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THÈSE DE DOCTORAT

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Data-driven innovation capability of marketing: conceptualization, construction process and consequences on value proposition

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Affidavit

I, undersigned, Ludivine Ravat, hereby declare that the work presented in this manuscript is my own work, carried out under the scientific supervision of Aurélie Hemonnet-Goujot and Sandrine Hollet-Haudebert, in accordance with the principles of honesty, integrity and responsibility inherent to the research mission. The research work and the writing of this manuscript have been carried out in compliance with both the French national charter for Research Integrity and the Aix-Marseille University charter on the fight against plagiarism.

This work has not been submitted previously either in this country or in another country in the same or in a similar version to any other examination body.

Aix-en-Provence, date 15 juillet 2024



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List of publications and refereed proceedings conference papers

1) **Article 1 - Marketing innovation capabilities: a bibliographic coupling analysis, a conceptual framework, and avenues for future research, by Ludivine Ravat.**

    1. Article presented at the international academic conference of the Industrial Marketing Management Summit, Leeds, UK, January 9-12, 2024.

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3) **Article 3 - Exploring how to develop data-driven innovation capability of marketing within B2B firms: Toward a capability model and process-oriented approach, by Ludivine Ravat, Aurélie Hemonnet-Goujot and Sandrine Hollet-Haudebert.**

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4) **Article 4 - Architecting value propositions for data-driven innovation: unveiling the role of data-driven innovation capability of marketing through a configurational approach, by Ludivine Ravat, Olivier Furrer, Aurélie Hemonnet-Goujot.**

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Résumé

L'innovation pilotée par les données (IPD) devient cruciale pour obtenir un avantage concurrentiel sur les marchés industriels, soulignant le rôle stratégique de la capacité d'innovation pilotée par les données (CIPD) du marketing dans la création de propositions de valeur. Bien que le marketing soit essentiel à l'innovation, la recherche sur la CIPD et son influence sur les propositions de valeur reste limitée, nécessitant une clarification. Cette thèse inclue quatre articles fondés sur trois approches méthodologiques complémentaires. Les articles 1 et 2 adoptent une approche conceptuelle pour développer des cadres théoriques et mieux appréhender: (1) les capacités d'innovation marketing via une analyse bibliométrique, et (2) la CIPD du marketing via une revue systématique de littérature. L'article 3 adopte une approche exploratoire qualitative et abductive, pour élucider le processus de construction de la CIPD du marketing. L'article 4 adopte une approche confirmatoire avec une analyse comparative qualitative par ensembles flous (fsQCA) pour examiner comment les interactions entre les ressources de la CIPD du marketing et celles de l'entreprise façonnent les propositions de valeur pour l'IPD. Cette recherche offre une base théorique et empirique sur le concept de la CIPD du marketing pour les chercheurs en marketing stratégique et les gestionnaires. Elle identifie les ressources critiques, routines et mécanismes d'apprentissage nécessaires pour s'engager dans l'IPD. En outre, elle enrichit la littérature sur le marketing stratégique B2B en décryptant le construit de la proposition de valeur dans le contexte de l'IPD, révélant le rôle clé de la CIPD du marketing.

Mots-clés: Capacités d'innovation marketing, capacité d'innovation pilotée par les données du marketing, innovation pilotée par les données, proposition de valeur, stratégie marketing, entreprises industrielles.

Abstract

Data-driven innovation (DDI) is increasingly vital for gaining a competitive advantage in business markets, underscoring the strategic role of data-driven innovation capability (DDIC) of marketing for crafting effective value propositions. Despite the marketing function's importance in developing new products and services, research on the DDIC of marketing and its influence on value propositions for DDI remains limited, highlighting the need to elucidate this concept in business markets. This doctoral work employs three complementary methodological approaches and presents four articles. Articles 1 and 2 use a conceptual approach to develop theoretical frameworks for: (1) marketing innovation capabilities through bibliometric analysis, and (2) DDIC of marketing through a systematic literature review. Article 3 adopts an exploratory approach, conducting a qualitative study using an abductive method to unravel the construction process of DDIC of marketing. Article 4 presents a confirmatory approach using fuzzy set qualitative comparative analysis (fsQCA) to examine interactions between the resources encompassing DDIC of marketing and firm resources that architect value propositions for driving identified DDI types. This research provides a theoretical and empirical foundation for the concept of DDIC of marketing, offering valuable guidance to strategic marketing scholars and managers. It identifies critical resources, routines, and learning mechanisms necessary for marketers to engage in DDI. Furthermore, it enriches B2B strategic marketing literature by elaborating on the value proposition construct within the DDI context, focusing on the pivotal role of DDIC of marketing.

Keywords : Marketing innovation capabilities, data-driven innovation capability of marketing, data-driven innovation, value proposition, marketing strategy, business-to-business firms.

A mon père, M. Jacky Ravat,
Pour son sens de la valeur du travail,
Pour ses leçons de morale et de vie dont lui seul avait le secret

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List of abbreviations

ABS *: Association of Business Schools*
AI *: Artificial Intelligence*
AJG *: Academic Journal Guide*
B2B *: Business-to-Business*
B2B2C *: Business-to-Business-to-Consumer*
B2C : *Business-to-Consumer*
BD *: Big Data*
CEO *: Chief Executive Officer*
CIMO *: Context, Intervention, Mechanisms, Output*
CIPD *: Capacité d'innovation pilotée par les données*
CMO *Chief Marketing Officer*
CRM *: Customer Relationship Management*
DC theory : *Dynamic Capabilities theory*
DDI *: Data-driven innovation*
DDIC *: Data-driven innovation capability*
DMC *: Digital marketing capabilities*
fsQCA *: Fuzzy set qualitative comparative analysis*
ICT *: Information and Communication Technologies*
IoT *: Internet of Things*
IPD *: Innovation pilotée par les données*
IT *: Information Technology*
MIC *: Marketing innovation capabilities*
MO *: Market Orientation*
MVP *Minimum viable product*
NPD *: New product development process*
PLS *: Partial Least Squares*
R&D *: Research and Development*
RBT *: Resource-Based Theory*
S-D *: Service-Dominant (S-D) Logic*
SEM *: Structural Equation Modeling*
SMEs *: Small and medium-sized enterprises*
WoS : *Web of Science*
XR *: Extended reality*

GENERAL INTRODUCTION

1. Research motivation

1.1. Recognizing the potential of data for a competitive innovation strategy

Every time I enter my electric car, I receive a notification on my mobile phone indicating that my driving behavior is being analyzed to improve various car settings, such as electric efficiency, seat position, and the average time spent in the car. Additionally, I have the option to connect my car's application with my Alexa application to activate the heating and lights five minutes before arriving home, among many other features, provided I agree to connect my personal devices to this application to enhance my comfort and experience.

This is a striking example of how the business-to-business (B2B) automotive industry has shifted its innovation strategies from an industrial mindset to a technological one, unlocking value from data to develop a new form of innovation: data-driven innovation (DDI). According to the Organization for Economic Co-operation and Development (OECD), DDI is a key pillar of twenty-first-century growth (OECD, 2015).

Consider the example of the well-established automaker, Ford. Ford entered the digital realm by equipping its cars with sensors, Internet of Things (IoT) technology, and Artificial Intelligence (AI), all connected to an internal network of recipients, such as the software design department, AI centers, units coordinating digital services, warehouses stocking spare parts, and service dealers. These recipients process the information, enabling the marketing department to deliver new value propositions, such as predictive maintenance services. Furthermore, Ford can connect its cars to external recipients outside the firm's value chain, such as Amazon via its Alexa smart speaker, and applications like Starbucks, banks, weather information providers, and Waze for traffic updates. Consequently, Ford can enhance the lifestyle of drivers by offering data-driven services, such as ordering a Starbucks coffee through Alexa, automatically paid for through the customer’s banking application and picked up at the nearest Starbucks thanks to geolocation. If customers need help with parking, Ford can now assist drivers in finding empty parking spots.

Ford's value propositions are expanding beyond their traditional industries. The marketing department is working on developing an array of data-driven services by

collecting, analyzing, and proposing relevant customer insights for DDI, extracted through the connectivity and interactivity of digital technologies such as sensors, IoT, and AI, to increase the benefits and usage for customers. As stated by former Ford Chief Executive Officer (CEO) James P. Hackett, in Ford's 2017 Annual Report[1]:

> *Breakthrough technologies are transforming nearly every aspect of the vehicles we build and how people use them, demanding a rethink of how we design transportation systems.*

Using data to develop value propositions for innovation outcomes is not a novel concept. In this regard, marketing has long been recognized as the voice of the customer (Griffin & Hauser, 1993). Specifically, marketing can be defined as the function of the firm that deals with the mobilization of organizational resources for the acquisition and integration of market-based knowledge into the value-creating activities of the firm, and the coordination of activities required for the firm to reach its targeted customers with superior products and services (Weerawardena, 2003a). The strategic marketing literature states that the primary role of marketing in the competitive advantage process is innovation (Varadarajan, 2010; Weerawardena, 2003a), highlighting innovation as a prevalent marketing theme. Innovation is an iterative process that begins with identifying a problem or unmet customer needs, leading to the development and production of a solution. It includes market research, invention, product development, commercialization, and continuous product improvement, involving market information at each step of the process (Garcia & Calantone, 2002; Thornhill, 2006).

What is new and different today is the type of data, i.e., Big Data (BD), and the modern technologies employed to capture, analyze, and integrate it to create value across society, for products, processes, or markets. BD can be defined as the large-volume, high-velocity, and heterogeneous data that emerges from the increasing digitalization of transactions, interactions, communications, and everyday experiences (McAfee et al., 2012). It has been predicted that every day in the world, by 2025, an estimated 463 exabytes of data will be generated, equivalent to 212,765,957 DVDs (Digital Versatile Disc)(World Economic Forum, 2019). BD facilitated a proliferation of digital technologies, resulting in traditional industries catching the wave of digitalization to shift towards Industry 4.0 or the "industrial internet," as earlier proclaimed by former CEO of General Electric, Jeff Immelt, at the 2012 conference "Mind and Machines." Digitalization provides new value-creating and revenue-generating opportunities (Parida et al., 2019), becoming key to innovation activities for achieving competitive advantage.

[1] https://shareholder.ford.com/Investors/financials/default.aspx

From a practical standpoint, the following examples of DDI below illustrate how traditional industries entered the era of the "industrial internet" and depict different types of DDIs that may exist[2]:

- *Digitalized service innovation*: This reflects how a company uses product-user interactions to develop a platform of personalized services for their customers. It provides an array of data-driven service offerings by connecting their customers with B2B third-party entities. For example, Peloton collects data on how users interact with its sports machines and shares this data with external B2B partners, such as nutritionists, trainers, sportswear providers, and different user communities, supporting new innovative offerings and revenue streams.

- *Data monetization*: General Electric Aviation collects real-time interactive data on pilots' interactions with airplane engines, providing customers with insights on how to optimize flight patterns for greater energy efficiency. The company monetizes this service, thereby creating an additional stream of revenue and a new data-driven innovative offering.

- *Global integrated solution*: In 2010, Caterpillar decided to expand its technology adoption from a few select products to all its products to meet growing customer needs in the new digital world. This means offering an entire solution of connected products and services. As a result, they were able to determine how best to adopt connected products for their businesses and what kind of digital services to offer. These new data-driven service value propositions manifest in several interface offerings, such as CAT Connect, Minestar, and Insight, enabling Caterpillar's customers to select the subscription they prefer from a menu of different options.

Below is an example of one of the data-driven products and services in Caterpillar's portfolio, extracted from its global integrated solution offering, CAT Connect.[3].

[2] https://mitsloan.mit.edu/ideas-made-to-matter/why-data-driven-customers-are-future-competitive-strategy

[3] https://www.cat.com/en_GB/support/operations/cat-connect-solutions/energy-transportation.html



Figure 1-1. A global integrated solution offering, CAT Connect

This data, derived from an array of digital technologies, guides competitive strategy for companies, as agreed and explained by various actors, governments, businesses, and academics in the following subsection.

1.2. Understanding digital competitive strategy: a pluralistic perspective

The following statements and statistics confirm that data and the ability to use it are essential for innovation, growth, and competitive advantage for industries.

First, from a *governmental perspective*, as illustrated by former Chancellor Angela Markel, at the World Economic Forum, in Davos, in 2015:

> *We must- and I say this as the German chancellor in the face of a strong Germany Economy – deal quickly with the fusion of the online world and the world of industrial production. In Germany, we call it Industrie 4.0…because otherwise, those who are the leaders of the digital domain will take the lead in industrial production. We enter this race with confidence. But it's a race we have not yet won.*

Second, from *a financial and economic perspective,* the European commission[4] established some impressive projected statistics regarding the future of data strategy:

[4] European data strategy, https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/european-data-strategy_en



Figure 1-2. 2025 projected figures on data by the European Commission

Third, from a *business perspective*, a recent survey of 200 firms revealed that digital product development is expected to enhance efficiency by 19% and decrease time-to-market by 17% on average (Geissbauer et al., 2019). While these figures are notable, they are eclipsed by the achievements of the top 10% of digital product leaders (Geissbauer et al., 2019). This elite group has managed to boost efficiency by 31%, shorten time-to-market by 28%, and cut production costs by 20%, compared to an average reduction of 13% (Cooper, 2021).

Lastly, from an *academic perspective*, DDI is regarded as an approach that is gaining momentum among academics to enhance innovation in companies by acquiring, analyzing, and acting upon consumer data (Rindfleisch et al., 2017). The graphic below illustrates the number of peer-reviewed articles related to the topic of DDI, extracted from a Web of Science research[5]. The main scientific research areas where the topic of DDI is proliferating are business economics, computer science, and engineering. The first academic article on DDI was published in 2014 (n=1). Nine years later, a substantial increase in research was evident, with a total of 53 articles published in 2023, demonstrating a confirmed interest in this recent yet growing phenomenon.

[5] https://www-webofscience-com

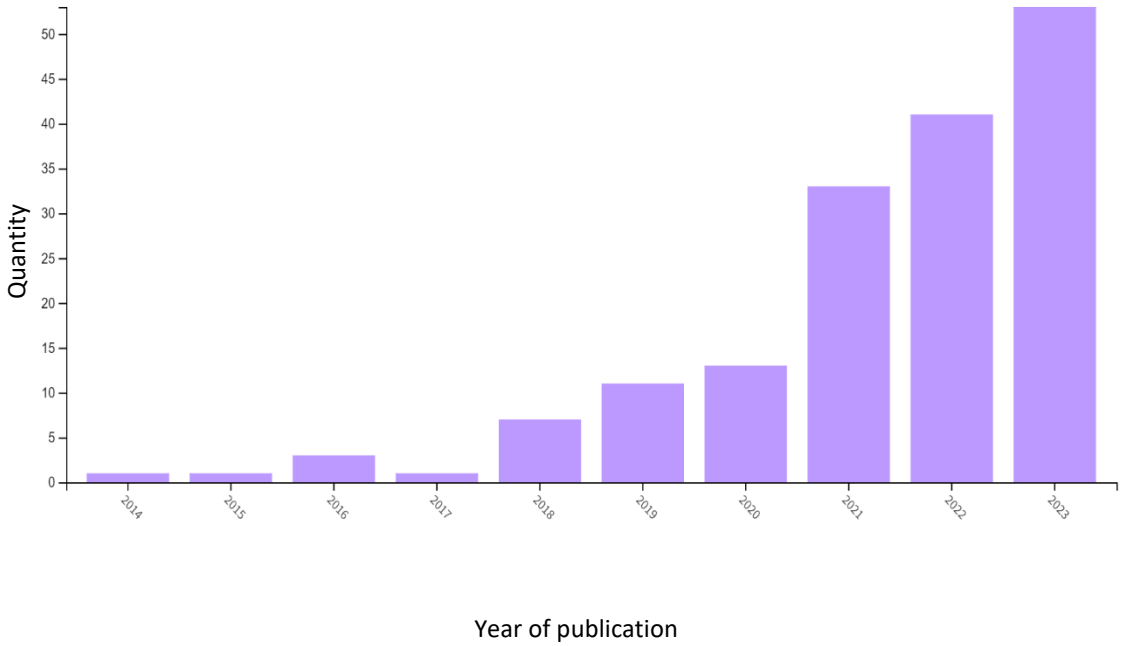


Figure 1-3 Peer-reviewed articles on the topic of data-driven innovation

In summary, we recognize the potential of data extracted from various modern digital technologies to develop a competitive innovation strategy. Specifically, this data assists companies in offering different types of DDI to create additional revenue sources and add value for customers. The next section focuses on the role of marketing, particularly through the deployment of marketing innovation capabilities, in achieving the DDI roadmap in B2B markets.

1.3. Marketing innovation capabilities as a contributor to DDI in B2B markets

Marketing's role in the organization is to help define, own, and manage the organization's customer interface (Sridhar & Fang, 2019) and to strategize with decisions and actions focused on creating value for stakeholders to build a sustainable differential advantage relative to competitors (Morgan et al., 2019; Varadarajan, 2010). This requires specific capabilities that enable the firm to carry out activities necessary to move its products or services through the value chain (Day, 1994). These capabilities are market-oriented by nature (Kozlenkova et al., 2014). Given that the primary objective of innovation is the development of new or modified products and processes to improve organizational performance—and that superior performance inherently depends on marketing's ability to understand and satisfy customer needs better than competitors—it is widely accepted that market-oriented capabilities and innovation are intrinsically linked constructs (Augusto & Coelho, 2009; Hauser et al., 2006). In the context of DDI, marketing departments develop and use digital resources to create differentiated and sustainable

value for customers (Bharadwaj et al., 2013). The acceleration of an organization's digitalization enhances marketing's role in firms' innovation strategies. From a product standpoint, the advent of digital technologies allows organizations to augment their capabilities with new offerings, whether through new products or services (Sridhar & Fang, 2019).

This has led to new research questions for industrial marketing scholars and managers, organized into two main dimensions.

First, a research stream on new marketing capabilities for practicing DDI has emerged over the past 15 years, particularly those related to digitalized marketing capabilities in business markets. There is a growing interest in understanding how firms today are equipped with resources, skills, and capabilities to cope with the digitalization era, thus expanding research in digital marketing literature (Kannan & Li, 2017; Lamberton & Stephen, 2016; Yadav & Pavlou, 2014). As emphasized by Rust (2020), advances in technology, particularly AI, BD, the Internet, and the expansion of networks, are creating a revolution in marketing that renders the 1960s-style Price, Product, Promotion, and Place marketing mix (4 Ps) increasingly obsolete. This transformation is reshaping marketing and compelling marketing managers to radically change and adapt their capabilities. For example, there is ongoing research on digital marketing capabilities (De Luca et al., 2021; Herhausen et al., 2020; Mikalef et al., 2018) and more recently on data-driven innovation capability (DDIC) (Sultana et al., 2022a, 2022b).

Second, the trend toward the servitization of industries is gaining attention in the context of DDI. Technological advances have enhanced firms' capabilities to communicate with customers, collect and store customer information, and analyze this data (Rust & Huang, 2014). This impacts the marketing department by deepening customer relationship capabilities and expanding the service economy. With service now dominant in the economy (Vargo & Lusch, 2004), research linking marketing capabilities, DDI, and servitization has begun to emerge (Barrett et al., 2015; Kowalkowski et al., 2024; Martín-Peña et al., 2019). More specifically, some research is exploring which types of servitized DDI could represent the future of digital competitive strategy, such as data-driven services (Ardolino et al., 2018; Harrmann et al., 2022), data monetization (Ritala et al., 2024), and global integrated solutions (van der Borgh et al., 2023).

In conclusion, we assessed the importance of integrating marketing innovation capabilities, such as DDIC of marketing, into the framework of DDI. We will now discuss how value propositions are linked to these marketing innovation capabilities as a strategic tool to achieve DDI.

1.4. Value proposition: a strategic tool for DDI

With the growing trend of servitization applied to DDI, researchers have begun to explore a third dimension: the value proposition. In other words, it is both reasonable and timely to reconsider the implicit assumptions embodied in the term "marketing," shifting the emphasis from marketing products to cultivating customer relationships (Rust et al., 2010).

From the standpoint of "service" (without an "s" at the end), the servitization perspective applied to DDI involves how firms can better serve their customers by creating value propositions, whether through services or products (Michel et al., 2008; Vargo & Lusch, 2008). These value propositions “should be the firm's most important organizing principle” (Webster, 2002). Initially widespread in the B2B environment, the notion of value proposition has become one of the most commonly used terms in the business world (J. Anderson et al., 2006) and has received continuous attention from researchers. Since its first appearance in 1990, 3,647 peer-reviewed articles have been identified, with one-third published in the most recent period from 2019 to 2024[6].

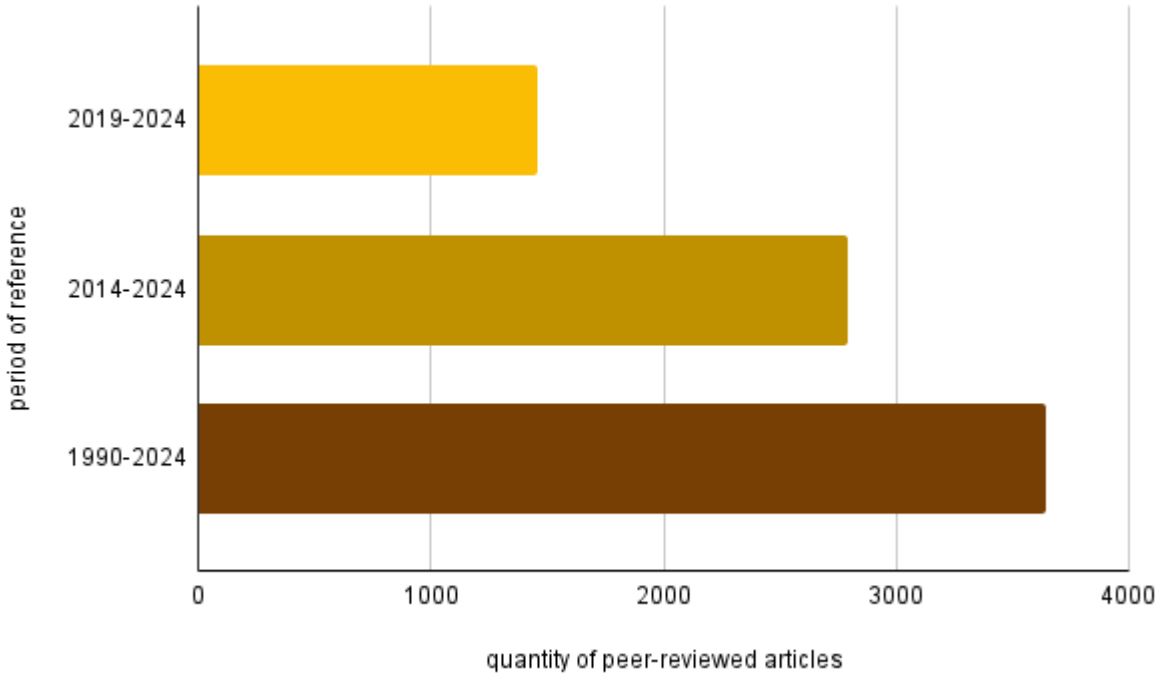


Figure 1-4. Peer-reviewed articles on the topic of value proposition

Moreover, the value proposition is crucial for the value creation process (Payne & Frow, 2005). The definition of a value proposition in marketing proposed by Payne et al. (Payne et al., 2017, p.472) supports our research context:

[6] https://www.webofscience.com

A value proposition is a strategic tool that facilitates an organization's ability to share resources and offer a superior set of values to targeted customers.

