multi-functional view of the articles

Note: Logical mapping of the literature review. See Table 1 for the respective indicative article

5. Discussion

DI is considered one of the most important theories of management and not appears as something that needs to be done, but as something inspiring (Si and Chen 2020). Digital DI unfolds fundamentally in changes of sustainable historical logics for value creation and resources reconfiguration (Skog, Wimelius, and Sandberg 2018). Over time, incremental improvements in digital technology gradually satisfy market needs, to obtain a certain market share or even replace historical incumbents in traditional markets.

The digital DI framework (Figure 3) elucidated relevant paths, main elements and dimensions of business innovation adding the multilevel influence factors of DI (Si and Chen 2020). It requires companies to accept a devaluation of their previous intellectual capital (Kranz, Hanelt, and Kolbe 2016) recognizing their needs to insert an evolutionary concept into existing capabilities (Helfat et al. 2009), to absorb new information and data that lead to disruption. However, the ability to absorb this knowledge can be both a blessing and a curse, as it depends heavily on related prior experiences (Roberts et al. 2012). This acquisition and application of knowledge, existing and new, merge during the dynamics of transformation on digital DI paths (Kranz, Hanelt, and Kolbe 2016) being valuable and necessary for the understanding and management of the phenomenon (Petzold, Landinez, and Baaken 2019).

Following Molina-Moralez et al. (2019) innovation as consequence of joint action between members of a cluster, creates several relationships between firms promoting not only trust, but also shared processes and values for the transmission of tacit knowledge, which is defined for Helfat et al. (2007) as the relational capacity that facilitate dynamic ecosystems. Digital businesses generally depend on subsidizing a group of users to attract others by the presence of relational capabilities to take advantages from a network effect.

Digital DI faces serious challenges including build and maintain an infrastructure to support a rapidly growing user base and identify ways to extract financial resources. By introducing and diffusing a digital DI, it may possible to extend the objective of a digital ecosystem to incorporate new specific goods or services to a sector and thus subject it to disruption (Skog, Wimelius, and Sandberg 2018).

The lack of ability to balance capabilities and disruption, emphasized by Kranz et al. (2016), would result in underestimation or overestimation of markets or technological potential of a digital DI. This leads to misalignments in timing and change extension required to build innovative new business models. Only when knowledge of markets and technologies are balanced and combined with precise connections between them might be possible to create value and innovation (Song et al. 2018).

The integrative dynamic model (figure 3) presented, this study draws attention to organizational factors and their moderating effect on relationship between perceived potential of digital DI and business change. This perceived potential for compatibility between existing and new business enhance the ability to dynamically integrate and reconcile organizational activities (internal and external) leading to better adaptation of firms in disruptive environments. Depending on firms' external and internal conditions, there is a greater probability of entering in markets in a timely manner (Luger, Raisch, and Schimmer 2013) and in innovative businesses without necessarily being a developer of a disruptive technology, however without DC it makes more difficult.

In sum, in turbulent times of game-changing and transformative environmental conditions, the emphasis must be on exploiting external resources through alliances, partnerships, mergers or acquisitions, meanwhile, the focus on more stable conditions must shift attention to exploiting internal resources.

6. Conclusion

DI theory, as a post hoc analysis of success stories, rather than a predictability resource, led the research question of this systematic literature review to understand potential digital DI paths. Here, digital DI roadmap is of specific value in guiding the path to transformation, which is particularly relevant for DI response. Furthermore, the approach taken allows to identify path dependencies and synergies throughout evolutionary capacity of both existing and new resources. This research also showed DI complexity and possibilities of its interaction with other prescriptive models.

As a practical contribution, executives can draw several ideas from this research, as findings show that balance between market-related DC (evolutionary capacity) and technology (technical capacity) is crucial to finding a contemporary value proposition of firms. To assess whether a technology has potential to meet future needs in targeting customers, firms must not only rely on current practices but also need to better understand the dynamics of business innovation within their ecosystem. It can deliver greater potential for success than just focusing attention on consumer behavior, technology, or business environment.