The authors highlight the strategic role of marketing in developing the value proposition, emphasizing the importance of resources such as digitalization and innovation, and the need for an appropriate set of values for the customer to gain a competitive advantage (Day & Wensley, 1988; Porter & Kramer, 1985; Slater, 1997). This differentiation allows innovative offerings to stand out from those of competitors.

The value proposition is widely recognized as a tactical tool for achieving DDI, necessitating a constant focus on innovating products or services. Emphasizing customer data is fundamental for creating new offerings and revenue streams in the digital era (Subramaniam, 2022). The value proposition, as an integrator of marketing capabilities (Moorman & Day, 2016), should underscore the importance of marketing resources, particularly those embedded in DDIC, to strategically design a value proposition for DDI.

In conclusion, marketing literature has established that marketing's role involves activities, institutions, and processes for creating, communicating, delivering, and exchanging offerings that provide value to customers, clients, partners, and society at large[7]. Moreover, DDI is a key pillar of twenty-first-century growth, and the design and development of data-driven innovations are crucial for survival in today's market and for creating value (OECD, 2015).This context reveals a new strategic organizational paradigm for B2B marketing departments in their value-crafting process connected to innovation. It is time to pave the way for "4.0 industrial internet marketing." Based on the previous analysis about DDI, marketing innovation capabilities, and value proposition, we propose a representation of this strategic organizational paradigm for B2B marketing departments, summarized according to the three aforementioned dimensions for DDI:

[7] American Marketing Association, https://www.ama.org/the-definition-of-marketing-what-is-marketing/

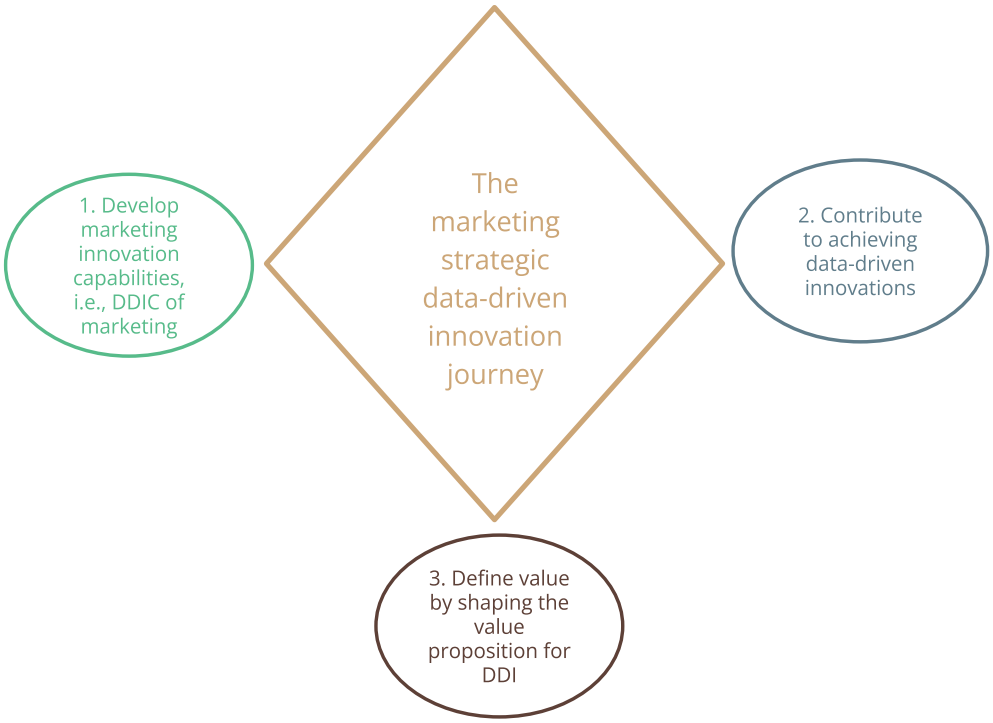


Figure 1-5. The B2B marketing strategic data-driven innovation journey

To address this strategic organizational paradigm of B2B marketing departments, this doctoral work is based on four successive articles: two using a conceptual approach, one using an exploratory approach, and one using a confirmatory approach.

In this context, the interest of this research is twofold for B2B strategic marketing literature. Firstly, at the academic level, it addresses the issue of marketing innovation capabilities, specifically digital marketing capabilities, by seeking to conceptualize the DDIC of marketing. Secondly, this study aims to analyze the value proposition that arises from the use of the DDIC of marketing and firm resources, and how both coalesce to drive different types of servitized DDIs.

Finally, at the managerial level, this thesis helps guide managers in their decision-making regarding DDI orientation by detailing a capability construction process for the DDIC of marketing, and then assists them in formulating a value proposition to create a sustainable competitive advantage.

The general structure of the introduction is presented below. We started by presenting our research motivation, explaining the significance of the study. It then addresses the positioning of the dissertation, highlighting the context, the concept, and the consequences under investigation. The literature review and research gaps section evaluates previous studies and identifies areas on which we based our research. The theoretical framework outlines key concepts and theories that supported our reflection. This is followed by the research problem and the research questions that guide the study.

The research methodology details the approaches and techniques used. Finally, the dissertation outline provides a roadmap for the subsequent parts ad sections, ensuring a clear and structured flow.



Figure 1-6. Structure of the introduction

The following section presents the positioning of the research according to a three-dimensional perspective, gathered into an integrated "3 C" framework.

2. Positioning of the dissertation

The detailed research motivation of this dissertation illuminates three interrelated dimensions of our work.

First, our research interest focuses on DDI in B2B firms as the *context* of our study. We aim to analyze the specificities of DDI, understand why this topic is gaining momentum in B2B to maintain a strategic competitive advantage, and explore the role of marketing in contributing to DDI strategies.

Second, our research interest posits marketing innovation capabilities as our focal marketing *concept*. We aim to advance our knowledge of marketing innovation capabilities in business markets by delineating their boundaries, influence, and composition, and by examining them in the era of Industry 4.0.

Third, our research interest emphasizes the value proposition as a *consequence* of applying the concept of marketing innovation capabilities in the context of DDI. We aim to confirm how the deployment and use of marketing innovation capabilities can significantly shape specific value propositions in the context of DDI.

Thus, the identified research object that intersects these three dimensions is *Data-Driven Innovation Capability (DDIC) of Marketing.* We seek to conceptualize it, describe how to build it, and confirm its impact on value propositions.

We hope this research topic will enrich our knowledge of strategic marketing literature concerning marketing innovation capabilities, DDI, and value propositions in business markets.

Figure 1-7. provides a synopsis of the positioning of this dissertation.

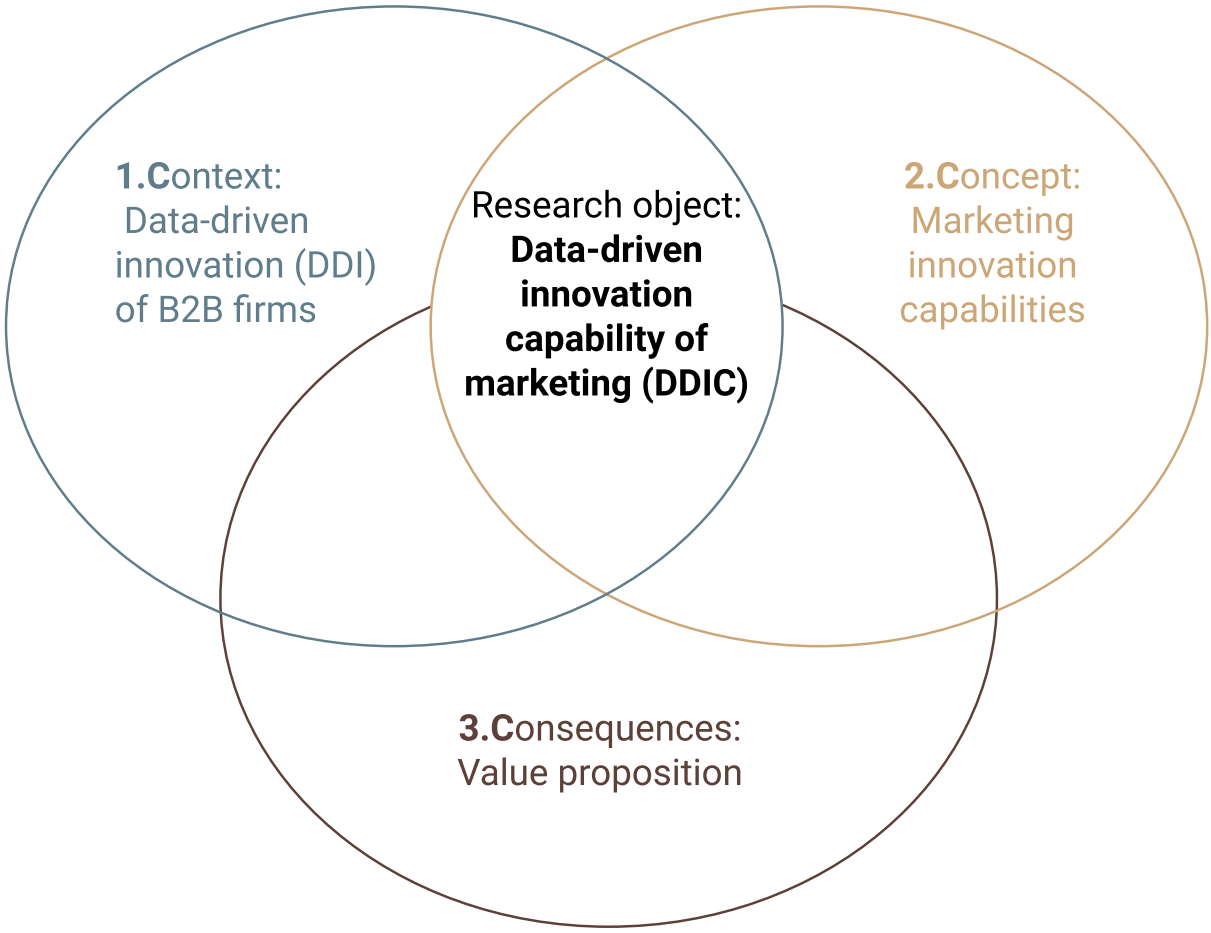


Figure 1-7. A 3 C framework research positioning

To understand why it is important to study DDIC of marketing for both academics and practitioners, we must thoroughly examine each of the three "C"s of our research positioning framework. For this purpose, the following section reviews the literature on (1) the *context* of DDI, (2) the *concept* of marketing innovation capabilities, and (3) value proposition as a *consequence* of using DDIC of marketing.

This literature review illuminates four major gaps, which we summarize into three main dimensions at the end of this section (Box 1-1.).

3. Literature review and research gaps

The literature begins by introducing our *context*, i.e., DDI, whose scope is closely linked to the exploration of our research object, i.e., DDIC of marketing. We then establish our study's *concept*, in which DDIC of marketing is anchored, specifically marketing innovation capabilities. Lastly, we analyze one potential *consequence* of using DDIC of marketing by depicting the main aspects of value proposition in business markets. By interrelating the context (DDI), the concept (marketing innovation capabilities), and the consequence (value proposition), we conclude this literature review section by identifying four research gaps. These gaps then guided us in addressing the topic of DDIC of marketing through four articles and three methodological approaches, included in Part 1, 2 and 3 of this dissertation.

3.1. Data-driven innovation

To clarify the DDI *context* of this study, several elements of discussion converge in the strategic marketing and management literature, which we detail below: (1) the concept of innovation, (2) the role of marketing in innovation (3) the digitalization of B2B firms, (4) the scope of the DDI definition, (5) DDI's impact on marketing innovation capabilities, and (6) a servitization perspective on DDI.

3.1.1. The concept of innovation

The first element involves understanding what innovation is from the perspectives of economic, strategic, and management literature.

Schumpeter (1934) was among the pioneers in theorizing about innovation, describing it as either new methods of operation or enhanced, distinctive combinations of production factors. Drucker (1985) emphasized that innovation should be embraced and leveraged as an opportunity, culminating in the creation of a new product or service or modifying an existing one. Additionally, Rogers (1983) defined innovation as any idea, practice, process, or product perceived as new by an individual, involving the translation of a novel solution into practical use. Burgelman et al. (1996) further elaborated that innovations result from a series of activities leading to new, marketable products and services or novel production and delivery systems. Moreover, innovation is a broad topic, and several disciplines refer to various aspects of innovation, including technology, quality, marketing

and operations management, product development, organizational behavior, and economics (Christensen, 1997).

In the innovation literature, innovations are typically analyzed from several perspectives: the processes (how innovation occurs), the outcomes (what is innovated) (Crossan & Apaydin, 2010), or the focus on resources versus practices (Skålén et al., 2015). These perspectives are usually framed within different forms of innovation, such as product, service, process, and business model innovations (Crossan & Apaydin, 2010), each contributing uniquely to the advancement of industries and markets (Ranta et al., 2020). Product innovation encompasses products that are perceived as meaningfully new, novel, original, or unique (Henard & Szymanski, 2001; Wang & Ahmed, 2004). Process innovation involves the introduction of new production methods, new management approaches, and new technologies aimed at enhancing production and management processes (Wang & Ahmed, 2004). Similarly, service innovation pertains to the introduction of new services to the market or significant improvements to existing services, involving important changes to their basic characteristics, intangible components, or intended purposes (Santamaría et al., 2012). Finally, business model innovation occurs when a firm adopts a novel approach to commercializing its underlying assets, fundamentally altering the way the business operates and delivers value (Gambardella & McGahan, 2010).

Each of these innovation forms plays a critical role in driving competitive advantage and fostering growth within organizations and innovation has become a cornerstone of continued development and sustainable competitive advantage(Friedrich et al., 2010) that generates value for companies (Cui & O'Connor, 2012; Miron-spektor et al., 2011). Innovation researchers agree that innovation is the most fundamental source for firm's success and survival in such a competitive complex and intellectual environment (Abbing, 2010; Cho & Pucik, 2005).

Successful innovation has the potential to transform marketplaces, enhance societal well-being, and establish new industry leaders (R. K. Chandy & Tellis, 2000). It is central to a firm's ability to differentiate itself from competitors and achieve sustainable competitive advantage (Porter, 1985). Firms with high innovation capability consistently bring high-quality products to market faster, more frequently, and at lower costs than competitors (Lawson & Samson, 2001). An innovation capability lies in the ability to introduce new products, processes, and systems through continuous knowledge and idea transformation, facilitated by marketing and process innovation that adds value for customers (Lawson & Samson, 2001).Firms with a strong innovation orientation stand out by the degree of innovation in their offerings (Hooley & Greenley, 2005). From an industrial perspective, innovative activities are crucial to the success of industrial firms, and a strong innovation orientation is positively correlated with competitive advantage (Hooley & Greenley, 2005; Hult et al., 2004).

In conclusion, it is not surprising that innovation is considered one of the most important topics in business research (Hauser et al., 2006). Building on Drucker's premise (see Mohr & Sarin, 2009) that marketing and innovation are crucial to the success of any firm, it is clear that innovation has always received focused attention. Therefore, in the context of our research, it is essential to conceptualize innovation within the specific context of DDI. Additionally, the next subsection helps us understand how this strategic activity is connected to marketing.

3.1.2. The role of marketing in innovation

This second element evaluates the role of marketing in innovation. Marketing scholars have shifted the innovation discourse from classical economic perspectives, such as Schumpeterian logic (J. A. Schumpeter, 1942), to a more nuanced focus on a firm's processes for developing new products, understanding customer needs, leveraging external networks, and fostering a culture conducive to innovation (R. Chandy et al., 2006; Hoffman et al., 2010; Rindfleisch & Moorman, 2001; Tellis et al., 2009).

Marketing academics assert that innovation is a critical area where marketers should be deeply involved (Hauser et al., 2006). The marketing discipline is uniquely positioned to contribute significantly to the ongoing discussion about innovation's importance, necessity, and process (Griffin et al., 2013). Acting as the voice of the customer within the firm (P. F. Anderson, 1982), the marketing department provides essential market intelligence (Kohli & Jaworski, 1990), which is crucial for successful innovation.

Innovation alone does not guarantee long-term success; rather, a firm must possess the ability to disseminate market intelligence throughout the organization and effectively market its offerings. In this context, innovation and marketing are complementary, synergistically enhancing marketplace performance (Ngo & O'Cass, 2012). Therefore, it is crucial for firms to understand how market knowledge is transformed into innovation outcomes through the integration of innovation and marketing (Ngo & O'Cass, 2012). This integration allows for the incorporation of knowledge from various functions, thereby enhancing innovation (Leiponen & Helfat, 2010).

Specifically, marketing literature often links the role of marketing to the new product development (NPD) process as a contributor to the financial outcomes of the firm, such as the extent to which the new product achieves its sales and profit objectives (Atuahene-Gima, 2005; Gatignon & Xuereb, 1997; Griffin & Page, 1996; Montoya-Weiss &

Calantone, 1994). A commonly accepted explanation for the positive contributory role of the marketing department on firm financial performance through innovation activities is its ability to reduce various risks, such as financial or technical risks, during NPD (Ayala-Cruz, 2016; Ortega et al., 2017). Firms may face significant uncertainty and various risks in NPD. The marketing function, based on its ability to capture and diffuse market insights within innovation-oriented firms and its ability to commercialize new products effectively (Mu, 2015), facilitates leveraging new product advantages for survival or customer value leadership (Durst et al., 2018), thus improving NPD effectiveness in competitive markets (Dangelico et al., 2013).

Moreover, firms may deploy intensive marketing proficiencies, particularly in the early NPD stages where generating new product ideas and conducting detailed market analyses are of high importance. This enables specifying how projects potentially benefit customers (Schmidt & Calantone, 2002). In these earlier stages, excellence in marketing execution will reveal all relevant information about market and consumer preferences, as well as competitive products and strategies. This knowledge base simplifies future NPD stages by quickly and significantly narrowing the number of product-market combinations. Prototype development and testing become easier because fewer designs need to be considered, focusing on those that meet customer expectations. As a result, the probability that the product ultimately provides unique customer value is enhanced (Harmancioglu et al., 2009) To summarize, marketing proficiencies produce superior product-market knowledge throughout the NPD process. This superior knowledge may positively impact new product profitability, speed, advantage, and customer needs met (Harmancioglu et al., 2009).

Another perspective from the service industry emphasizes that the profusion of analytics is changing the nature of the customer-firm connection, thereby disrupting existing value propositions (Huang & Rust, 2017). Specifically, it enhances the marketing ability to develop precise actions related to innovation activities, such as spotting customer behavior patterns, ensuring real-time market responsiveness, and achieving data-driven market ambidexterity (De Luca et al., 2021). As a result, marketing departments invest in BD because it positively influences service innovation and is perceived as a source of competitive advantage (De Luca et al., 2021). Thus, the marketing function is tightly linked to firm innovation activities, whether from a product or service viewpoint.

We now describe how the digitalization of B2B firms has redefined the boundaries for innovation.

3.1.3. The digitalization of B2B firms

The third element of discussion lies in the foundational aspect that digitalization represents and how it has reshaped the way companies organize for innovation to maintain their competitive advantage. Digitalization has gained momentum recently as it is increasingly identified as the new source of "creative destruction" (Schumpeter, 1950, p.83) and aims to deliver innovative applications that may result in strategic advantages (Akter, Wamba, et al., 2021).

Concretely, digitalization has led many companies to accumulate vast amounts of data daily from multiple sources, providing them with new routes to markets, new opportunities for relationship development, and new options for product development (Hoyer et al., 2010). Digitalization, through the combination of various technologies (e.g., cloud technologies, sensors, BD, 3D printing), opens unforeseen possibilities and offers the potential to create radically new products and services (Rachinger et al., 2018). It provides new functionality, higher reliability, greater efficiency, and optimization opportunities that exponentially increase the value manufacturing companies deliver to customers (Porter & Heppelmann, 2015).

Companies that can capitalize on the potential of digitalization driven by BD and analytics will outperform their peers in revenue growth by extracting valuable insights that foster their innovation strategy. This emphasizes the expanded role of the marketing department with the rise of industrial digitalization, as connections with customers are essential for understanding their current and latent needs for driving DDI projects. These connections are facilitated and multiplied through a vast array of digital resources.

In conclusion, digitalization represents the use of digital technologies to innovate and provide new revenue streams and value-producing opportunities in the industrial environment.

We present the extent of the DDI definition available in the academic literature in the next subsection.

3.1.4. The scope of the DDI definition

Fourth, based on the major academic definitions of DDI in strategy and management, we have summarized the fundamental elements to delineate the theoretical boundaries of DDI.

The scope of DDI involves several key attributes. Firstly, *data* is used as a core resource in the innovation process, characterizing DDI. Secondly, DDI employs *advanced*

technological tools and techniques, such as BD analytics, machine learning, deep learning, AI, sensors, and IoT. These technologies are pivotal for processing and analyzing extensive datasets to derive new insights. Thirdly, DDI facilitates the *innovation of products and services* by leveraging data. Additionally, DDI helps firms create *value* for themselves and their customers. Finally, through DDI, companies can sustain a *competitive advantage* by continuously enhancing their product innovation efforts.

As DDI is still a nascent phenomenon, there is no consensus on its definition. Various perspectives from the strategic and management literature have been compiled in Table 1-1. to summarize the main definitions of DDI.

Table 1-1. Definitions of DDI from the academic literature

Authors/Year/Journal	**Definition of DDI**
Alghamdi & Agag, 2024 *Journal of Retailing and Consumer Services*	DDI refers to a collection of processes employing tools, such as "big data analytics", and methodologies, such as machine learning techniques and artificial intelligence, to generate fresh insights from existing datasets. Firms can maintain a competitive advantage via data-driven innovation, research, and development, as well as the creation of new product and service.
Babu et al., 2024 *Annals of Operations Research*	DDI refers to the innovation process that adopts techniques and technologies for processing and analyzing big data using data-based decision processes.
Eriksson & Heikkilä, 2023 *Industrial Marketing Management*	DDI refers to innovation that utilizes data as a core ingredient.
Hossain et al., 2024 *Annals of Operations Research*	DDI produces innovative outputs from data and is a primary source of competitive advantage for firms.
Rindfleisch et al., 2017 *Review of Marketing Research*	DDI helps firms to exploit their existing value and enhance their product innovation by gathering and analyzing data.
Sultana et al., 2022 *Technological Forecasting and Social Change*	DDI is series of innovation processes that apply techniques (such as big data analytics) and technologies (e.g., machine learning, deep learning, and artificial intelligence) to extract meaningful value from data to generate innovative results.

The following subsection portrays DDI's impact on marketing innovation capabilities.

3.1.5. DDI's impact on marketing innovation capabilities

The fifth element that allows for the apprehension of the concept of DDI is how it has changed and impacted the configuration of a firm's organizational capabilities. This involves the marketing department considering the acquisition, release, or adaptation of new resources for capturing customer data, which is crucial for new offerings and revenue streams in the digital era (Subramaniam, 2022).

According to prior research, firm marketing capabilities are tightly associated with innovation (Merrilees et al., 2011). The role of marketing is to provide knowledge about current and future customers, which is essential to the success of innovation (Griffin et al., 2013), specifically through its digitalization-related capabilities that positively influence the innovation of B2B companies (Lenka et al., 2017). Investments in BD, analytics, and digital technologies improve marketing's ability to respond to market trends by creating new offerings (De Luca et al., 2021).

From a strategic marketing perspective, marketing capabilities comprise the ability to innovate and deliver superior customer value (Day, 1994). In this ever-evolving digitalized world and connected business environment, marketing has transformed its innovation capabilities to offer an appropriate and differentiated set of customer values to gain a competitive advantage (Porter, 1985; Slater, 1997). Consequently, it is essential to understand which set of resources and processes are necessary to build these inherent innovation marketing capabilities. As firms increasingly adopt digitalization in their innovative offerings, they must invest significant resources in building new capabilities to support DDI initiatives within their organizations and maximize the potential for value creation (Lenka et al., 2017).

In conclusion, DDI impacts the nature and composition of marketing innovation capabilities. This fifth characteristic aligns with our research topic, which involves conceptualizing the new phenomenon of DDIC of marketing by unraveling its building components.

The last subsection unveils a servitization perspective on DDI.

3.1.6. A servitization perspective on DDI

The final element involves understanding how DDI has steered B2B companies' innovative offerings toward more servitization, whether the firms are product- or service-oriented. It is essential to focus on how digital technologies are augmenting and transforming core products by providing new values to consumers, fostering the creation

of data-driven augmented services (Kannan & Li, 2017). This strategic shift, known as digital servitization, can be defined as a transition process from pure products and add-on services to smart product-service systems (Kohtamäki et al., 2020).

Servitization is a strategy employed by product providers to add accompanying services to their product range, a growing trend for manufacturing firms (Carlborg et al., 2014; Neely, 2008; Ostrom et al., 2010). Servitization is often seen on a continuum from pure products to pure services, where the relative importance of services over products in the value proposition steadily increases (Oliva & Kallenberg, 2003; Raja et al., 2013). Through the use of digital technologies, IoT, and IT capabilities, along with tools like sensors and BD analytics, manufacturers are increasing their service innovation offerings and enhancing customer value by improving the usage of the product fleet being operated (Ardolino et al., 2018; Luz Martín-Peña et al., 2018).

This shift toward service orientation leads to different DDI types, such as new digitalized service innovations, data monetization offerings or global integrated solutions. Below, we outline some representative examples from the B2B industry.

Table 1-2. Relevant examples and explanation of three different DDI types.

DDI type	Company's example	Description
Digitalized service innovation	Schneider Electric	Schneider Electric's B2B platforms improve operational efficiency, facilitate customised products and offer advanced services, known as product-as-a-service.
Data monetization offering	John Deere	John Deere uses its Operations Center to collect and analyze data from agricultural equipment, weather conditions and soil. This data monetization generates additional revenue and provides farmers with valuable insights to optimize their operations and increase productivity.
Global integrated solution	Rolls-Royce Corporation	To meet exponentially increasing customer demands for propulsion system performance and delivery efficiency, Rolls-Royce has digitalized its value chain with AI and digital twins, optimizing efficiency and cost across product design, development and testing, creating value at multiple levels.

In this servitization-centered DDI approach, marketing capabilities are essential for understanding and engaging customers in DDI and for clearly articulating the DDI value proposition to potential customers (Eriksson & Heikkilä, 2023). These capabilities are reflected in resources and are vital for executing key DDI activities such as conceptualizing customers' needs, gathering data from various sources, refining data for product innovation, storing and managing insights, and ultimately distributing, presenting, and analyzing market feedback (Akter, McCarthy, et al., 2021). According to the S-D Logic (Vargo & Lusch, 2004), operant resources—such as competencies and organizational processes—are key elements that act on operand resources (e.g., physical resources like facilities and materials) to produce effects. Operant resources are essentially the skills, knowledge, and processes that an organization uses to transform operand resources into valuable outcomes.

In the context of DDI, marketing operant resources, referred to as the DDIC of marketing, involve the strategic use of digital technologies and data. These digital resources include IoT devices, BD analytics, and user interfaces or platforms. By leveraging these technologies, organizations can drive servitized DDI.

For example, IoT devices can collect real-time data from various sources, which can then be analyzed using BD analytics to derive actionable insights. The DDIC of marketing can then use these data resources, known as insights, to develop new products or services that meet the specific needs of customers. Integrating operant resources, like DDIC of marketing, with digital technologies, in the DDI context, enables organizations to transform data into meaningful innovations, enhancing their ability to serve customers, and creating differentiated and sustainable value for their customers, leading to a competitive advantage. This approach aligns with the broader goal of S-D Logic, which emphasizes the importance of service and value co-creation in achieving business success (Bharadwaj et al., 2013).

In conclusion, DDI facilitates the manifestation of servitization offerings. This perspective emphasizes the role played by marketing operant resources, i.e., competencies and skills that facilitate the management of insights extracted from the operand IT infrastructure resources.

The servitization perspective on DDI involves creating value propositions by integrating firm and marketing resources.

We now present a literature review on the concept that motivated our research, namely, marketing innovation capabilities. This review spans from describing the nature of a capability to revealing what is known about DDIC of marketing in the strategic marketing literature.

3.2. From capabilities to data-driven innovation capability of marketing

This section reviews the literature on capabilities in strategic marketing and management, particularly those connected to innovation and the marketing department. We examine the concept of capabilities according to the following aspects: (1) what a capability is, (2) what marketing capabilities are, (3) what marketing innovation capabilities are, and (4) what the data-driven innovation capability of marketing is.

3.2.1. What is a capability ?

Anchored in the strategic management literature, the term 'capability' has been labeled in various ways (Collis, 1994). Some authors refer to it as core competences, while others call it collective skills, complex routines, best practices, or organizational capabilities (Schreyögg & Kliesch-Eberl, 2007). Despite this variety, the term 'capability' has gained predominance and is still recommended and commonly used in today's literature, making it suitable for our work.

At the firm level, capabilities are broadly viewed as the processes and routines through which a firm transforms its resources into valuable outputs (Reed & Defillippi, 1990; Teece et al., 1997). Grounded in the resource-based view, a firm's resources are tangible or intangible assets controlled by the firm (Lusch & Constantin, 1985) . These resources offer the greatest sources of competitive advantage when they are valuable, rare, inimitable, and non-substitutable (J. Barney, 1991). There is a consensus that a capability does not represent a single resource among others such as financial assets, technology, or manpower, but rather a distinctive and superior way of allocating resources. More than the resources themselves, it is the specific decisions involved in how resources are accessed, combined, and deployed that generate a firm's capabilities (Grant, 1991).

Grant, (1996) defines organizational capabilities as "the ability to perform repeatedly a productive task which relates either directly or indirectly to a firm's capacity for creating value through effecting the transformation of inputs into outputs" (p. 377). From this perspective, resources serve as the inputs, or "source of a firm's capabilities" (Grant, 1991, p.119). Decisions regarding which capabilities to build or accumulate, and how this should be accomplished, are an integral part of the firm's strategy for understanding how capabilities can influence competitive advantage. Organizational capabilities can be viewed as the tacit knowledge, processes, procedures, skills, or competencies that enable companies to aggregate and deploy their resources to achieve a desired goal. Simply put, they are the glue that holds a firm's resources together and allows for their strategic deployment (Amit & Schoemaker, 1993; Day, 1994).

Capabilities can be developed across various fields and organizational levels, such as within specific departments (e.g., marketing, supply chain, or finance), at the divisional level, like the division for individuals and professionals at a car manufacturer, or at the corporate level, such as at Ford. These capabilities are integral to the value chain and can manifest as functional and cross-functional workflows designed to perform specific tasks by utilizing different categories of resources, such as tangible resources (e.g., financial and physical resources), human skills (e.g., employees), and intangible resources (e.g., organizational culture and learning) (Grant, 1991). For example, Ford possesses multiple resources for producing and assembling its cars. These resources include raw materials, spare parts, software, quality controls, and specialized operators. The company's unique, innovative, and dynamic approach to assembly, which incorporates specific capabilities, traces back to Henry Ford's pioneering use of standardization and assembly lines—a concept later known as Fordism. This approach led to the success of the Ford Model T, the company's first best-seller. Ford has continued to enhance its competitive advantage by continuously transforming its processes, empowering its assembly lines with capabilities based on the principles of Six Sigma, to achieve its strategic objectives of cost reduction, quality improvement, customer satisfaction, and low environmental impact[8].

Lastly, organizational capabilities can be defined by three specific characteristics that assist them in playing a significant role in performing firm tasks and activities. Three main attributes are generally used to describe them: (1) they are specific, sophisticated, and adapted to solve complex problems; (2) they represent habitualized action patterns and are integral to the firm's practices; and (3) they are reliable, as their development takes time, making them increasingly pertinent (Schreyögg & Kliesch-Eberl, 2007).

We propose the following visual representation to summarize the definition and characteristics of organizational capabilities.

[8] https://www.6sigma.us/uncategorized/six-sigma-case-study-ford-motors/. Introduced by Motorola in 1986, Six Sigma is a set of techniques and tools for process improvement that has been widely adopted across various industries to enhance manufacturing processes, reduce defects, and ensure quality.

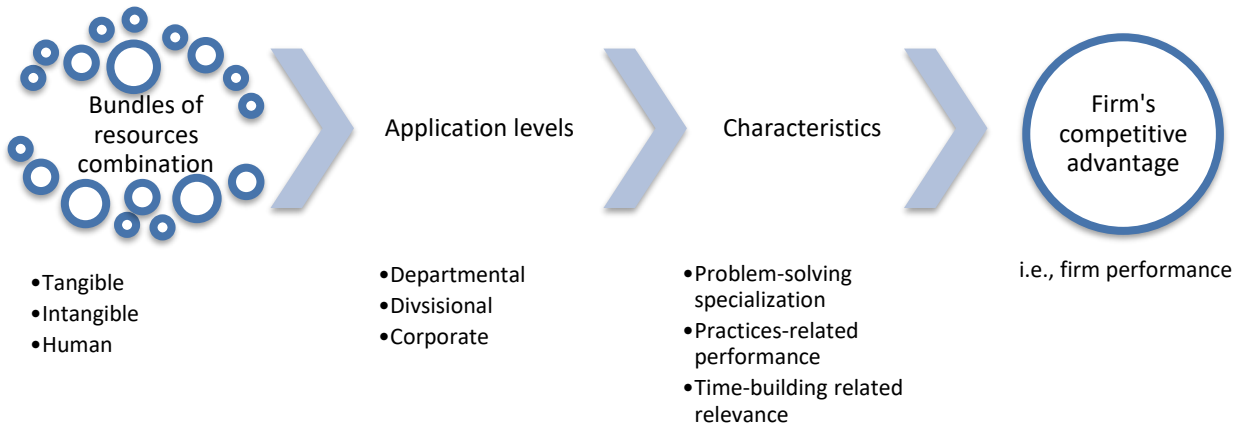


Figure 1-8. A representation of organizational capabilities' definition and characteristics

The next subsection describes what capabilities are from a marketing perspective.

3.2.2. What are marketing capabilities ?

Marketing scholars have long held that the core objective of marketing is to attract and retain customers (Srivastava et al., 1999). Specifically, the first conceptualization of marketing capabilities lies in their ability to attract and retain customers by connecting them to the company's main core business areas that generate value for customers—product development management, supply chain management, and customer relationship management—which in turn creates shareholder value (Ramaswami et al., 2009).

Furthermore, the concept of "marketing capability" has been extensively studied and defined in marketing literature as a distinct competency, with various classifications and operationalizations proposed. For instance, Conant et al., (1990) identified twenty specific marketing competencies, such as knowledge, product development, planning, monitoring, and pricing strategy, to name a few. Weerawardena (2003) further developed these ideas by incorporating skills like customer service quality and promotional effectiveness as indicators of marketing capabilities. Additionally, Song et al. (2008) linked marketing capabilities to knowledge of competition, market segmentation, and pricing strategies. Vorhies et al., (2009) differentiated marketing capabilities into two types: specialized and architectural. Specialized capabilities focus on functional areas such as pricing and product development, leveraging the firm's specific marketing knowledge. Architectural capabilities coordinate these specialized capabilities to align resources with strategic product-market goals, ensuring effective implementation of marketing strategies. Mariadoss et al. (2011) detailed several marketing capabilities that

may influence innovation strategies for firm sustainability, such as product packaging, sales, product development, channel linking, price setting, and relationship building.

Specifically, with the marketing function serving as the relay between markets and firms, there is a long-established literature tradition of considering marketing capabilities as the set of processes and skills that enable the management of market-based resources. These resources refer to a subset of firm resources related to marketing activities, such as building brands, relationships, innovations, or knowledge (Srivastava et al., 1998). These market-based assets include customer relationships, channel relationships, and partner relationships and have the potential to influence shareholder value (Srivastava et al., 1998).

Day (1994) extended the view of market-based resource management through processes by defining marketing as integrative processes designed to apply the collective knowledge, skills, and resources of the firm to the market-related needs of the business. This approach enables the business to add value to its goods and services and meet competitive demands. He particularly stresses the importance of learning processes in the development of marketing capabilities, as other authors have (Vorhies & Harker, 2000). Day (1994) argues that marketing capabilities are developed via learning processes when the firm's employees repeatedly apply their knowledge to solving the firm's marketing problems and accomplish its competitive strategy.

Vorhies & Morgan (2005) identified eight distinct marketing capabilities that contribute to sustained competitive advantage and improved business performance: (1) product development, (2) pricing, (3) channel management, (4) marketing communications, (5) selling, (6) market information management, (7) marketing planning, and (8) marketing implementation.

Finally, a more recent study depicted how firms can maintain their competitive advantage by organizing for marketing excellence through the management of their marketing capabilities(Moorman & Day, 2016). These capabilities enable the firm to reach its strategic objectives connected to several tasks and activities, such as anticipating market changes, adapting strategy to stay ahead of competition, aligning the organization with strategy and market, activating effective implementation, ensuring accountability for results, attracting resources, and managing marketing assets (Moorman & Day, 2016). According to these authors, there is a reasonable consensus in the literature that primary capabilities within the domain of marketing include the following:

- Market sensing and knowledge management capabilities, notably including market orientation as the process of generating, disseminating, and responding to market intelligence.

- Relational capabilities, such as customer relationship management (CRM) processes of acquiring and retaining valuable customers and managing channel partnerships.
- Management of the brand asset and leveraging of brand equity.
- Strategic marketing planning and implementation, or more generally, the architectural capabilities that direct and coordinate the deployment of task-specific capabilities.
- Specific functional capabilities related to the marketing mix (pricing, product line management, marketing communication, and sales)

Like organizational capabilities, marketing capabilities connect multiple related resources that may play a particularly important role in attaining a sustained competitive advantage. This is achieved by making it more difficult for competitors to discern and imitate the process by which various resources are combined and deployed to form the capability (Dierickx & Cool, 1989; N. A. Morgan & Slotegraaf, 2012). Indeed, based on the literature on organizational capabilities, a unique marketing capability is developed when marketing knowledge and skills are combined to execute marketing actions (Vorhies & Morgan, 2005). Consequently, marketing capability is difficult for competitors to imitate and cannot be easily substituted due to the idiosyncratic way firms integrate their knowledge about markets and marketing. Therefore, it is suggested that firms with superior marketing capability can develop and maintain a sustained competitive advantage, providing the opportunity to create superior performance.

The table below lists the most cited marketing capabilities extracted from the strategic marketing literature.

Table 1-3. Relevant research on types of marketing capabilities

	Authors									
Capabilities	Srivastava et al., 1999; 1998	Conant, Mokwa, Varadarajan, 1990	Weerawardena 2003	Song et al., 2008	Vorhies et al., 2009	Mariadoss et al., 2011	Ramaswami, Srivastava, Bhargava, 2009	Day, 1994; Grant, 1991, 1996	Vorhies and Morgan, 2005	Moorman & Day, 2016
Product development /Innovation	✓	✓		✓	✓	✓	✓		✓	✓
Pricing		✓		✓	✓	✓			✓	✓
Channel management						✓	✓		✓	✓
Marketing communications and promotion			✓						✓	✓
Customer relationship management /Relational capabilities	✓	✓				✓	✓			✓
Market-based resources management	✓	✓		✓				✓	✓	✓
Marketing planning		✓							✓	✓
Marketing implementation					✓				✓	✓
Brand management	✓									✓
Sales						✓			✓	✓

Section 3.2.3. reveals the scope of marketing capabilities connected to the field of innovation.

3.2.3. What are marketing innovation capabilities ?

Table 1-3 emphasizes the importance of marketing capabilities for product development and innovation, which is the most cited dimension connected to marketing capabilities. This is followed by market-based resource management, pricing, and then customer relationship management. This justifies a strong research interest in the relational link between marketing capabilities and the innovation context and reinforces the relevance of our thesis, particularly by considering market-based resource management and customer relationship management dimensions in the equation, activities where marketing capabilities also play a crucial role.

The necessity for innovation remains a top priority among CEOs (Jaruzelski et al., 2014), and its critical role in enabling a firm to create customer value, differentiate from competitors, develop a sustainable competitive advantage, and grow revenues and profits has been well-documented across various disciplines, including economics (J. A. Schumpeter, 1942), management (Cohen & Levinthal, 1990; Porter, 1985), marketing (R. K. Chandy & Tellis, 1998), and finance (Brown et al., 2009). Specifically, the literature suggests that marketing plays a key role in the competitive advantage process through innovation (Kerin et al., 1992), which is viewed as a central concept in the search for differential advantage. Marketing involves mobilizing organizational resources for acquiring and integrating market-based knowledge to create value, by reaching targeted customers with superior products and services. These specific marketing innovation capabilities enable the firm to carry out activities necessary to move its products or services through the value chain (Day, 1994).

As the interface between the customer and the company (Day & Montgomery, 1999), the marketing department, through its marketing innovation capabilities, serves as a vital conduit for unique market intelligence (Kohli & Jaworski, 1990) that is essential for successful innovation (Griffin et al., 2013). This intelligence provides knowledge about current and future customer needs. For example, research in marketing and innovation tends to compare the effects of market-based resources on innovation performance—whether radical or incremental—and new product success (Atuahene-Gima, 2005; Harmancioglu et al., 2009). This research highlights the importance of diverse market-based resources such as resources that aid in sensing changes in the environment (like customer and competitor sensing) and responding effectively through technical execution and organizational resources (Lee & Grewal, 2004; Li & Calantone, 1998; Moorman & Slotegraaf, 1999). Additionally, the importance of continually enhancing the quality of data regarding consumer needs, trends, and habits has been emphasized, along with the significant impact of customer involvement in the innovation process (Griffin et al., 2013). Marketing managers and academics note the importance of continuing to improve the quality of data received about consumer needs, trends, and habits, as well as the overall impact of customer involvement in the innovation process; pertinent customer information, used diligently, improves innovation outcomes (Griffin et al., 2013).

Marketing innovation capability is particularly crucial at the product development stage, which is defined as the phase where ideas from the planning stage are transformed into a product, and the organization makes decisions regarding its market introduction (X. M. Song et al., 1996). During this stage, assessing consumer needs and competition is essential, and information must be shared to advance new product ideas into the development phase (X. M. Song et al., 1996). Past research indicates that firms need adequate marketing resources and skills to successfully develop new products (Calantone & Rubera, 2012). Marketing capabilities are seen as an essential antecedent of NPD (Martin & Javalgi, 2016; O'Cass & Sok, 2014) comprising a set of procedures that enable firms to explore and deliver superior value to their customers (Krush et al., 2015) and increase their resilience to accelerated market shifts (Martin & Javalgi, 2016; Mu, 2015). Proficiency in marketing activities and protocols are key success factors for NPD (Henard & Szymanski, 2001).

The interplay between marketing and innovation capabilities is vital in today's interconnected market environment. Firms with robust networking abilities can boost their market learning capabilities by partnering with others to obtain valuable insights and adapt effectively to industry changes (Varadarajan, 2020). This market learning capability enables firms to monitor competitors, understand market opportunities, and innovate, thereby increasing the intensity and novelty of their innovations (Kaleka & Morgan, 2017). Consequently, developing marketing capabilities is crucial for firms to leverage market insights for innovation. High levels of marketing capabilities offer distinctive value to customers and enhance the success of NPD (Aljanabi, 2022), underscoring the connection we aim to establish between marketing capabilities and their impact on value proposition within the context of innovation.