This systematic literature also revealed gaps which require further academic research as future studies in more clearly integration of identification, assimilation, and reconfiguration processes in response to DI; identify and validate specific DC functions in growth and evolutionary development, that is, highlight the nature of business profitability using DC; and link digital DI processes to specific functions promoting also internal organizational alliances to facilitate disruption.

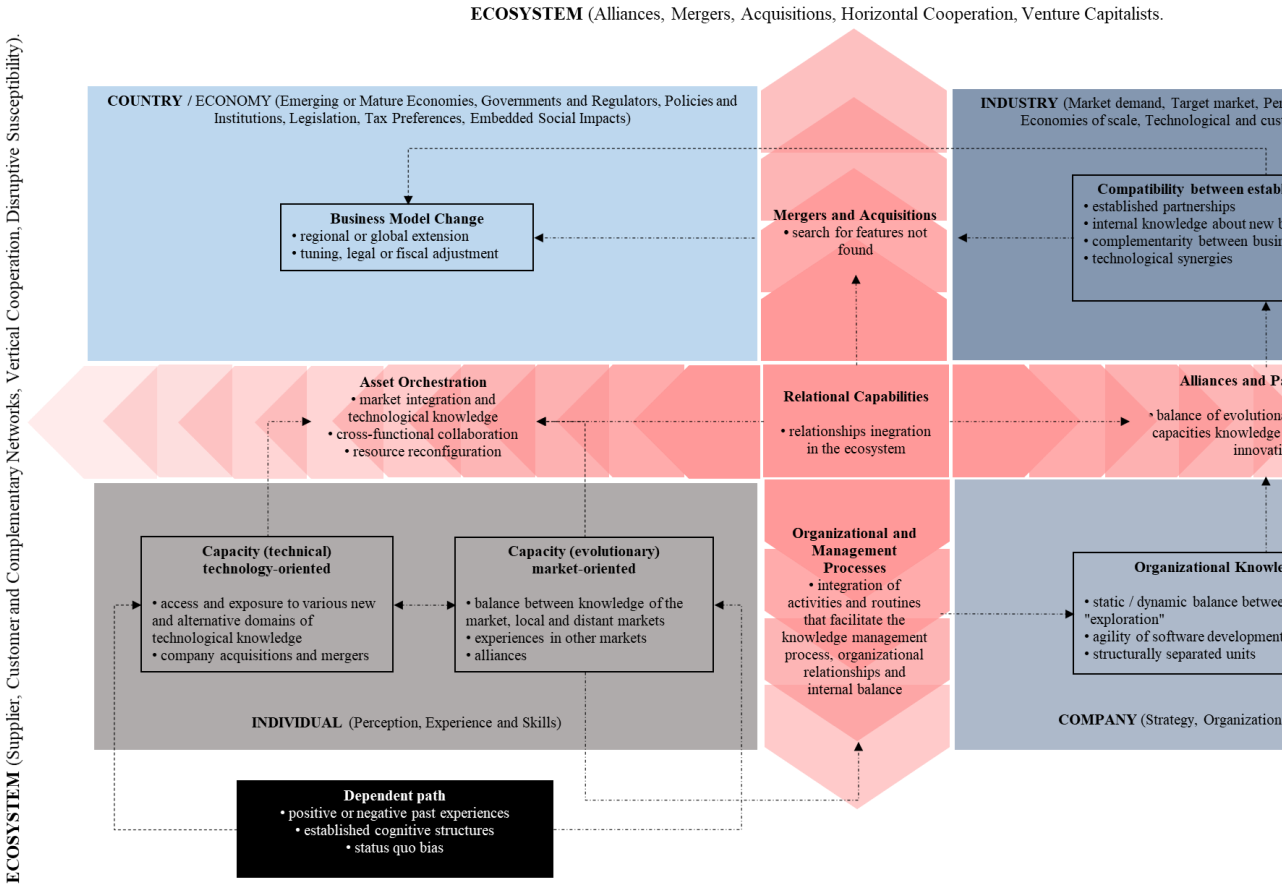

Figure 3. Digital Disruptive Innovation – Integrative Dynamic Model

Note: Model developed based on theoretical studies on digital disruption, disruptive innovation, dynamic capabiliti

Source : Elaborated by the authors based on (Helfat et al. 2009; Kranz, Hanelt, and Kolbe 2016; Si an

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