However, studies on marketing capabilities related to innovation are less common compared to other application domains such as marketing strategy or international marketing (Kozlenkova et al., 2014). There is no specific study on marketing innovation capabilities, analyzed as a distinctive sub area of marketing capabilities. Moreover, studies on innovation and marketing capabilities have primarily been conducted from an academic perspective (Hauser et al., 2006), and few general theories, models, or findings about best practices developed by marketing academics are being implemented by firms in general, and by B2B firms in particular (Lilien, 2011). This lack of practitioner engagement with the knowledge base generated by marketing academics is particularly pronounced concerning innovation within B2B firms (Workman, 1993).

I attempted to address this gap by gathering state-of-the-art knowledge on marketing innovation capabilities and investigating past, present, and future research to highlight the importance of such capabilities in driving firm performance. I undertook a conceptual approach, executing a bibliographic coupling (Article 1), to establish a theoretical foundation on marketing innovation capabilities that can assist marketers in their

innovation practices to achieve sustained competitive advantage. The motivation for research article 1 thus stems from my desire to address the first identified research gap:

> *GAP 1 - There is no consensus on the current status of literature research on marketing innovation capabilities, its existing research streams, and the identification of its primary themes for future research avenues*

We now review what is known about the data-driven innovation capability of marketing by examining the literature on digital marketing capabilities and highlighting the unexplored dimensions that require further investigation we propose to investigate.

3.2.4. What is data-driven innovation capability of marketing ?

To understand the importance of studying DDIC of marketing, we need to comprehend the crucial role of digitalization in delineating new boundaries for industries embracing Industry 4.0 to fuel their business growth. The Fourth Industrial Revolution involves a gradual implementation of firms' digitalization. Companies have digitalized their ecosystems by utilizing modern technologies, such as equipping products with sensors to develop new service offerings, integrating IoT to improve operational efficiencies and collect real-time customer data, and investing in AI to offer predictive data-driven services and highly customized solutions. Digitalization provides industries with new value-creating and revenue-generating opportunities (Parida et al., 2019) because it is linked to improved company profit performance (Kohtamäki et al., 2020) and achieving a competitive advantage (Akter & Wamba, 2016).

At the core of this data-driven strategy is innovation. Innovation has been hailed by the industrial marketing and strategic management literature as the path to sustaining a competitive advantage (Stopford & Baden-Fuller, 1994). It is a major driver of business growth and expansion, and firms constantly transform their capabilities to become more adaptive and develop the ability to learn and exploit new ideas for their strategic innovation objectives (Peres et al., 2010).

Nevertheless, in the specific context of DDI, given the essential role played by the B2B marketing department in developing new products and services, it is crucial to understand how it can strategically shift its innovation capability to become data-driven, which involves building and deploying DDIC of marketing. Few studies have investigated the competencies and mechanisms required for developing these capabilities, especially within the B2B context and for innovation purposes. This scarcity is notable, as researchers(Moorman & Day, 2016; Parida et al., 2019; Verhoef & Bijmolt, 2019) and

practitioners (Galante et al., 2013; Sayre et al., 2012) have urged scholars to explore the constituent elements of digital marketing capabilities (DMC).

Research on DDIC is indeed anchored in DMC. DMC can be defined as a company's ability to use digital technology-enabled processes to interact with customers and partners in a targeted, measurable, and integrated way to create new forms of value (McIntyre & Virzi, 2019; Sridhar & Fang, 2019; Wedel & Kannan, 2016). While opening a fertile area of research, the current literature on DMC presents some limitations that we detail below.

First, some studies offer valuable insights toward a conceptualization of DMC. Homburg & Wielgos (2022) propose a broad analysis perspective on DMC and its relevance to firm performance. Herhausen et al. (2020) review the literature on DMC by describing four main categories of competencies related to them: channels, social media, digital relationships, and digital technologies, and how DMC can drive future value for B2B firms. Wang (2020)conceptualizes DMC from a relational dynamic capabilities perspective and explores performance outcomes of DMCs for international firms. However, while presenting a detailed conceptualization of DMC and their potential consequences, these studies remain holistic and do not focus directly on innovation as a specific conceptualization scope.

Second, some research presents valuable contributions on how DMC can be specifically connected to innovation. Cao et al. (2019) observed that leveraging BD enhances marketing analytics, positively influencing marketing decision-making and product development management capabilities. Johnson et al. (2017) identified both marketing exploration and exploitation capabilities as key drivers of BD integration, contributing to increases in new product revenues. Additionally, a positive correlation exists between business analytics, Information Technology (IT) infrastructure, and marketing's market orientation capability in achieving innovation performance, as noted by Ashrafi & Zare Ravasan (2018). Investment in BD technologies is also seen as beneficial for marketing departments, enhancing customer knowledge and facilitating the development of service innovations (De Luca et al., 2021). However, few studies from an innovation perspective delve into the components of DDIC of marketing and how to effectively utilize them. A significant contribution to this discussion is the study by Mikalef et al. (2018), which reviews the components of BD analytics capabilities and their potential to drive business value through innovation, yet not analyzed from a marketing perspective.

Third, recent literature has tried to fill these gaps by offering a conceptualization of DDIC, connecting it to the innovation theme, and detailing its components (Sultana et al., 2022b, 2022a). These authors refer to DDIC as the managerial, technological, and personnel capabilities essential for achieving DDI. They also identify market orientation, talent, and IT infrastructure capabilities as antecedents to DDIC, which in turn, they argue, enhances market performance by fostering market agility (Sultana et al., 2022a). However, these

studies focus on the required resources to build DDIC at the firm level rather than resources specific to the marketing department.

Fourth, none of these works present a construction process orientation for DDIC of marketing and lack an explanation of the capability-building process perspective. It specifically involves studying how these components, together with tacit experience accumulation processes, explicit knowledge articulation, and codification mechanisms can be orchestrated and structured toward building a capability (Sirmon et al., 2011; Zollo & Winter, 2002).

Consequently, we took the first step toward bridging these gaps in the concept of DDIC of marketing by (1) connecting the concept to the innovation theme, (2) detailing its building components, (3) offering an analysis of the concept within the marketing micro-level department, and (4) describing a processual capability model perspective. Our propositions are included in Article 2, a conceptual paper on DDIC of marketing, and in Article 3, an exploratory paper on DDIC of marketing.

The figure below outlines a four-dimensional perspective on the relevant literature on DMC and our identified gaps.

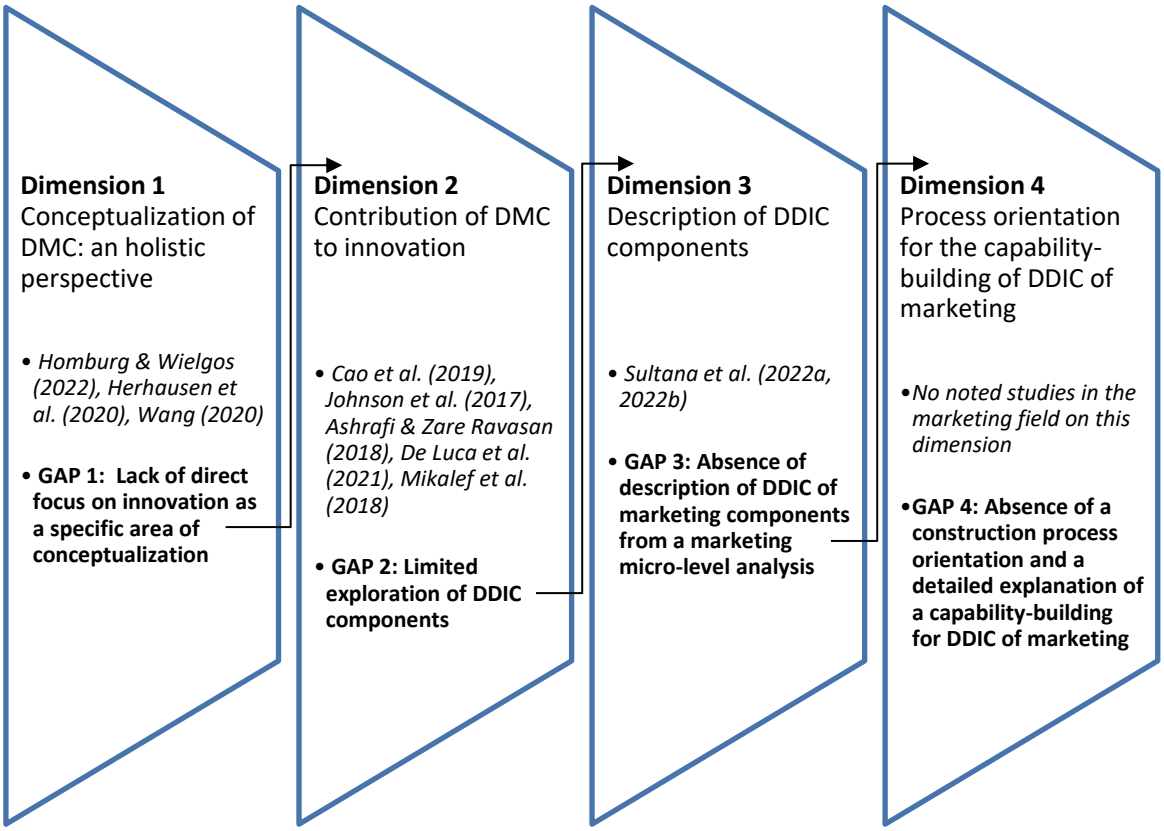


Figure 1-9. A four dimensions perspective on the relevant literature on DMC and gaps

The analysis of relevant literature on DMC allow us to depict two main specific research gaps connected to the research object of DDIC of marketing:

> *GAP 2 – There is no conceptualization of DDIC of marketing from both an innovation perspective and a micro-level analysis of the marketing department.*
>
> *GAP 3 – There is no description of the components of DDIC of marketing from a micro-level analysis of the marketing department and from a process-oriented capability-building perspective*

The next section details the anatomy of the value proposition concept connected to marketing resources for driving DDI, from a S-D Logic perspective.

3.3. Value proposition in business markets

This section presents the literature on value proposition in business markets. We begin by reviewing (1) the concept of value in business markets, then we portray (2) the value proposition as a strategic marketing tool, and finally, we outline (3) the value proposition for DDI within B2B firms.

3.3.1. Value in business markets

Conceptualizing value propositions in business markets posits two main approaches to value, introduced by Adam Smith (1723–1790) in his seminal work "The Wealth of Nations": (1) the notion of value in use, meaning the utility of a particular object, and (2) the notion of value in exchange, referring to the power of purchasing other goods that the possession of that object conveys.

Zeithaml (1988) was among the first major authors to focus attention on the construct of value in the marketing discipline before it became a pivotal concept for the field in general (Holbrook, 1994). The concept of the value evolved from an exchange perspective to a relational perspective. Both perspectives encompass several elements of understanding and distinctive roles for the marketing department.

Historically, marketing adopted an objective approach to value, the exchange view, as reflected in market prices, where value is embedded in products and services by suppliers, exchanged, and then realized by customers through consumption (J. C. Anderson & Narus, 1998; Bagozzi, 1975). This is a transactional view of value; the creation of value in use occurs after the exchange process and takes place within the customer's sphere (Grönroos & Voima, 2013) by integrating the customer's own

resources with the resources acquired through exchange. In this approach, marketing's role is to understand, communicate, and deliver value to the customer (J. C. Anderson & Narus, 1998).

However, more recent developments challenge this perspective by adopting a subjective approach with the concept of value in use contributing to goal achievement (i.e., utility) (Eggert et al., 2019). The S-D Logic introduced by Vargo and Lusch (2004, 2008) argues that value is not delivered to customers but rather is determined by them based on their use of the product or service. S-D Logic shifts the focus from value exchange to value co-creation through resource integration, where value is perceived and determined by the customer. In this context, marketing's role is to identify, prepare, and facilitate opportunities for co-creation of value, moving the locus of value creation from a singular sphere to a joint sphere involving both the customer and the provider. This approach has been increasingly influential, particularly in B2B marketing, highlighting a paradigm where both parties share the responsibility and benefits from the value created (Eggert et al., 2018). As such, this approach guided us in assessing value proposition architecture for driving DDI.

It is worth noting that, as we reviewed value in the B2B environment from a firm's point of view to set the stage for how companies can shape value propositions for DDI from a marketing department's perspective, we intentionally do not address value from a consumer perspective. Indeed, we do not focus our analysis on works like those by Aurier et al. (1998), which inscribe value in use within the fields of consumption or possession experiences, or those by Holbrook (1999), who define it as "a relative preference (comparative, personal, situational), characterizing an individual's experience in interaction with an object."

There are relevant studies on the analysis of value in use in the B2C marketing literature. Aurier et al. (2004) identified six components of consumption value: utilitarian, knowledge, experiential stimulation, social connection, self-expression, and spiritual. However, these studies do not position value from the company's perspective, with the objective of guiding the design of the value proposition in the B2B environment.

Furthermore, Mencarelli & Rivière (2015) note that other approaches, although considering the relational aspect of value, like in B2B marketing, focus on the experiential dimensions that it provides between an individual and an object (Bolton & Drew, 1991; Holbrook, 1999). Coupled with the development of numerous measurement models (aggregated or analytical, one- or multidimensional), these approaches often neglect the relationships between seller and buyer (Gil-Saura & Ruiz-Molina, 2009), which are largely studied in industrial marketing, and do not address the perspective of co-creation developed by organizations since the

theoretical foundation of the S-D Logic, with just a few exceptions (Andreu et al., 2010; Ramaswamy, 2008).

Table 1-4 below reviews some relevant contributions on value conceptualization in B2B markets, showing its evolution from value in exchange to value in use, divided into three major phases, which form the basis of our reasoning.

Table 1-4. Main contributions on the value concept in B2B markets

Phases	Authors and contributions
First phase: Transposition from consumer to business marketing	• Zeithaml (1988): Initiated the transfer of the customer value concept to business marketing • Anderson et al. (1992): Investigated value characteristics specific to business marketing compared to consumer marketing • Anderson et al. (2000): Investigated price and value as two separate elements to conceptualize value • Ulaga & Chacour (2001): Integrated sacrifice dimension to define customer value as a perceived trade-off between benefits and sacrifices • Eggert & Ulaga (2002), Ulaga & Eggert (2006): Explored relationships with other business marketing constructs, identifying similarities and differences
Second phase: Expansion of the construct	• Ravald & Grönroos (1996): Recognized a link between value chain analysis and relationship marketing • Eggert et al. (2006), Flint et al. (1997, 2002): Explored dynamic nature of value perceptions by comparing relationship value to other relationship constructs • Ulaga & Eggert (2006): Expanded the definition of value from a goods-centric domain to include relational aspects with buyers establishing key supplier relationships • Blocker et al. (2011): Studied variations across countries and markets for perception of relationship value
Third phase: Emphasis on co-creation and S-D Logic	• Vargo & Lusch (2004, 2008): Introduced S-D Logic emphasizing value co-creation and value in use perspective • Corsaro & Snehota (2010),Grönroos (2008, 2011) & Grönroos & Voima (2013): Focused on joint value creation through cooperation and the pivotal role of direct interactions for value co-creation opportunities • Frow & Payne (2011): Highlighted the role of wider networks and resource integration capabilities • Macdonald et al. (2016): Reported that value in use corresponds not just to collective, organizational goals but also to individuals' goals and that both provider's and customer's resources and processes quality design value proposition • Kowalkowski et al. (2017): Acknowledged value co-creation through interconnected activities and resources • Kleinaltenkamp et al. (2022): Rethinked customer-perceived value in business markets from an inter-organizational relationships' perspective

The next section focused more specifically on the value proposition from a subjective approach value, i.e., value in use, and a S-D logic perspective (Vargo & Lusch, 2008).

3.3.2. Value proposition, a strategic marketing tool

A comprehensive description of the value proposition and a structured approach for representing it was initially published by Lanning and Michaels in 1988 (Lanning & Michaels, 1988). They defined a value proposition as "what precise benefit or benefits, at what price, will be offered to what customer group, at what cost" (p. 3). This concept concerns how a firm plans to deliver superior value to customers (Webster, 2002). The perspective of relationship value has further advanced the concept of the value proposition by considering what is valuable and results from interactions between customers and suppliers, sharing their resources in a specific context of product or service usage for specific goals.

The marketing department uses the value proposition as a strategic tool that articulates how firms assist their customers in “getting an important job done” (Johnson et al., 2008, p.60). This tool is central in conveying the essence of a company's marketing strategy, encapsulating the core decisions regarding resource deployment and market selection. It clearly outlines the exceptional benefits that targeted customers can anticipate when they engage with the supplier firm. Payne et al. (2017, p. 472) define the value proposition as “a strategic tool that facilitates an organization's ability to share resources and deliver a superior set of values to targeted customers".

The role of marketing is pivotal for achieving enhanced outcomes and for customers to perceive value in the firm’s offerings. Marketing plays a crucial role in determining which organizational resources are essential and how they should be deployed to meet the firm's diverse strategies, as discussed by Morgan (2012). This strategic role is deeply anchored in Resource-Based Theory (RBT) (J. Barney, 1991), which posits that while organizational resources and capabilities are foundational for superior performance, they do not directly determine performance outcomes. This view is supported by Eggert and colleagues (2018), who argue that it is the strategic application of these resources through marketing that drives superior competitive advantage and performance.

Furthermore, the value proposition serves as a vital instrument for enhancing the alignment between a firm’s marketing program and its innovation efforts. It ensures that the deployment of resources is effectively aligned with the firm's innovation agenda, thus maximizing efficiency and impact. A well-crafted value proposition can significantly improve the synchronization between marketing strategies and the processes involved in deploying resources, ultimately leading to a more robust and innovative marketing program (Morgan, 2012).

In summary, the value proposition acts as a bridge between organizational resources and capabilities, and market performance, ensuring that the marketing department can

effectively translate their marketing strategy decisions into market success and positional advantage for the firm compared to the competition (Eggert et al., 2018).

Based on this view of the value proposition as a strategic marketing tool, we now depict the construct applied to the context of DDI within B2B firms. We review what is known so far and reveal an identified gap.

3.3.3. Value proposition for DDI within B2B firms

The transition towards data-centric and digital ecosystem-based business models necessitates that companies quickly adjust their value propositions, which are crucial to the value creation process. As the market increasingly demands continual innovation and contemporary digital technologies broaden the potential for creating value, firms must assess their resources, engage in necessary partnerships for innovation (Lindgreen & Wynstra, 2005), and reconfigure their value propositions.

Manufacturing companies are increasingly adding services and combining products and services to differentiate themselves and provide more value to their customers (Baines et al., 2009; Oliva & Kallenberg, 2003; Parida et al., 2014). This requires integrating firm and marketing capabilities to architect value propositions (Moorman & Day, 2016), such as DDIC of marketing. In other words, from a relational value perspective, it means understanding how marketing can carry out co-creation innovation activities by sharing its knowledge with customers and building specific digitalized capabilities, thereby shaping value propositions for driving DDI.

To pursue this servitization strategy in the era of Industry 4.0, it is crucial for marketing to consider the required digitalized capabilities to support co-creation value mechanisms (Mostafa, 2016) and how to build them, either in-house or with new partners (Parida et al., 2019). Some underlying digitalized capabilities include intelligence capabilities (the ability to configure hardware components to sense and capture information with minimal human intervention), connectivity capabilities (the ability to connect digitalized products through wireless communication networks), and analytic capabilities (the ability to transform data into valuable insights). These have been identified as facilitating competencies to interact and engage in co-creating value with customers (Lenka et al., 2017). Hasselblatt et al., (2018) identified five distinct capabilities that can leverage an IoT-based innovation strategy within a co-creation perspective: digital business model development, building scalable solution platforms, IoT value selling, IoT value delivery, and business intelligence and measurement. Key activities to build digital capabilities in manufacturing firms also include investing in intelligent and connected IT resources to foster co-creation practices (Parida et al., 2019). Notably, building platform capabilities for advanced service offerings facilitates information-related value co-creation activities between manufacturing firms and their customers (Cenamor et al., 2017). While these

studies provide insights into digitalized capabilities for enhancing co-creation activities, they do not connect with the perspective of value proposition architecture for DDI.

Another series of studies have advanced our knowledge of resource integration to build capabilities for developing value propositions in a servitization context. Skålén et al. (2015) identified ten common practices, organized into three main aggregates that constitute value propositions: provision practices, representational practices, and management and organizational practices. Lindič & Da Silva (2011) correlated value proposition and innovation by providing a framework to decompose its constitutive elements into five components: performance, ease of use, reliability, flexibility, and affectivity. Payne & Frow (2014) deconstructed the value proposition of an innovation exemplar in the healthcare sector, offering a framework to acknowledge the value-in-use resulting from different encounters, incorporating learning processes, and recognizing its interactive and recursive nature. Ulaga and Eggert (2006) focused on relationship value and identified core differentiators such as personal interaction, service support, and the supplier's know-how, showing that these differentiators are often more important than cost considerations. Other differentiators in the value proposition can include service-based solutions (Matthyssens & Vandenbempt, 2008). However, these studies, while contributing to strategic marketing and service innovation connected to value propositions, do not consider the specific context of DDI and lack analysis from the micro-level of the marketing department.

In conclusion, while the necessity to leverage digital resources to create value and differentiate innovative offerings to profit from digitization (Gauthier et al., 2018) has been documented at the firm level, there is a lack of understanding of the specific digitalized innovation capabilities needed at the marketing department level. The connection between marketing innovation capabilities, specifically DDIC of marketing, DDI, and value propositions remains underexplored. Marketing capabilities are strategic in developing value propositions through the incorporation of digital technologies and innovation resources, enabling the delivery of an appropriate set of values to customers to gain a competitive advantage. There is a need to clarify the combination and relevance of salient resources to architect value propositions (Payne et al., 2017) by understanding the full scope of value that modern digital technologies can bring and how these elements combine to shape value propositions that drive DDI.

We thus identified the following gap to investigate with a fourth article:

> *GAP 4 - There is a need to assess the contributive role of DDIC in marketing in architecting value propositions for DDI.*

This gap is illustrated in the following figure below.

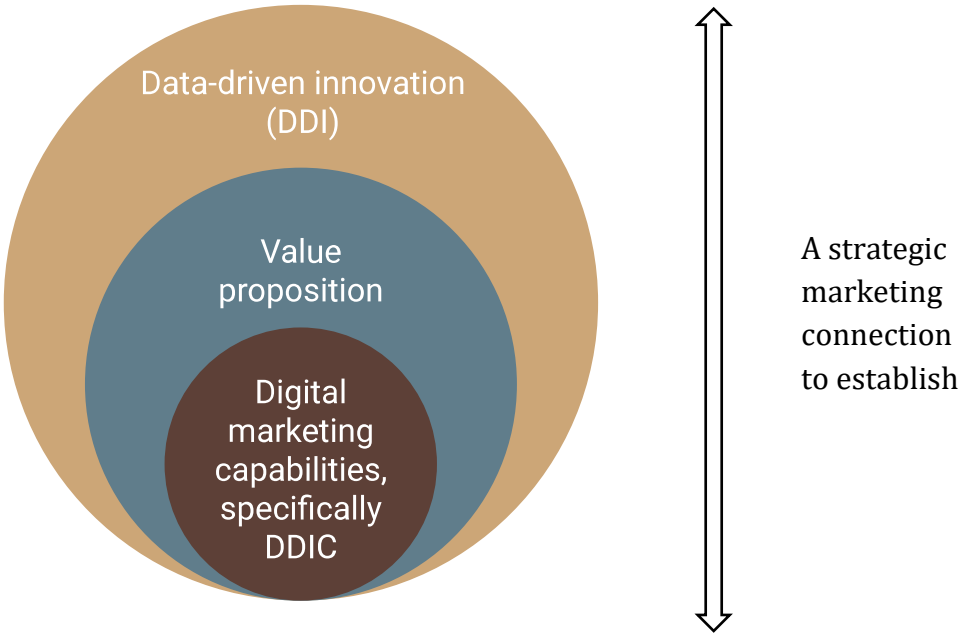


Figure 1-10. Gap 4 : Assessing the contributive role of DDIC of marketing in architecting value propositions for DDI

In summary, this literature review shed light on four distinct literature gaps on DDIC of marketing, and research is needed to advance on conceptualizing, exploring and confirming academic knowledge on this concept. We present the identified literature gaps of DDIC of marketing under a three-dimensional perspective, which is illustrated in Box 1-1. below:

Key takeaways in the identified literature gaps

Dimension 1 - CONCEPTUALIZING

GAP 1 - There is no consensus on the current status of literature research on marketing innovation capabilities, its existing research streams, and the identification of its primary themes for future research avenues

GAP 2 - There is no conceptualization of DDIC of marketing from both an innovation perspective and a micro-level analysis of the marketing department

Dimension 2 - EXPLORING

GAP 3 – There is no description of the components of DDIC of marketing from a micro-level analysis of the marketing department and from a process-oriented capability-building perspective

Dimension 3 - CONFIRMING

GAP 4 - There is a need to assess the contributive role of DDIC of marketing in architecting value propositions for DDI

Box 1-1. A three-dimensional perspective on the identified literature gaps of DDIC of marketing

Section 4 presents a comprehensive theoretical framework that was employed to analyze and structure the findings of this thesis.

4. Theoretical framework

Our research was formalized according to complementary theoretical backgrounds from the strategic marketing and organizational management literature. This was done in order to build new theoretical knowledge on the marketing innovation capabilities field and advance the operational applicability of our results for marketers.

The first theoretical framework aimed at contextualizing DDIC of marketing by delineating its boundaries from a marketing organizational perspective, for which we

used a theory mainly anchored in strategic marketing literature: Market Orientation (MO), from a process-oriented approach (Jaworski & Kohli, 1993).

The second theoretical framework aimed at describing the nature of the marketing components necessary to build DDIC of marketing, for which we used a theory mainly diffused to describe marketing departments and organizations in general: Resource-Based Theory (RBT) (JBarney, 1991; Barney, 1986; Slotegraaf et al., 2003; Vorhies et al., 2009).

The third theoretical framework aimed at articulating these components by revealing the relationships and underlying processes between the resources and capabilities of DDIC of marketing, for which we employed a theory used to illuminate the inner workings underpinning organizational capabilities: the Dynamic Capabilities (DC) theory (Teece, 2007), complemented by the use of a dynamic capability model, specifically that of Zollo & Winter (2002).

The last theoretical framework aimed at confirming the relationships between DDIC of marketing and value propositions, applied to DDI, for which we used a service-centered view, as previously mentioned: S-D Logic (Vargo & Lusch, 2004, 2008).

Box 1-2 is a synopsis of the theoretical frameworks we employed to investigate DDIC of marketing and their objectives connected to our research.

We detail their main tenets in the next sections.

4.1. Contextualizing DDIC of marketing: Market Orientation theory

Our first theoretical framework is MO. MO has been a focal construct in the marketing literature (Smirnova et al., 2011) for characterizing marketing capabilities. Moorman and Day (2016) include MO among marketing capabilities, and Kozlenkova et al. (2014) argue that marketing capabilities are essentially market-oriented. MO relates to operationalizing the marketing concept, which posits that a company's success hinges on identifying and satisfying customers' needs and wants more effectively than competitors (Kotler, 1994). It signifies a philosophy of learning from customers and competitors (Noble et al., 2002), with the marketing department serving as the voice of the customer (Griffin & Hauser, 1993), leveraging collective knowledge, skills, and resources to address business needs. This aids in adding value to products, meeting competitive demands (Day,

1994), and influencing various types of innovations pursued by the firm (Weerawardena, 2003b).

Based on the works of Hult et al. (2005), and Mohr & Sarin (2009), we summarize complementary perspectives on Market Orientation (MO) that have emerged in the literature, according to three main approaches. The first perspective sees MO as a corporate culture that prioritizes customers' interests, as outlined by Deshpandé et al., (1993). The second perspective from Narver & Slater (1990) describes MO as an organizational culture that combines three components: customer orientation, competitor orientation, and inter-functional coordination. The third perspective from Kohli and Jaworski (1990) presents MO from a behavioral approach, in response to the competitive operational dynamics that an organization faces, by emphasizing specific activities relating to the generation and dissemination of and responsiveness to market intelligence (Kohli & Jaworski, 1990).

Narver and Slater (1990) and Kohli and Jaworski (1990) perspectives are often used to explore the relationship between MO and marketing innovation capabilities, leading to comparisons. Both models highlight the need for customer and competitor knowledge and inter-functional coordination (Deng & Dart, 1994; Jaworski & Kohli, 1996). They also view MO as a continuum rather than binary (Mavondo et al., 2005). The key difference lies in their focus: Kohli and Jaworski emphasize information processing (1990), while Narver and Slater focus on organizational culture and behaviors (1990). The Kohli and Jaworski (1990, p. 6) definition posits an information-processing perspective predicated on a set of three key activities: (1) organization-wide generation of market intelligence pertaining to current and future customer needs; (2) dissemination of the intelligence across departments; and (3) organization-wide responsiveness to it. In contrast, the Narver and Slater (1990, p. 21) definition places greater emphasis on organizational culture, stating that MO is "the organizational culture that most effectively and efficiently creates the necessary behaviors for the creation of superior value for buyers and thus, continuous superior performance for the business". The assumption inherent in the Narver and Slater conceptualization (1990) is that information-processing activities are a product of a market orientation rather than the orientation per se.

The objective of this study is to construct a framework for DDIC of marketing by revealing a potential process orientation, upon which specific marketing activities for DDI are deployed, that should lead to the development of new value propositions. In order to achieve this, the conceptualization and building of DDIC of marketing was based on the information-processing perspective (Kohli & Jaworski, 1990). In this sense, MO provides firms with market-sensing capabilities that should lead to the development and deployment of superior value-creating capabilities, such as innovation and marketing, which serve as mechanisms for value creation for customers (Day, 1994; Hult & Ketchen, 2001; Kirca et al., 2005). As Jaworski & Kohli (1993, p.56) state, "a market orientation essentially involves doing something new or different in response to market conditions;

it may be viewed as a form of innovative behavior." This perspective aligns well with DDIC of marketing, seen as a new capability to build in order to address the innovative paradigm of DDI.

Furthermore, MO is a critical capability for firms pursuing innovation-based competitive strategies. Literature confirms the positive link between MO and product innovation, new product performance, and the relationship between product/market exploration and exploitation (Kyriakopoulos & Moorman, 2004; Liu & Atuahene-Gima, 2018; Lukas & Ferrell, 2000). Empirical research has shown that a firm's level of involvement in new product development activities is significantly correlated with the extent and nature of its market orientation (MO) (Narver et al., 2004).

To follow the innovation roadmap, it is also crucial for marketing departments to connect to the external environment to enable the business to compete by foreseeing market requirements ahead of competitors and fostering lasting relationships with customers, channel members, and suppliers. This explains why some advances in MO emphasize the need to go beyond market-driven efforts by incorporating an outside-in view (Day, 2014). Weerawardena & O'Cass (2004) stress the need to develop spanning market-based information capabilities by sensing the market, engaging with customers, and connecting with partners.

MO theory has recently been used to describe digital marketing capabilities. Homburg Homburg & Wielgos (2022) treats MO as an organizational contingency that impacts digital marketing capabilities. MO capabilities are essential drivers of data-driven innovation capabilities and business performance, consequently improving competitive advantage (Babu et al., 2024; Bhatti et al., 2022; Sultana et al., 2022a). Lastly, by leveraging MO, the data-driven approach can be applied to extract valuable knowledge regarding customer trends and preferences for designing products (Li et al., 2015).

Consequently, MO constitutes our first theoretical pillar to support our findings on DDIC of marketing, and we go a step further by using the analytical grid of the process-orientation perspective (Jaworski & Kohli, 1993). In contrast, other works on DDIC (Alghamdi & Agag, 2024; Sultana et al., 2022a, 2022b) have primarily used the approach of Narver & Slater (1990).

4.2. Describing DDIC of marketing: Resource-Based Theory

RBT is our second critical framework in strategic management, focusing on how a company's heterogeneous and complementary resources and capabilities contribute to

achieving a competitive advantage and superior performance. Initially articulated by Barney (1991), RBT posits that for resources to provide a superiority of one firm above others in a given market condition and a competitive advantage, they must be valuable, rare, inimitable, and non-substitutable. These resources include tangible assets like financial and physical resources, human skills, and intangible assets such as organizational culture and learning (Grant, 1996).

In the context of marketing, RBT is particularly influential in elucidating how marketing capabilities can drive better results. According to research by Slotegraaf et al. (2003) and Vorhies et al. (2009), marketing capabilities that are unique and well-integrated within a firm can significantly enhance its market position and performance by effectively deploying these strategic resources.

RBT's relevance extends further into the realm of marketing innovation. Studies such as the review on RBT by Kozlenkova et al. (2014) confirmed a connection between marketing capabilities and innovation. Other works, such as Atuahene-Gima (2005), linked marketing capabilities to the scope of radical or incremental innovation performance, and Harmancioglu et al. (2009) and Li & Calantone (1998) to new product success. RBT is also used to delineate how innovation generates the constitution of resources and capabilities for marketing to improve long-term company performance (Dutta et al., 1999; Srinivasan et al., 2002).

Moreover, the advent of digitalization has deepened the application of RBT in marketing to study the concept of digital marketing capabilities. Scholars like Gupta & George (2016) and Akter et al. (2016) explore how BD and analytics capabilities can transform traditional marketing strategies into insight-driven approaches that not only enhance firm performance but also establish new competitive paradigms. These digital marketing capabilities involve collecting, disseminating, and analyzing vast amounts of data to produce actionable business insights, underscoring the strategic significance of data as a key resource to build DDIC of marketing in contemporary DDI strategies.

More recently, RBT has been applied to the areas of DDI and DDIC (Alghamdi & Agag, 2024; Chaudhuri et al., 2024; M. Kumar et al., 2024; Mikalef & Krogstie, 2020; Sultana et al., 2022a). For instance, Mikalef & Krogstie (2020) utilized RBT to illustrate how a company's capabilities in BD analytics and information governance define its ability to innovate incrementally and radically. Alghamdi & Agag (2024) proposed a longitudinal analysis and demonstrated how DDIC is related to competitive advantage over time through the mediation of marketing agility. Chaudhuri et al. (2024) explain how 4.0 technologies lead organizations to improve their data-driven culture, which can in turn improve DDIC. Lastly, Sultana et al. (2022a) describe the antecedents and effects of DDIC based on the RBT approach for sustaining DDI blueprints.

Thus, these applications confirm that RBT is a robust theoretical backbone for understanding and leveraging the role of marketing capabilities in DDI. The theory helps to explain the resources embedded in the DDIC of marketing that can drive DDI.

4.3. Articulating the components of DDIC of marketing: Dynamic Capabilities theory

The third theoretical framework is the DC theory, which serves to articulate the components of DDIC in marketing. Innovation and marketing are critical components for organizations aiming to adapt and thrive in rapidly changing environments. However, RBT alone is not sufficient to support firm strategies in an increasingly volatile and dynamic business environment (Žitkienė et al., 2015). This limitation has been addressed by theorists who have developed the DC view (Karimi & Walter, 2015; Teece et al., 1997). DC are defined as the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments (Teece et al., 1997). Among the functional dimensions of DC, dynamic marketing capabilities are important because they guide the innovation process to meet customers' needs (Fang & Zou, 2009). As stated by Bruni & Verona (2009), dynamic marketing capabilities consist of human capital, social capital, and the cognition of managers involved in the creation, use, and integration of market knowledge and marketing resources to match and create market and technological change.

Over the past few decades, a considerable number of researchers have identified DC theory as one of the prominent theories in the domain of formulating competitive advantage in the areas of new product development and innovation (Deeds et al., 2000; Giniuniene & Jurksiene, 2015; Qiu et al., 2020). Marketing nurtures its dynamic innovation capabilities by sensing new opportunities and seizing these opportunities through strategic decisions to respond and align with new market realities (Eisenhardt & Martin, 2000). Dynamic marketing capabilities fundamentally use market knowledge as their raw material (Menguc, 2006), act as a tool to absorb market knowledge (Bruni and Verona, 2009), and disseminate market knowledge within the organization (Fang and Zou, 2009). Such capabilities are essential for sustaining competitive advantage and fostering continuous innovation (Dubey et al., 2018). As confirmed by Sharma et al. (2016), dynamic marketing capabilities enhance product innovation and R&D (Research and Development) investments. The attributes of dynamic marketing capabilities, such as responsiveness and efficiency across various functions like product development, supply chain management, and customer relationship management (Srivastava et al., 1999), support the creation and delivery of customer value while adapting to shifts in the marketplace (Fang and Zou, 2009).

Digitalization has significantly bolstered dynamic marketing capabilities. The use of technologies such as BD analytics, AI, and IoT for data analysis, customer engagement, and real-time feedback makes marketing operations more data-driven, which in turn enhances the dynamic approach to decision-making processes and innovation capabilities. Digital tools and platforms provide marketers with the ability to gather extensive market insights and analytics, enabling faster and more effective decision-making processes for innovation outputs ((Alyahya et al., 2023). For instance, Duan et al. (2020) highlighted that deploying business analytics improves environmental scanning systems, directly bolstering innovation competencies. There are multiple examples of BD initiatives (e.g., Dixon et al., 2019; Gupta et al., 2019) that create business-related knowledge, improve performance, and therefore sustain competitive advantage in the dynamic market (Singh & Del Giudice, 2019). For example, advanced analytics skills (i.e., predictive analytics) are essential for data-centric innovation in dynamic markets, as they support or verify the intuitive judgments of innovation talents (Sultana et al., 2021). Thus, in a digitalized environment, dynamic marketing capabilities are fundamental as they allow firms to learn from the market and inform DDI approaches (Cao et al., 2019; Guo et al., 2018).

From a constitutive perspective, dynamic marketing capabilities can be materialized as patterned activities that emerge over time and integrate organizational processes. These processes establish, link, and configure market resources to identify, create, and deliver customer value, thereby generating responses to changes in the firm's competitive environment (Helfat & Peteraf, 2003; Winter, 2003), and sustaining the DDI efforts. There is a convergence on the idea that DCs are purposefully developed and comprise a set of identifiable and specific routines, nurtured by processes and mechanisms (Eisenhardt & Martin, 2000). These routines are commonly understood as learned, highly patterned, and repetitious, directed towards corporate actions (Winter, 2003). The construction of DDIC of marketing involves organizing routines for accumulating knowledge and deploying learning mechanisms for their activation and codification (Zollo & Winter, 2002). Thus, DDIC of marketing can be seen as a DC that enables marketing departments to systematically evolve their operational innovation routines for better efficiency and quick market adaptation (Teece et al., 1997; Zollo and Winter, 2002). The marketing department integrates, reconfigures, gains, and releases resources to innovate with BD technologies (Eisenhardt and Martin, 2000; Teece et al., 1997).

Specifically, there is academic interest in understanding which set of processes and patterns underpin the routines of DDIC of marketing and the decision to integrate, gain, or reconfigure resources for building a capability model for DDIC of marketing, as the literature on DCs has often ignored the fundamental processes by which resources are transformed into customer value (Srivastava et al., 2001). In this increasingly data-rich and connected world, marketing has gradually shifted its innovation tasks toward data-driven operational routines. This shift requires the department to develop a set of systematic skills and methods through organizational learning in order to perform DDI

effectively. For this purpose, in addition to the DC theory view, we adopted the perspective of the capability model of Zollo & Winter (2002), which depicts that DCs can be characterized as systematic patterns of organizational activity aimed at the generation and adaptation of operating routines, and whose evolution is nurtured by learning mechanisms: tacit accumulation of past experience, knowledge articulation, and knowledge codification processes.

In conclusion, based on this theoretical foundation, we propose a dynamic processual capability view for DDIC of marketing by revealing how the bundle of resources and capabilities embedded in it shape some operational routines, achieved thanks to the activation of deliberate learning mechanisms that fulfill the DDI initiative.

4.4. Confirming the relationships of DDIC of marketing with value proposition: Service-Dominant Logic

Our final theoretical framework for studying DDIC of marketing is the S-D Logic. The previous literature review gap stressed the importance of analyzing the role of DDIC of marketing in designing value propositions for DDI, identifying the S-D logic (Vargo & Lusch, 2004, 2008) as an appropriate theoretical pillar to connect these dimensions. Therefore, we detail the main tenets of this logic and its effective connection with the topic of DDIC of marketing and the construct of value proposition in the context of DDI.

S-D Logic bases its assumptions on a relational aspect and posits that service innovation focuses on creating and developing value propositions through which firms can support their customers' value creation, regardless of whether this takes place through services or products (Vargo & Lusch, 2004, 2008). S-D Logic states that service is the activity required to satisfy another's need. It is not service(s) in the conventional sense, where services are used merely to address needs that tangible goods cannot fulfill. In S-D Logic, 'service' is superordinate to both goods and services (Vargo & Lusch, 2008, p. 256). Four main tenets comprises S-D Logic: co-creation, resources integration, value in use, and value proposition.

The first tenet of the S-D Logic lies in a collaborative marketing approach involving both sellers and buyers in a reciprocal process of value co-creation (Lusch & Vargo, 2014; Vargo & Lusch, 2004). It requires companies to focus on marketing with customers rather than marketing to them (Vargo & Lusch, 2004), and to innovate with customers, thereby actively involving them in the innovation process.

The second tenet of the S-D Logic is that these collaboration practices manifest in customers and firms integrating and sharing resources in order to co-create value (Aarikka-Stenroos & Jaakkola, 2012; Grönroos & Voima, 2013). Customers integrate resources in the form of products and services in their usage processes to create value for themselves or others (Vargo & Lusch, 2008), and resources are also integrated in the configurations that firms offer the market in the form of value propositions (Grönroos, 2009; Vargo & Lusch, 2008).

The third tenet lies in the relational aspect of the value concept. Through interaction, the experience of service becomes the basis for assessments of value-in-use by beneficiaries (Vargo & Lusch, 2008, p. 3). Value is not derived from a transactional approach and a goods-dominant logic by suppliers (Anderson et al., 2007), but is jointly created and demonstrated as value-in-use. The customer is the final arbiter of value co-created, and most importantly, the arbiter of value-in-use derived from interaction with goods and other physical resources. In other words, goods and physical resources are seen as service appliances, as distribution mechanisms for service, and their value is determined at the time of use, as value-in-use (Lusch & Vargo, 2006).

The fourth tenet posits value proposition as the strategic instrument that helps deploy the S-D Logic for innovation initiatives in business markets, both within and outside the organization. Ballantyne et al. (2011) describe the value proposition as a mutual marketing tool between firms and customers that enhances exchanges, relationship building, and knowledge renewal, requiring the marketing department to integrate resources and assess value-in-use.

From an S-D Logic relational standpoint, digitalization and servitization act as catalysts to nurture DDI, demonstrating that DDI is essentially an ecosystemic value co-creation process that facilitates stronger relational interactions and closer integration among its actors (suppliers, intermediaries, and customers) (Story et al., 2017). All of this enables firms to offer highly customized value propositions based on their co-creation practices and resource integration with customers. In this regard, marketing capabilities play an essential role in nurturing relationships that shape value propositions for innovation (Lindgreen et al., 2012). S-D Logic highlights the management of knowledge through firm-customer collaborations and emphasizes the role of continuous dialogue in knowledge creation (Vargo & Lusch, 2004). It details how marketers can leverage customer relationships and online communities by studying factors driving customer participation (Akman et al., 2019), particularly during the ideation stage of new product development (Filieri, 2013).

Additionally, in the extant literature on S-D Logic, researchers have recognized servitization as an "offering not previously available to the firm's customers [...] that requires modifications in the sets of competences applied by service providers and/or customers" (Ordanini & Parasuraman, 2011, p.5), or as "rebundling of diverse resources

that create novel resources that are beneficial (i.e., value-experiencing) to some actors in a given context; this almost always involves a network of actors, including the beneficiary (e.g., the customer)" (Lusch & Nambisan, 2015). Applied to our context, the fast-changing digitalized environment requires organizations to source and develop the requisite marketing innovation capabilities to innovate toward more data-driven services, which necessitates assessing the contributive role of DDIC of marketing for architecting value propositions in the context of DDI.

From an S-D Logic perspective, we then confirm that marketing capabilities are pivotal for DDI, as they help create attractive value propositions for innovation outcomes. However, some industrial companies struggle with introducing DDI into their portfolios, particularly due to deficiencies in marketing capabilities. Rapaccini & Adrodegari, (2022) stressed that the interface between service design and value creation mechanisms is an underexplored area; this appears to be where industrial firms need more expertise, such as the development of marketing DDI capabilities (Eriksson & Heikkilä, 2023).

In conclusion, with this final theoretical framework of S-D Logic, we intend to demonstrate how the resources that shape DDIC can foster co-creation practices for servitized DDI, and how these integrated practices lead to architecting the ad hoc value proposition, to provide a new value to customers.

Box 1-2. summarizes the theoretical pillars used to frame our findings on our research object of DDIC of marketing.

Contextualizing DDIC of marketing	Describing DDIC of marketing	Articulating the components of DDIC of marketing	Connecting DDIC of marketing to value proposition
Market Orientation theory *Kohli and Jaworski, 1990*	**Resource-based theory** *Barney, 1991; 1986; Slotegraaf et al., 2003; Vorhies et al., 2009*	**Dynamic capabilities theory** *Teece, 1997; 2007* **Dynamic capability model** *Zollo & Winter 2002*	**Service-Dominant Logic** Vargo & Lush, 2004 ; 2008

Box 1-2. Overview of the theoretical framework to investigate DDIC of marketing

We have detailed the literature review for our dissertation, identified a three-dimensional perspective on the identified literature gaps, and presented the theoretical framework that serves as a support for addressing the research problem on DDIC of marketing. In the next section, we describe our research problem in more detail, along with the corresponding research questions and objectives.

5. Research problem, research objectives and research questions

We draw on different theoretical perspectives to enhance insights into the DDIC of marketing, a research topic that is gaining momentum in the strategic marketing literature. Moreover, the literature background on this concept highlights a three-dimensional perspective on the identified literature gaps. First, conceptually, there is no consensus on the current state of research on marketing innovation capabilities, including its research streams and key topics for future exploration. In addition, the conceptualization of DDIC of marketing lacks both an innovation perspective and a micro-level analysis from the marketing department. Furthermore, from an exploratory approach, there is a lack of detailed description of the components of DDIC of marketing from a micro-level analysis of the marketing department and from a process-oriented capability building perspective. Finally, from a confirmatory approach, there is a need to assess the contributory role of DDIC in shaping value propositions for DDI.

Accordingly, we state the corresponding general research problem:

How can the concept of data-driven innovation capability of marketing be elucidated within B2B markets?

Based on this identified research problem, our objectives are fourfold:

1. Understanding what marketing innovation capabilities are
2. Conceptualizing DDIC of marketing
3. Exploring the components and underlying processes of DDIC of marketing
4. Confirming the consequences of using DDIC of marketing in architecting value propositions for DDI

The following main research questions guided our doctoral work:

General research questions
RQ1 – What is the current status of literature on marketing innovation capabilities RQ2 – How to conceptualize DDIC of marketing ? RQ3 – How to build DDIC of marketing ? RQ4 – What is the contributive role of DDIC of marketing in architecting value propositions for DDI?

To address these four questions, our thesis followed a structure divided into four articles, with the research problems, research objectives, and research questions detailed below.

5.1. Article 1

Article 1 is titled :

Marketing innovation capabilities: a bibliographic coupling analysis, a conceptual framework, and avenues for future research

While marketing innovation capabilities have drawn sustained interest, the field exhibits several limitations.

Specifically, we raised the following research problem: there is no comprehensive overview, no structured mapping of emerging knowledge, and the research agenda is scattered on marketing innovation capabilities.

Accordingly, the connected research objective of this paper is to present a synthesis of past, present, and future opportunities regarding marketing innovation capabilities to enrich the strategic marketing literature.

We proposed the corresponding research questions for Article 1:

Research questions for Article 1:

A1RQ1 – What is the current status of literature research on marketing innovation capabilities?
A1RQ2 – What distinct research streams exist concerning marketing innovation capabilities?
A1RQ3 – What primary themes drive future research avenues related to marketing innovation capabilities?

5.2. Article 2

Article 2 is titled :

Data-driven innovation capability of marketing: a systematic review and research agenda

We identified the following research problem: there is a lack of conceptualization of DDIC from a strategic organizational approach by marketing departments.

Accordingly, the connected research objectives of this paper were threefold: (1) to contextualize DDIC within marketing departments, (2) to gather evidence of its components and underlying processes to establish a construction model and (3) to propose an overall conceptual framework detailing the construction process, components, related variables and possible relationships for a comprehensive explanation of the concept.

We proposed the corresponding research questions for Article 2:

Research questions for Article 2:

A2RQ1 – What is the contextual role of big data technologies in building DDIC of marketing?
A2RQ2 – What resources, capabilities, underlying mechanisms and building process are required for DDIC of marketing?
A2RQ3 – Is there evidence of complementarity between DDIC of marketing and companies' resources?
A2RQ4 – To what type of innovation output does DDIC of marketing contribute?

5.3. Article 3

Article 3 is titled :

Exploring how to develop data-driven innovation capability of marketing within B2B firms: Toward a capability model and process-oriented approach

The identified problem is formulated as follows: there is a limited understanding of what constitutes digital marketing capabilities, especially within the B2B context and for innovation purposes.

Accordingly, the connected research objective of this paper is to unravel the construction process of DDIC of marketing within B2B firms.

We proposed the corresponding research questions for Article 3:

Research questions for Article 3:
A3RQ1 – How can a capability model be developed for DDIC of marketing in B2B firms? A3RQ2 – What resources and processes are required to develop DDIC of marketing?

5.4. Article 4

Article 4 is titled :

Architecting value proposition for data-driven innovation: unveiling the role of data-driven innovation capability of marketing through a configurational approach

We identified the following research problem: the contribution of DDIC of marketing to architecting value propositions for DDI has been minimally explored in the business environment.

Accordingly, the connected research objective of this paper is to decompose the value proposition design elements derived from the organizational resources, specifically unveiling the role of the resources integrated into the DDIC of marketing for driving DDI.

We proposed the corresponding research questions for Article 4:

Research questions for Article 4:

A4RQ1 – What is the architecture of value propositions for DDI types, and how can we organize a common set of practices to design it?
A4RQ2 – What DDIC of marketing and organization resources of these value propositions are relevant for realizing specific DDIs, and how do these elements combine to achieve their effect?

We summarize our research problem, research objectives, and research questions in the overall research framework below (Figure 1-11.).

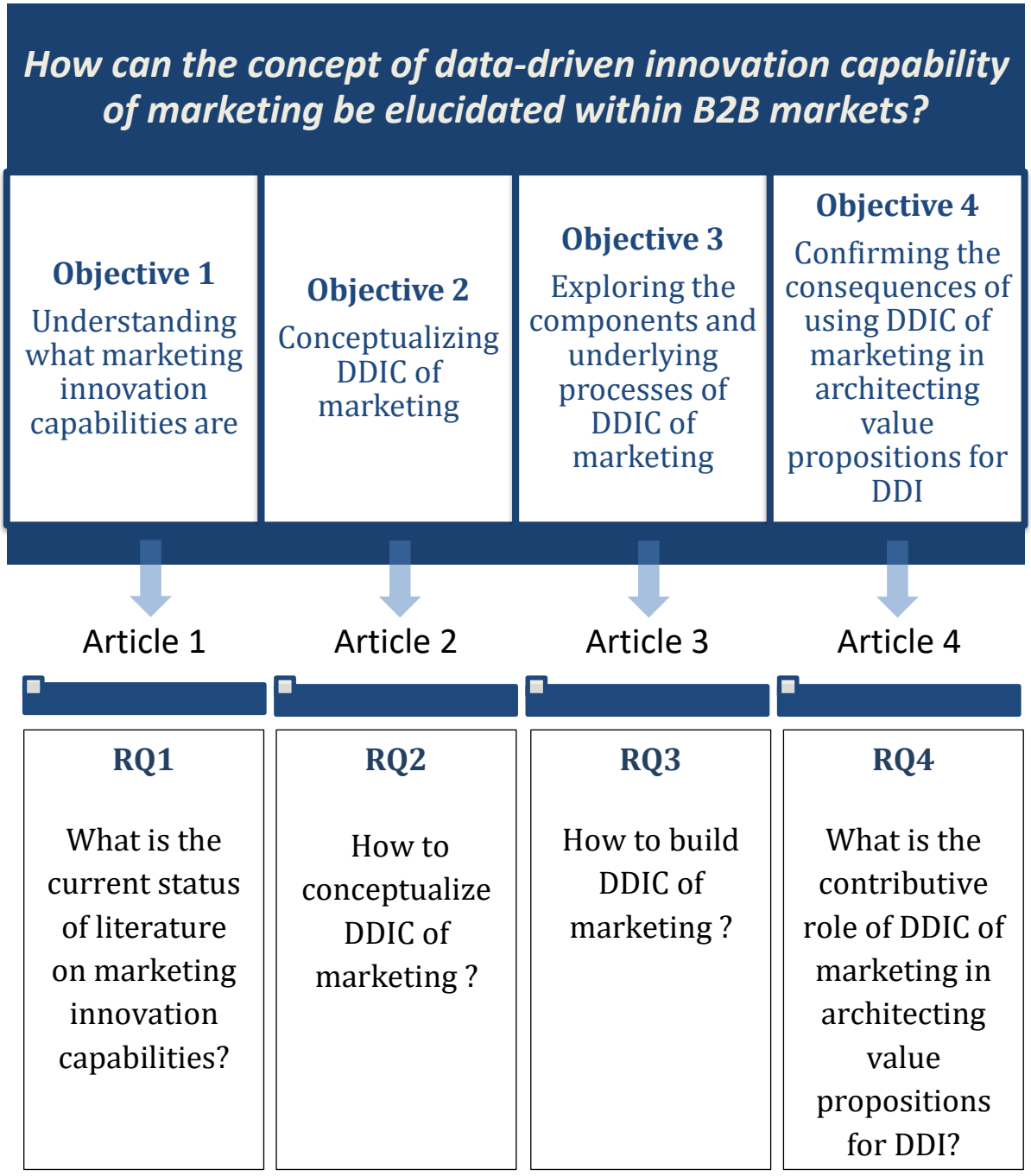


Figure 1-11. General research framework

We believe that such academic research offers a theoretical and empirical basis to elucidate the concept of DDIC of marketing, providing valuable guidance to marketing managers aiming to engage in DDI and strategic marketing scholars seeking to enrich the concept of digital marketing capabilities applied to innovation. This research identifies the critical resources, routines, and learning mechanisms necessary for the marketing department to drive DDI initiatives, benefiting both practitioners and researchers. It also enriches B2B strategic marketing literature by elaborating on the value proposition construct in the DDI context, focusing on the critical role of DDIC in marketing and firm resources. Managerially, it offers guidance on how companies can utilize their resources to create specific DDI types through the strategic and instrumental use of value propositions.

The methodology employed to address the research problem is explained in Section 6.

6. Methodology

To address our research problem and our four research questions, we employed three complementary methodological approaches, which we present below : (1) a conceptual approach, (2) an exploratory approach, and (3) a confirmatory approach.

6.1. Conceptual approach

Articles 1 and **2** are conceptual in nature and aim to develop theoretical frameworks for clarifying two main concepts: (1) marketing innovation capabilities, and (2) DDIC of marketing. This approach helps establish connections between existing theories and new observations for the analyzed constructs. Moreover, a conceptual approach allows for identifying gaps in existing research. By structuring current knowledge, it reveals under-explored areas and unresolved questions that warrant further investigation. Lastly, it guides empirical research by providing a framework for formulating research hypotheses and designing empirical studies that are well-grounded in existing theory.

These articles reviewed the literature on marketing innovation capabilities and DDIC of marketing, respectively, using two distinctive review methods: bibliometric analysis and systematic literature review.

Both review methods present some similarities. First, they share the same objective, which is to synthesize information from various bibliographic sources. Second, they base their synthesis on existing literature, analyzing previous works to build a more comprehensive understanding of a research field.

Nevertheless, they also present differences. Bibliometric analysis assesses trends and patterns in the literature in a more quantitative and structural manner, while the systematic review focuses on the content and quality of studies to address specific research questions. Bibliometric analysis is broad scope-oriented, whereas systematic literature reviews are typically content-oriented. It is commonly accepted that systematic literature review content can be reviewed manually, which is not usually the case with bibliometric analysis.

More precisely, bibliometric analysis is quantitative in nature, using statistical methods to analyze the quantitative characteristics of literature, such as the number of co-citations among authors, which we opted for through the bibliographic coupling method. It summarizes the bibliometric and intellectual structure of a field by analyzing the social and structural relationships between different research constituents (e.g., authors, countries, institutions, topics) (Donthu et al., 2021). However, systematic literature reviews involve the acquisition, arrangement, and assessment of the extant literature using systematic procedures (Palmatier et al., 2018; Tranfield et al., 2003), typically carried out manually (e.g., content and thematic analyses) by scholars (Lahiri et al., 2020; Lim et al., 2021).

In conclusion, these two distinctive, yet complementary conceptual approaches align well with our research objectives. The objective of Article 1 was to present a synthesis of past, present, and future opportunities regarding marketing innovation capabilities to enrich the strategic marketing literature, and a bibliometric analysis provides an overview of the structural aspects of research, such as research clusters and the evolution of themes over time. The objective of Article 2 is connected to the narrower scope of DDIC in marketing, part of marketing innovation capabilities, with specific objectives: (1) contextualizing DDIC within marketing departments, (2) gathering evidence of its components and underlying processes to establish a construction model, and (3) proposing an overall conceptual framework. The use of a systematic review is then judged opportune as it can lead to an in-depth synthesis of research findings through a rigorous, methodical process for selecting, evaluating, and summarizing relevant studies.

6.2. Exploratory approach

Article 3 is anchored in an exploratory approach. Based on our conceptual analysis of DDIC of marketing, we continue our investigation with the objective of unraveling the construction process of DDIC of marketing within B2B firms. The exploratory approach is fundamental for explaining new fields that are underdeveloped, such as the emerging phenomenon of DDIC of marketing.

First, this approach assisted us in confirming what was theoretically interpreted from the systematic literature review on DDIC of marketing, advancing knowledge and building theory on our research topic.

Second, it allows us to generate fresh insights on unexpected dimensions for DDIC of marketing that may arise from the field and the qualitative content analysis.

Third, this data exploration can serve as guidance for future research, by formulating hypotheses and a research agenda to be tested in subsequent studies.

Fourth, qualitative study supports various theory development efforts, including theory elaboration, which builds on existing conceptual ideas and frameworks to inform study designs (Lindgreen et al., 2021). This echoes our research objective for Article 3, which, building on the systematic review of DDIC of marketing and a detailed theoretical framework (see Section 4 of the general introduction), analyzes qualitative ground material to elaborate a capability model for DDIC of marketing. Moreover, there is a high trend in the industrial marketing literature to employ qualitative studies related to the fields of innovation, new product development, and services, which aligns with the investigated research object (Lindgreen et al., 2021).

Lastly, Article 3 conducted a qualitative study using an abductive approach to perform its qualitative content analysis. The abductive approach is focused on matching, which Dubois & Gadde, (2002) define as "going back and forth between framework, data sources, and analysis" (p. 555). In other words, we concentrated on identifying an overall theoretical framework, i.e., a capability model for DDIC of marketing, and then systematically confronted it with empirical data from the interviews, thus allowing us to combine the received theory with the empirical findings and other theoretical perspectives, i.e., RBT (Barney, 1991; Vorhies et al., 2009) and DC (Teece, 2007; Teece et al., 1997), to build new theory (Andersen & Kragh, 2010; Guenzi & Storbacka, 2015).

6.3. Confirmatory approach

Article 4 presents a confirmatory approach using a fuzzy set qualitative comparative analysis (fsQCA) (Ragin, 2000, 2008) to examine the intricate interactions between organizational resources, particularly those integrated into the DDIC of marketing, that architect value propositions for DDI.

This approach builds on the exploratory study by testing the resources embedded in the proposed capability model of DDIC of marketing, which, in conjunction with firm resources, shape value propositions for driving different types of DDI.

The method analyzes configurations of variables, i.e., resources, to determine which are necessary to produce the studied outcome, i.e., specific types of DDI. It allows for the exploration of how different combinations of factors lead to the same results, thus highlighting equifinal causality (different paths can lead to the same outcome).

fsQCA is best suited for examining interplays between elements of a complex, non-linear nature (Fiss, 2007). The main difference of configurational methods is that they view elements through a holistic lens, requiring simultaneous examination. This is particularly attractive for context-related studies involving complex causality (Mikalef & Krogstie, 2020). Applied to our research context, it is a suitable method to understand which resources embedded in the DDIC of marketing—revealed during the previous exploratory stage—constitute confirmed combinations for architecting value propositions for specific identified types of DDI.

In summary, the fsQCA approach is a method often used in organizational and strategic contexts, and it helped us examine causal configurations of resources for specific outcomes. It aligns with our research objective to advance the field of organizational marketing literature applied to innovation strategies.

Table 1-5 below synthesizes our research methodology.

Table 1-5. Synthesis of research methodology

	Conceptual approach		**Exploratory approach**	**Confirmatory approach**
	Article 1	*Article 2*	*Article 3*	*Article 4*
Research objective	Synthesizing past, present, and future opportunities regarding marketing innovation capabilities	(1) to contextualize DDIC within marketing departments, (2) to gather evidence of its components and underlying processes to establish a construction model, and (3) to propose an overall conceptual framework	Unravelling the construction process of DDIC of marketing within B2B firms	Decomposing the value proposition design elements derived from the organizational resources, specifically unveiling the role of the resources integrated into DDIC of marketing for driving DDI
Research methodology	Bibliometric analysis	Systematic literature review	Qualitative study	fsQCA
Data collection method	Scopus and Web of Sciences	Scopus , Web of Sciences, EBSCOhost – Business Source Complete, and Google Scholar	Semi-structured interview	Online survey
Sample size	262 peer-reviewed articles	48 peer-reviewed articles	17 professionals from marketing, executive management, data and digital, and sales department	103 professionals from marketing, digital, IT, R&D, finance, and sales department
Data analysis method	Bibliographic coupling analysis	Thematic coding	Abductive approach	Configurational approach
Analysis software	VOSviewer 1.6.19.	NA	NVivo 14	fsQCA 4.1

Hereafter, we present the dissertation overview, introducing its structure and chronological sequence.

7. Dissertation overview

7.1. Structure

The structure of the dissertation was established around four articles, all presented at international conferences and submitted to academic journals (ranging from rank 3 to rank 4*, according to the AJG 2021), one of which was published.

The dissertation is divided into three parts. We may summarize its sequence as "from generalization to scrutinization," where the generalization aspect maps marketing innovation capabilities, and the scrutinization aspect focuses specifically on the link between the DDIC of marketing and value propositions in the context of DDI (see Figure 1-12.).

Part 1 is an in-depth literature review analyzing two main concepts: (1) marketing innovation capabilities, and (2) DDIC in marketing. It is composed of two articles:

- Article 1: *Marketing innovation capabilities: a bibliographic coupling analysis, a conceptual framework, and avenues for future research*
- Article 2: *Data-driven innovation capability of marketing: a systematic review and research agenda*

Part 1 addresses the *"WHAT"* of our doctoral thesis.

The main findings include:

- Article 1: Mapping and clustering of four research streams on marketing innovation capabilities, integrated into a conceptual framework: (1) innovation strategy, (2) knowledge, (3) drivers and moderators of innovation, and (4) innovation performance
- Article 2: (1) Development of a 'CIMO-logic' framework (Context, Intervention, Mechanisms, Output) for the DDIC of marketing building process, with an explanation synthesis of its components, dynamic phases and connected dimensions, and (2) a definition proposal of DDIC of marketing.

Part 2 presents an exploratory study and focuses on the specific DDIC of marketing to unravel a building process and a capability model approach. It integrates Article 3:

> *Exploring how to develop data-driven innovation capability of marketing within B2B firms: Toward a capability model and process-oriented approach*

The reasoning is based on a qualitative study using an abductive approach. We utilized existing literature on digital marketing capabilities and DDI, along with the theoretical pillars of RBT (Barney, 1991), DC (Teece, 2007), and a dynamic capability model representation by Zollo & Winter (2002) to inform our results and advance theory.

Part 2 addresses the *"HOW"* of our doctoral thesis.

The main findings include the proposition of an overall process-oriented and dynamic framework for the DDIC of marketing, highlighting potential enablers, a three-phase capability building process, and potential consequences.

Part 3 presents a confirmatory study and investigates the consequences of using DDIC of marketing on value propositions in the context of DDI. More precisely, it enhances our understanding of the contributive role of resources embedded in DDIC of marketing in shaping value propositions for DDI. It incorporates Article 4:

> *Architecting value proposition for data-driven innovation: unveiling the role of data-driven innovation capability of marketing through a configurational approach*

Using a configurational approach via the fsQCA method, it provides several combinations of marketing and firm resources that compose value proposition practices for driving specific types of DDI.

Part 3 addresses the *"WHY"* of our doctoral thesis.

The main findings emphasize:

- Confirmation that the resources embedded in DDIC of marketing play a strategic role in fulfilling the practices of value propositions that drive DDI types
- Identification of sets of configurations of marketing and firm resources for achieving three identified DDI types

The three parts of this dissertation amalgamate the four aforementioned articles, presented in a "WHY/HOW/WHAT" sequence (Figure 1-12.) inspired by Simon Sinek's view of innovation for firms[9]:

[9] https://www.ted.com/talks/simon_sinek_how_great_leaders_inspire_action?language=fr

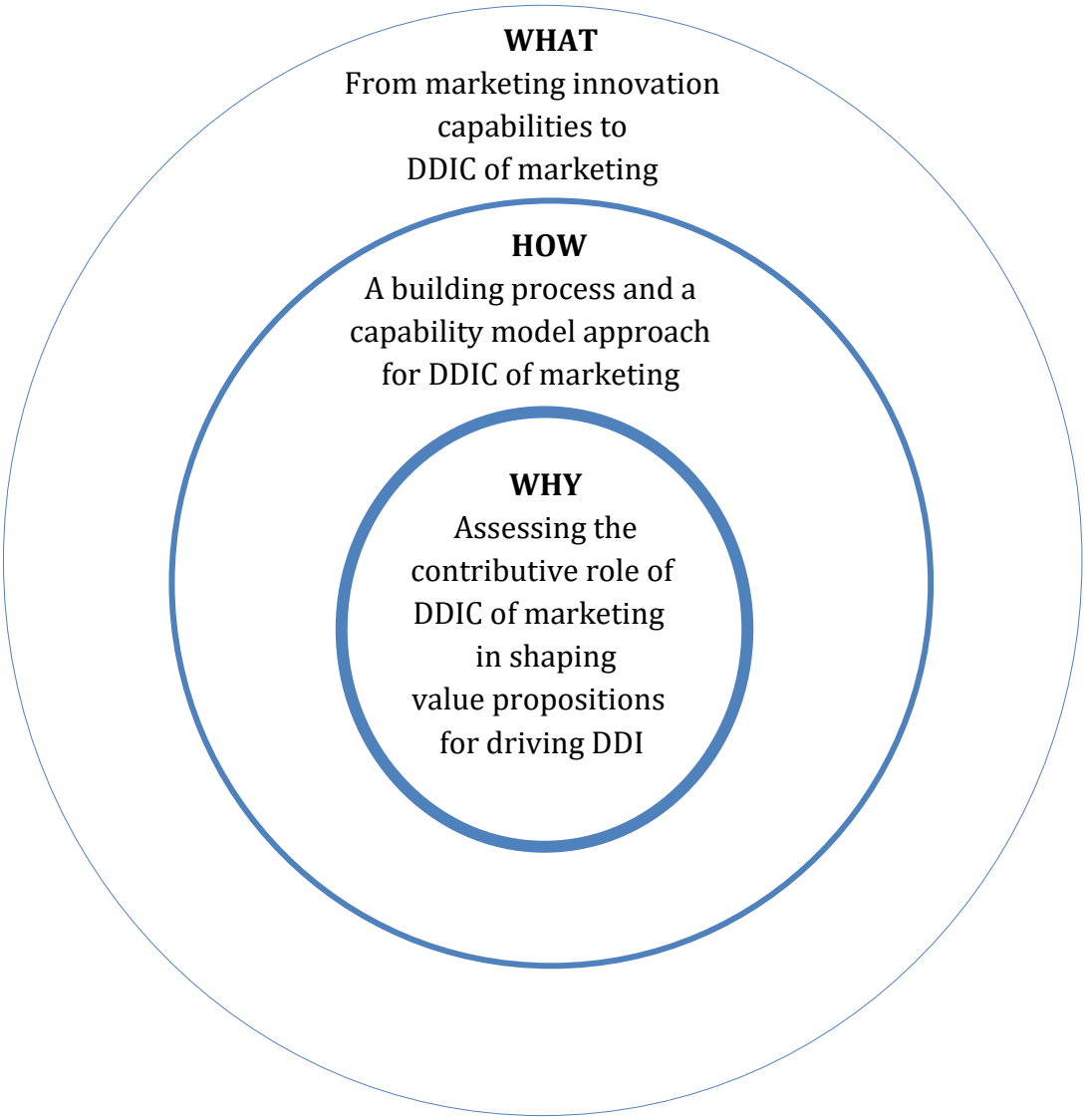


Figure 1-12. Dissertation overview representation on DDIC of marketing

Finally, we conclude our dissertation with a general conclusion organized into five parts. The first part elaborates on our research findings, and the second part discusses them. The third part outlines the theoretical, methodological, managerial, and educational contributions. The fourth part delineates the limitations of this research and opens an agenda for future research. Lastly, the fifth part advances academic and managerial thinking on the future of B2B marketing, digitalization, and DDI.

7.2. Chronology

This doctoral work was executed over a three-year period, as is standard for completing a Ph.D. in France.

Our articles follow a chronological order that sometimes overlaps due to their respective submission and revision processes for different academic journals.

The first year was dedicated to understanding the concepts of marketing innovation capabilities and DDIC of marketing.

Based on this foundation, in the second year, we started presenting our initial results on the systematic literature review of DDIC of marketing while conducting interviews to investigate DDIC of marketing from a qualitative exploratory approach. These works were submitted and revised between the second year and the beginning of the third year.

Article 2 was submitted in November 2022 to the International Journal of Management Reviews (rank 3, AJG 2021) and is currently under a third round of minor revisions, to be resubmitted in September 2024.

Article 3 was accepted in December 2023 and published in April 2024 in Industrial Marketing Management (rank 3, AJG 2021).

Meanwhile, we began drafting Article 1, presenting a bibliometric analysis on marketing innovation capabilities. It was introduced at the Industrial Marketing Management Summit in Leeds, UK, in January 2024 and submitted to the Journal of Business Research (rank 3, AJG 2021) in May 2024.

Finally, we started our investigation for Article 4, an fsQCA paper linking DDIC of marketing, value propositions, and DDI, in December 2023. The article was presented at the 2024 Haring Symposium at Kelley Business School, Indiana University, USA, in April 2024. We received valuable and encouraging feedback, which we integrated into our paper that will be finalized and submitted to the Journal of the Academy of Marketing Science (rank 4*, AJG 2021) in September 2024.

The figure below summarizes the status of our research, including each article's status, the dedicated academic journals, and the international academic conferences where the articles were presented.

	Conceptual approach		Exploratory approach	Confirmatory approach
Article's status	**Submitted on May 13, 2024** **Under review since June 12, 2024**	**Under minor revision,** **Round 3, since June 2024**	**Accepted December 2023 & published April 2024**	**On-going research** **To be submitted:September 2024**
Academic journal	Journal of Business Research, **rank 3, AJG 2021**	International Journal of Management Reviews, **rank 3, AJG 2021**	Industrial Marketing Management, **rank 3, AJG 2021**	Journal of the Academy of Marketing Science, **rank 4*, AJG 2021**
Academic conference	-Industrial Marketing Management Summit, **Leeds, UK,** January 9-12, 2024 -Academy of Innovation, Entrepreneurship & Knowledge **Paris, IAE Sorbonne** June, 4-6, 2024	Academy of Innovation, Entrepreneurship, and Knowledge (ACIEK), **Madrid, Spain,** June 21-23, 2023	Industrial Marketing Management Summit, **Bamberg, Germany,** January 19-20, 2023	The 2024 Haring Symposium, Kelley Business school, **Indiana University, USA**, April 12-13, 2024

Figure 1-13. Statement of research

This section concludes our general introduction. The following three sections are devoted to the detailed presentation of our four articles. Part 1 is an in-depth literature review covering Articles 1 and 2. Part 2 is our exploratory study of Article 3. Finally, Part 3 is a confirmatory study that includes an fsQCA analysis presented in Article 4.

PART 1: IN-DEPTH LITERATURE REVIEW

1. **<u>ARTICLE 1</u> - Marketing innovation capabilities: a bibliographic coupling analysis, a conceptual framework, and avenues for future research**

1.1. Summary of Article 1

The author is this article is Ludivine Ravat.

Article 1 follows the connected research objective of understanding what marketing innovation capabilities are, by answering the following question:

What is the current status of literature on marketing innovation capabilities?

Findings revealed four research streams integrated into a conceptual framework: (1) innovation strategy, (2) knowledge, (3) drivers and moderators of innovation, and (4) innovation performance.

The box 2-1. below summarizes highlights and status for Article 1.

HIGHLIGHTS OF ARTICLE 1

- *The paper explores the literature on marketing innovation capabilities.*
- *A bibliographic coupling study of 262 articles identifies four research streams.*
- *A framework integrates these research streams on marketing innovation capabilities.*
- *It serves as a theoretical pillar to identify gaps and propose a research agenda.*
- *Findings guide managers in assessing their marketing capabilities for innovation.*

CURRENT STATUS OF ARTICLE 1

1. *Article presented at the international academic conference of* ***the Industrial Marketing Management Summit****, Leeds, UK, January 9-12, 2024*

2. *Article accepted to the international academic conference of the* ***Academy of Innovation, Entrepreneurship & Knowledge,*** *(ACIEK), Paris, IAE Sorbonne, June, 4-6, 2024.*

3. *Article submitted to the* ***International Journal of Management Reviews****, ranked 3, AJG 2021 and currently under revision and resubmission, minor revision, round 3, June 2024.*

Box 2-1. Key takeaways from Article 1

1.2. Abstract

This study examines the past, present, and future of marketing innovation capabilities, and underscores the importance of these capabilities within firms to enhance performance. Using Scopus and Web of Science databases, this paper draws on 262 peer-reviewed articles and applies a bibliographic coupling method to identify four marketing innovation capabilities research streams: (1) marketing innovation capabilities and innovation strategy; (2) marketing innovation capabilities and knowledge; (3) marketing innovation capabilities, and drivers and mediators of innovation; and (4) marketing innovation capabilities and innovation performance. The findings are integrated into a framework that illuminates a research agenda. Additionally, this study contributes to establishing a theoretical foundation for marketing innovation capabilities that can aid marketers in their innovation efforts to secure a sustained competitive advantage.

Keywords:

Marketing innovation capabilities, bibliographic coupling, innovation strategy, knowledge, drivers and mediators of innovation, innovation performance.

1.3. Introduction

Innovation is widely acknowledged as a crucial driver of business growth, fostering the development of capabilities within organizations that enable them to achieve and maintain superior performance and a competitive advantage (Barney, 1991; Day, 1994). Lawson and Samson (Lawson and Samson, 2001) defined innovation capability as the capacity to continually transform knowledge and ideas into new products, processes, and systems for the benefit of the firm and its stakeholders. This path to innovation necessitates the leveraging of market-based marketing capabilities (Arunachalam et al., 2018), which encompass a blend of skills, knowledge, and resources embedded in organizational processes to fulfill marketing tasks, including innovation activities, and meet market needs (Day, 1994; Moorman and Day, 2016; Morgan et al., 2018). Superior marketing capabilities are essential for launching products more quickly and serving customers more effectively than competitors (Vorhies and Morgan, 2005).

Over the last 25 years, marketing scholars have focused on conceptualizing marketing capabilities and the role of such capabilities in explaining firm performance, particularly their contribution to the commercial success of products and innovation performance (Day, 1994; O'Cass and Weerawardena, 2009; O'Driscoll et al., 2000), the radical or incremental innovation performance (Atuahene-Gima, 2005), or the success of new products (Harmancioglu et al., 2009; Li and Calantone, 1998).

Research on marketing innovation capabilities (MIC) has drawn sustained interest, but also exhibits certain limitations. Firstly, there are few studies that explore what we know about the history of MIC and there is a need to delve further into its evolution, key theories, and prominent themes to address managerial challenges. For example, the classical stages of the new product development process (NPD) have been challenged with the advent of customers' participation in innovation (Martín-de Castro, 2015), digital ecosystems (Wetzels, 2021), open innovation (Chesbrough and Bogers, 2014), or agile methods (Cooper et al., 2021).

Secondly, recent literature on marketing capabilities connected to innovation topics proposes various new research areas such as co-innovation (Blazevic and Lievens, 2008; Coviello and Joseph, 2012), data-driven innovation (De Luca et al., 2021; Zhan et al., 2017), servitization, and customer value offerings (Kohtamaki et al., 2015; Lindgreen et al., 2012; Zhang et al., 2015). Although these areas offer fertile ground for research, the emerging knowledge about MIC requires structured mapping to align with these new research paths.

Lastly, there's an apparent disconnect between the existing literature and contemporary trends relating to MIC, such as digital technologies and their application to marketing innovation activities, resulting in a scattered agenda and emphasizing the necessity of focusing on newer aspects.

To address these gaps, we propose three key research questions:

- What is the current status of literature research related to MIC?
- What distinct research streams exist concerning MIC?
- What primary themes drive future research avenues related to MIC?

This paper aims to bridge these gaps by providing a synthesis of the past, present, and future opportunities regarding MIC from a strategic marketing perspective. Based on data from 262 articles in the marketing field and using the bibliometric method of bibliographic coupling, I identified four main research streams:

1. MIC and innovation strategy
2. MIC and knowledge
3. MIC, and drivers and mediators of innovation
4. MIC and innovation performance

I developed a research framework to integrate these findings and suggested future research directions. This review aims to offer a solid marketing theoretical foundation on MIC for future research and can serve as a guide for marketing managers looking to challenge their MIC in the era of Industry 4.0.

This paper is organized as follows. The next section introduces the review methodology. Section 2.1.5. provides descriptive results of the article dataset. Section 2.1.6. structures MIC and presents the analytical research themes extracted from the bibliographical coupling network. Section 2.1.7. identifies research propositions based on an integrated framework that summarizes the four research communities. Section 2.1.8. discusses theoretical and managerial implications, and Section 2.1.9. concludes by presenting the limitations of the research.

1.4. Review methodology

To answer the three research questions, I chose a literature review methodology that follows a three-step process (Kohtamäki et al., 2023, 2022; Rabetino et al., 2018) (Figure 2-1.).

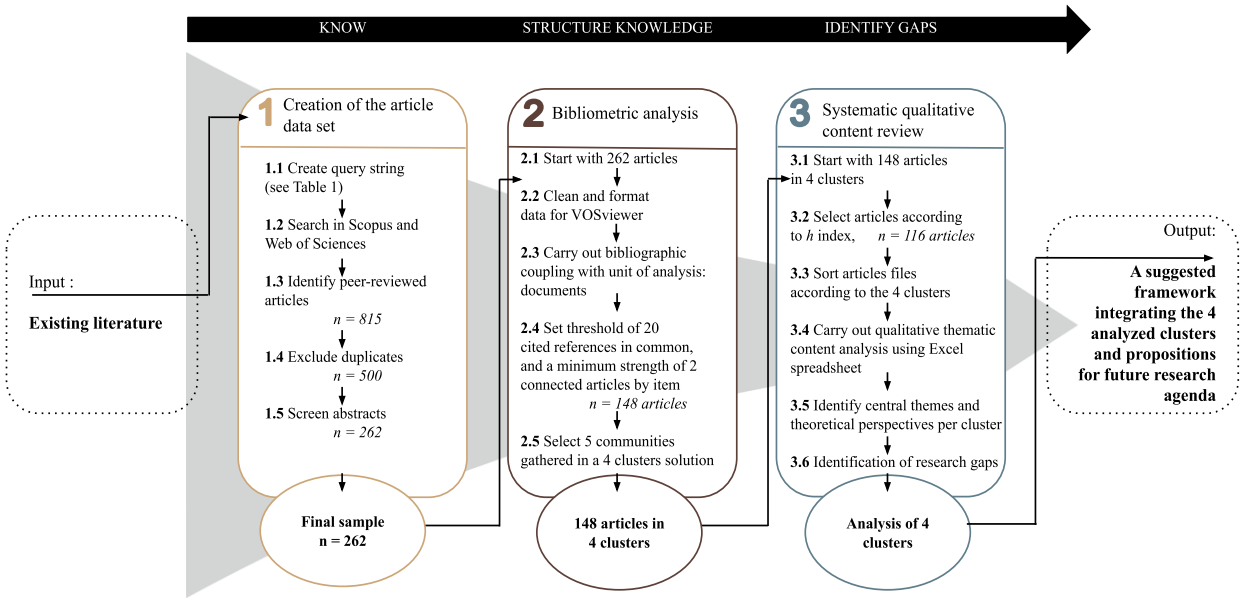


Figure 2-1. A three-step funnel process methodology for reviewing the MIC literature

1.4.1. Step 1: Know

To acquire state-of-the-art information on MIC, a dataset was constructed using specific selection criteria. I used search terms related to marketing, innovation, and capabilities. While broad search terms, encompassing "marketing" and "innovation", seemed appropriate to capture their diverse uses in academic journals (Guckenbiehl et al., 2021), I included synonyms for "capabilities" to ensure comprehensive coverage, such as "competenc*", "skill*", "practice*", "proficienc*", "abilit*", "capacit*", "resource*", "asset*", and "activit*" (Table 2-1.). This research was conducted in Elsevier's Scopus database, recognized as one of the best tools for electronic literature searches, particularly for articles published after 1995 (Tukker, 2015). I utilized Thomson Reuters' ISI Web of Science—Core Collection, which is considered the most common source of bibliographic data (Zupic and Čater, 2015), to validate the results.

Table 2-1. Criteria for selecting the article dataset

Search string	Inclusion criteria	Exclusion criteria
• Keyword (marketing) • AND ("innovation") • AND ("capabilit*" OR "competenc*" OR "skill*" OR "practice*" OR "proficienc*" OR "abilit*" OR "capacit*" OR "resource*" OR "asset*" OR "activit*") • Search in: Abstract • Subject area/category: Business and Management	• Articles written in English • Document type: Academic articles published in marketing peer-reviewed journals, referenced in journal lists (Web of Science Social Sciences Citations Index and Science Citation Index Expanded, Scopus Indexed Journals list and Association of Business Schools-ABS list)	• Articles not investigating MIC • Articles with full text not available

The search query identified 815 documents. As these three terms appeared in numerous full texts, I focused on abstracts from peer-reviewed marketing journals in English, included in Web of Science, Scopus, and Association of Business Schools (ABS) lists to ensure their quality. I excluded duplicate articles and those that lacked a direct relationship with MIC, obtaining a final sample of 262 documents.

1.4.2. Step 2: Structure knowledge

The secondary objective was to explore the intellectual structure of the MIC research field by identifying blocks of common knowledge. I adopted bibliographic coupling, a technique that connects documents based on the number of shared references. This method introduces a systematic, transparent, and reproducible review process (Zupic and Čater, 2015), thus mitigating researcher bias and enhancing rigor (Tranfield et al., 2003). It also incorporates new publications that have not been cited yet, and research from emerging fields and smaller subfields, and is therefore less biased towards the past and offers more precise results than the co-citation analysis technique (Boyack and Klavans, 2010; Zupic and Čater, 2015). In addition, using the bibliographic coupling technique aligned with the review objective, as it allows to delineate the present state of the MIC field by categorizing its thematic fields into different groups and evaluating their potential future research impact. I conducted bibliographic coupling on the sample of 262

documents using VOSviewer[10] software (Van Eck and Waltman, 2010), which facilitates the creation of networks by examining similarities between documents, resulting in a classification into homogeneous clusters and visual representation (Boyack and Klavans, 2010). The analysis was conducted at the document level. To enhance the clarity of the network, I set thresholds for couplings between a document and a minimum number of other documents (Vogel and Güttel, 2013). After testing various threshold values and aiming to simplify the network for better comprehension without being overly reductionist, I decided to consider every item sharing at least 20 citing references with a minimum of two other documents. The final network analysis comprised 148 articles, grouped into five communities, which I further consolidated into a four-cluster solution.

1.4.3. Step 3: Identify gaps

The final step involved a qualitative content analysis of the identified clusters after executing the bibliographic coupling. To bolster the reliability and validity of the results, the articles were selected based on their cluster's h-index (n = 116), and data on authors, titles, domains, theories, and results were entered into an Excel spreadsheet. Using a systematic approach (Braun and Clarke, 2006), I coded the evidence to first-order emerging categories and developed key thematic categories (Miles and Huberman, 1994). I identified four clusters whose analysis is presented in section 4. I then integrated these clusters into a framework to help identify gaps and develop a comprehensive research agenda (see section 2.1.7.).

1.5. Describing MIC

The topic of MIC has received growing attention since the identification of its first related publication in 1975 (Figure 2-2.). I have observed a clear acceleration since 2011, with the 2011–2023 period representing 75.2% of all the related publications (n = 197) (Table 2-2.). Nevertheless, the first period (i.e., 1975–2010) still constitutes a strong theoretical pillar in MIC studies as it includes the five most influential publications (Table 2-3.). These publications are widely cited, suggesting that they inspired the subsequent studies on MIC.

Moreover, the business-to-business (B2B) marketing community is highly interested in the MIC topic and whose related journals are largely represented in the selected studies (n = 39%) (Table 2-2.). MIC studies have a long tradition originating from objectivism; among the analyzed studies, 97 out of 116 were quantitative, a method that is mainly used

[10] WoS Viewer is a software tool designed to visualize and analyze bibliometric networks. https://www.vosviewer.com/

in the strategic management and innovation research domain to connect dimensions together under specific contexts or contingencies.

Finally, MIC is receiving worldwide attention, as evidenced by the fact that the US, the UK, and Australia are the top three countries publishing research on the topic (and producing 170 articles out of a total dataset of 262 (Figure 2-3.). However, at the individual level, Finnish author Professor Leena Aarikka-Stenroos is a prominent figure, with four published articles (n = 4) (Figure 2-4.).

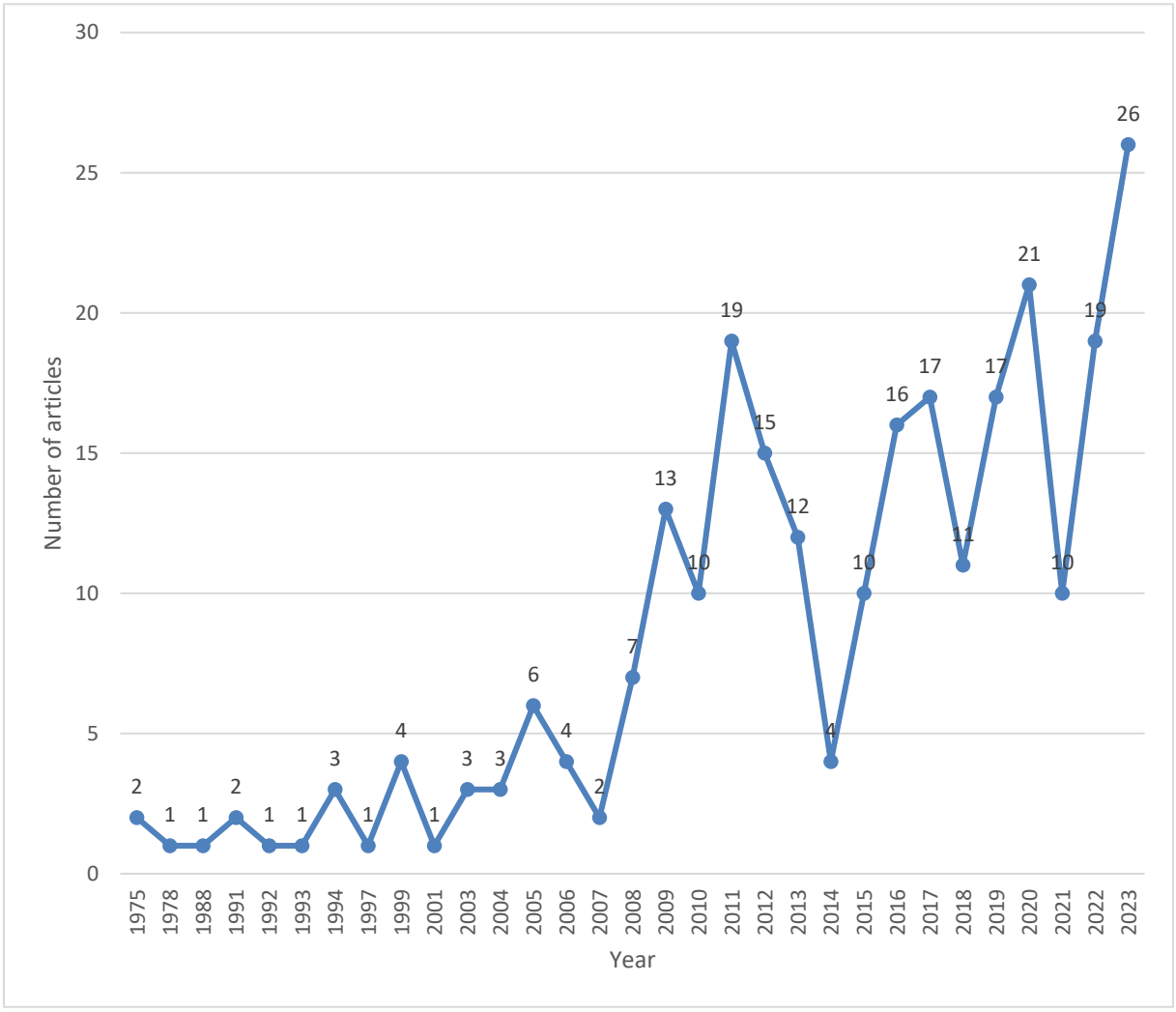


Figure 2-2. Evolution of the number of articles about MIC

Table 2-2. Journals publishing articles on MIC (2011–2023)

Journal	No. of articles published (2011–2023)
Industrial Marketing Management	37
Journal of Business and Industrial Marketing	36
Journal of Business Research	24
Journal of Strategic Marketing	13
Journal of the Academy of Marketing Science	11
International Marketing Review	9
Marketing Intelligence and Planning	8
Australasian Marketing Journal	5
European Journal of Marketing	5
Journal of Marketing Management	4
International Journal of Research in Marketing	4
Journal of Business-to-Business Marketing	4
Asia Pacific Journal of Marketing and Logistics	3
Psychology and Marketing	3
Journal of Marketing	3
Journal of Services Marketing	3
International Journal of Technology Marketing	3
Journal of Global Marketing	3
Marketing Letters	2
Qualitative Market Research	2
Journal of International Marketing	2
International Journal of Consumer Studies	2
Journal of Marketing Research	2
Journal of Interactive Marketing	2
Journal of Consumer Behaviour	1
Journal of Retailing and Consumer Services	1
Marketing Science	1
Journal of Destination Marketing and Management	1
International Journal of Retail and Distribution Management	1
Journal of Research in Interactive Marketing	1
Journal of Retailing	1
Total articles	**197**

Table 2-3. Top 25 most influential MIC-related publications

Position	Author	Publication title	Journal	Year	No. of citations
1	Atuahene-Gima K.	Resolving the capability-rigidity paradox in new product innovation	Journal of Marketing	2005	1,089
2	De Luca L.M., Atuahene-Gima K.	Market knowledge dimensions and cross-functional collaboration: Examining the different routes to product innovation performance	Journal of Marketing	2007	757
3	Tellis G.J., Prabhu J.C., Chandy R.K.	Radical innovation across nations: The preeminence of corporate culture	Journal of Marketing	2009	588
4	Dutta S., Narasimhan O., Rajiv S.	Success in high-technology markets: Is marketing capability critical?	Marketing Science	1999	493
5	Sorescu A.B., Chandy R.K., Prabhu J.C.	Sources and Financial Consequences of Radical Innovation: Insights from Pharmaceuticals	Journal of Marketing	2003	411
6	Ng I.C.L., Wakenshaw S.Y.L.	The Internet-of-Things: Review and research directions	International Journal of Research in Marketing	2017	382
7	Yalcinkaya G., Calantone R.J., Griffith D.A.	An examination of exploration and exploitation capabilities: Implications for product innovation and market performance	Journal of International Marketing	2007	346
8	Naidoo, V.	Firm survival through a crisis: The influence of market orientation, marketing innovation and business strategy	Industrial Marketing Management	2010	309
9	Weerawardena J.	The role of marketing capability in innovation-based competitive strategy	Journal of Strategic Marketing	2003	296
10	Weerawardena J., O'Cass A., Julian C.	Does industry matter? Examining the role of industry structure and organizational learning in innovation and brand performance	Journal of Business Research	2006	285
11	Ballantyne D., Frow P., Varey R.J., Payne A.	Value propositions as communication practice: Taking a wider view	Industrial Marketing Management	2011	282
12	Mavondo F.T., Chimhanzi J., Stewart J.	Learning orientation and market orientation: Relationship with innovation, human resource practices and performance	European Journal of Marketing	2005	262

13	Shankar V., Inman J.J., Mantrala M., Kelley E., Rizley R.	Innovations in shopper marketing: Current insights and future research issues	Journal of Retailing	2011	242
14	Coviello N.E., Joseph R.M.	Creating major innovations with customers: Insights from small and young technology firms	Journal of Marketing	2012	239
15	Wang Y., Hong A., Li X., Gao J.	Marketing innovations during a global crisis: A study of China firms' response to COVID-19	Journal of Business Research	2020	223
16	Merrilees B., Rundle-Thiele S., Lye A.	Marketing capabilities: Antecedents and implications for B2B SME performance	Industrial Marketing Management	2011	216
17	Blazevic V., Lievens A.	Managing innovation through customer coproduced knowledge in electronic services: An exploratory study	Journal of the Academy of Marketing Science	2008	206
18	Martín-de Castro G.	Knowledge management and innovation in knowledge-based and high-tech industrial markets: The role of openness and absorptive capacity	Industrial Marketing Management	2015	204
19	Lindgreen A., Hingley M.K., Grant D.B., Morgan R.E.	Value in business and industrial marketing: Past, present, and future	Industrial Marketing Management	2012	202
20	Lages L.F., Silva G., Styles C.	Relationship capabilities, quality, and innovation as determinants of export performance	Journal of International Marketing	2009	199
21	Ngo L.V., O'Cass A.	Creating value offerings via operant resource-based capabilities	Industrial Marketing Management	2009	190
22	Weerawardena J.	Exploring the role of market learning capability in competitive strategy	European Journal of Marketing	2003	182
23	Nath and Mahajan	Chief marketing officers: A study of their presence in firms' top management teams	Journal of Marketing	2008	180
24	Hsieh S.H., Chang A.	The Psychological Mechanism of Brand Co-creation Engagement	Journal of Interactive Marketing	2016	175
25	Varadarajan R.	Innovating for sustainability: a framework for sustainable innovations and a model of sustainable innovations orientation	Journal of the Academy of Marketing Science	2017	173

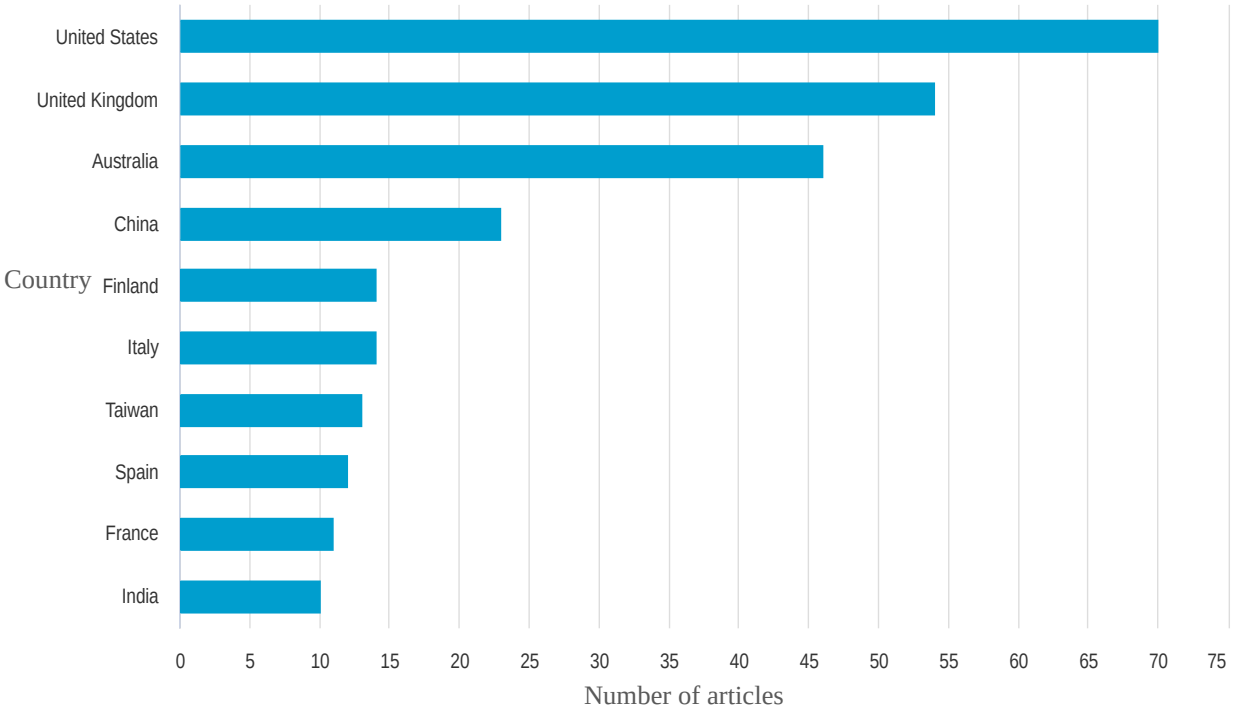


Figure 2-3. Number of articles on MIC by nationality of the first author

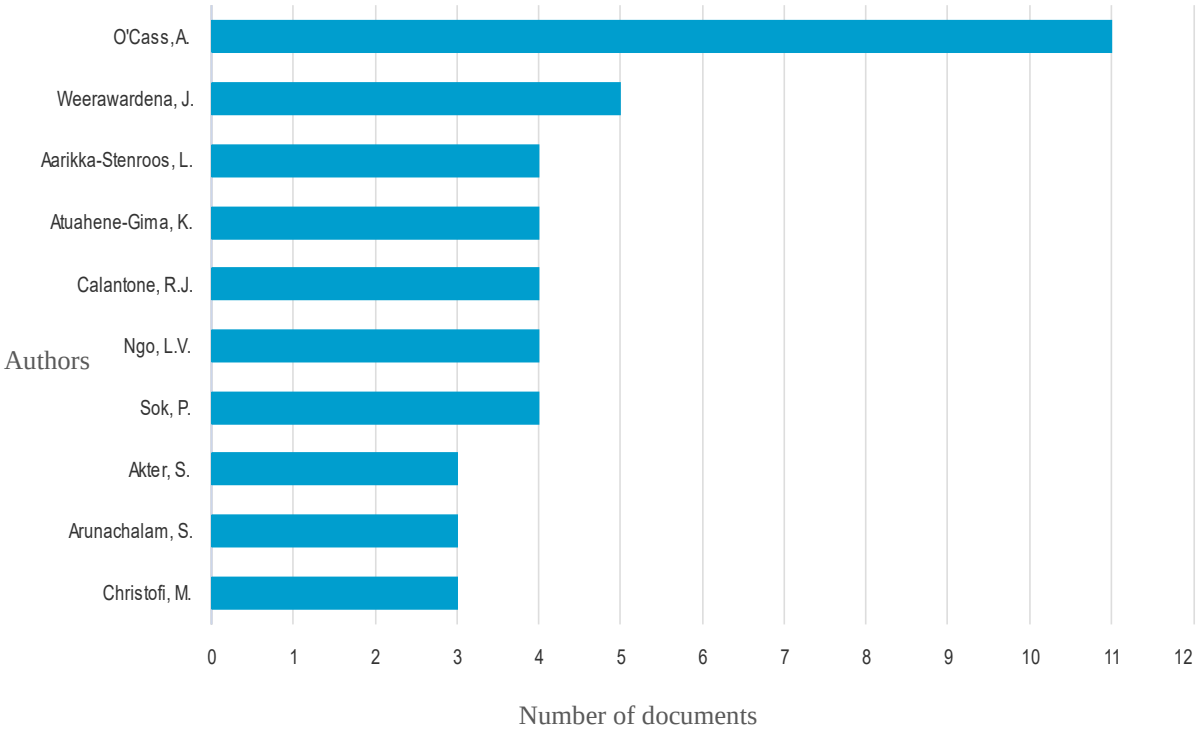


Figure 2-4. Top 10 researchers publishing on MIC

1.6. Structuring MIC research themes

I structured this section according to Figure 2-5.'s network mapping. The colors denote clusters, circle size reflects the number of paper citations, and distances between circles indicate the number of shared citations. The lines connect papers sharing the highest number of similar citations. The analysis formed five clusters, gathered into four research streams.

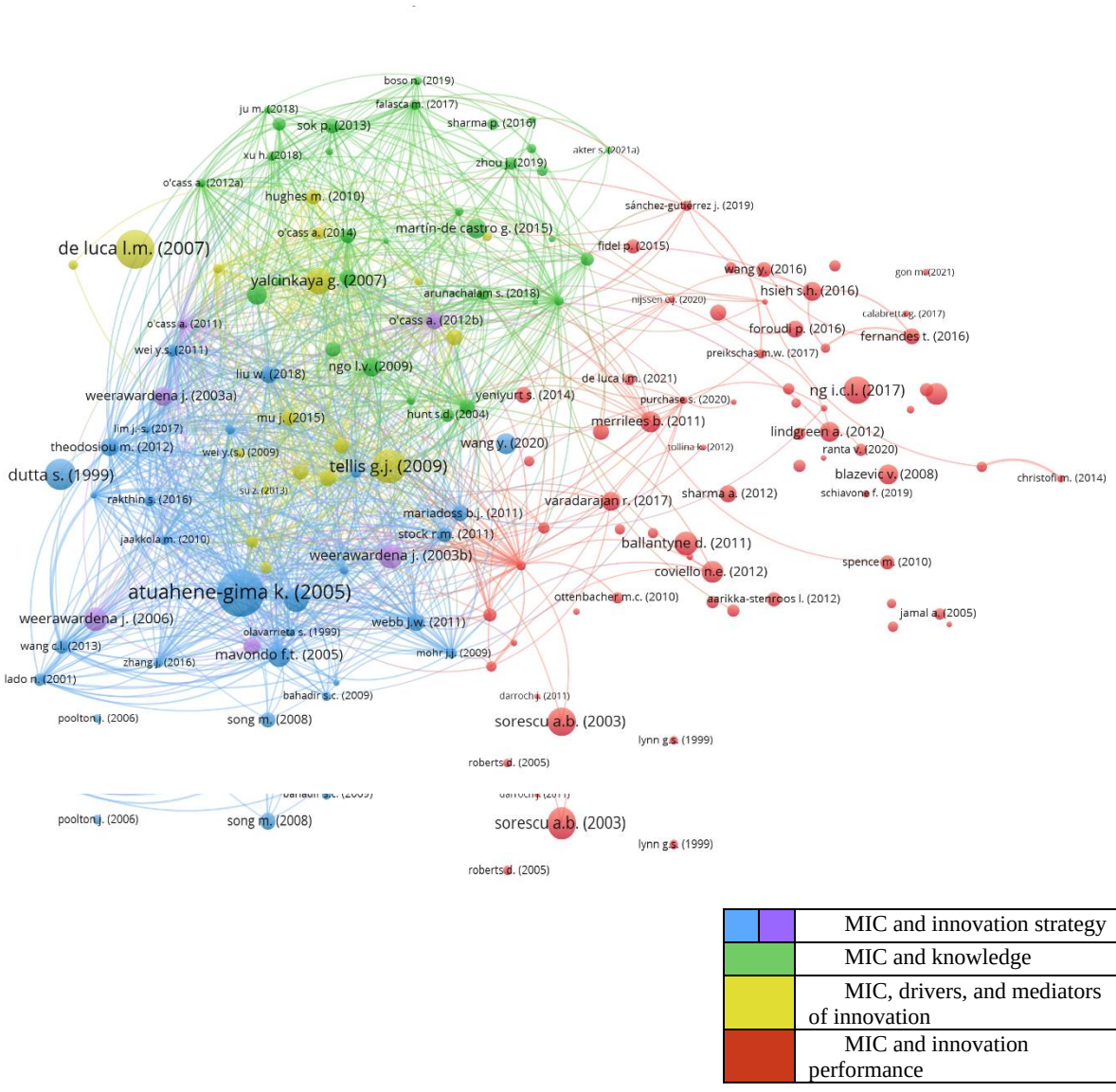


Figure 2-5. Bibliographic coupling network on MIC

Table 2-4. outlines emerging research themes, detailed in the following subsections. Table 2-5. provides an overview of the most cited publications by research stream.

Table 2-4. Overview of emerging research streams on MIC in the marketing literature

Research stream	Cluster color	Main focus and central themes	Date	Popularity	Average citation	h-index
MIC and innovation strategy	Blue/ purple	*How is innovation strategy connected to MIC?* 1. Market orientation 2. Innovation-based strategy typology	1999–2020	33 publications, representing 22.3% of the network	155	30
MIC and knowledge	Green	*What are the multiple facets of knowledge related to MIC?* 1. Knowledge activity management 2. Knowledge operant resources 3. Complementarity of knowledge assets 4. Strategic orientation of marketing knowledge	2004–2022	32 publications, representing 21.6% of the network	70	24
MIC, and drivers and mediators of innovation	Yellow	*How are MIC related to firm performance through drivers and mediators?* 1. Drivers 2. Mediators	2007–2023	18 publications, representing 12.2% of the network	168	17
MIC and innovation performance	Red	*How can MIC contribute to innovation performance and what outputs result from this interaction?* 1. “MIC type–innovation type” interface 2. Co-creation innovation activities 3. Data-driven competencies 4. Value as an innovation performance output	1997–2022	65 publications, representing 43.9% of the network	120	45

Table 2-5. Three most cited papers in each cluster

Research stream	Cluster color	Title	Date	Author	No. of citations
MIC and innovation strategy	Blue/ purple	1.Resolving the capability-rigidity paradox in new product innovation	2005	Atuahene-Gima K.	1,089
		2.Success in high-technology markets: Is marketing capability critical?	1999	Dutta S., Narasimhan O., Rajiv S.	493
		3.Firm survival through a crisis: The influence of market orientation, marketing innovation and business strategy	2010	Naidoo V.	309
MIC and knowledge	Green	1.Knowledge management and innovation in knowledge-based and high-tech industrial markets: The role of openness and absorptive capacity	2015	Martín-de Castro G.	204
		2.Relationship capabilities, quality, and innovation as determinants of export performance	2009	Lages L.F., Silva G., Styles C.	199
		3.Creating value offerings via operant resource-based capabilities	2009	Ngo L.V., O'Cass A.	190
MIC, and drivers and mediators of innovation	Yellow	1. Market knowledge dimensions and cross-functional collaboration: Examining the different routes to product innovation performance	2007	De Luca L.M., Atuahene-Gima K.	757
		2.Radical innovation across nations: The preeminence of corporate culture	2009	Tellis G.J., Prabhu J.C., Chandy R.K.	588
		3.An examination of exploration and exploitation capabilities: Implications for product innovation and market performance	2007	Yalcinkaya G., Calantone R.J., Griffith D.A.	346
MIC and innovation performance	Red	1.Sources and Financial Consequences of Radical Innovation: Insights from Pharmaceuticals	2003	Sorescu A.B., Chandy R.K., Prabhu J.C.	120
		2.The Internet-of-Things: Review and research directions	2017	Ng I.C.L., Wakenshaw S.Y.L.	382
		3.Value propositions as communication practice: Taking a wider view	2011	Ballantyne D., Frow P., Varey R.J., Payne A.	282

1.6.1. Blue/purple cluster: MIC and innovation strategy

Central themes

Studies within the blue/purple cluster mainly focus on innovation strategy from a marketing perspective. Two interconnected subtopics within this cluster are market orientation (MO) and innovation-based strategy typology. Both subtopics contribute to improving performance by fostering a sustained competitive advantage.

Market orientation

This central concept in strategic marketing literature, closely tied to innovation, represents a core element of MIC present in the majority of documents, potentially contributing to the high density within this cluster in the broader network. It signifies a philosophy of learning from customers and competitors (Noble et al., 2002), while the marketing department serves as the link between the company and its customers (Day and Montgomery, 1999), leveraging collective knowledge, skills, and resources to address business needs. This aids in adding value to products, meeting competitive demands (Day, 1994), and influencing various types of innovations pursued by the firm (Weerawardena, 2003b).

In this cluster, three dimensions of MO connected to MIC are observed: MO complementarity with other resources or capabilities, MO components, and MO application. Firstly, combining MO with other resources or capabilities, evident in resource-based view (RBV) literature (Barney, 1991; Slotegraaf et al., 2003), underlines the significance of complementarity in achieving sustained competitive advantage and may lead MIC to be a distinctive capability. For example, the fusion of learning concepts with MO helps marketing departments to develop market-based assets, leading to better market understanding, innovation opportunities, and enhanced market position advantage (Mavondo et al., 2005; Olavarrieta and Friedmann, 2008). Additionally, MO, when coupled with the firm's absorptive capacity and innovation, enhances firm performance and customer acquisition (Rakthin et al., 2016). MO necessitates a constant connection to the external environment, requiring marketing organizations to embody the innovativeness, proactiveness, and risk-taking typical of entrepreneurial capabilities (O'Cass and Ngo, 2011; Webb et al., 2011). Additionally, the combination of internal capabilities (e.g., technical and R&D), when used with market-based resources, positively influences firm performance through product innovation (Dutta et al., 1999; O'cass and Ngo, 2012).

Secondly, MO has been dissected in studies such as Atuahene-Gima (2005), the most cited paper within the global network of studies, for their relation to the topic of achieving

firms' competitive advantage. This relation includes examining customer and competitor orientations components (Narver and Slater, 1990) and their effects on innovation performance moderated by inter-functional coordination.

Thirdly, drawing on the three-step MO process view of Kohli and Jaworski (1990), Ashrafi and Zare Ravasan (2018) also highlight the positive influence of business analytics on intelligence dissemination and responsiveness, and this applied MO process leads to improved marketing activities and innovation performance.

Innovation-based strategy typology

This theme correlates MIC with innovation-based strategies to achieve sustainable competitive advantage, reflecting two subtopics: types of innovation-based strategies connected to MIC and strategic contextual application. Firstly, the type of innovation-based strategy used by firms directs specific MIC mobilization. For instance, firms focusing on brand performance through innovation strategies in dynamic industries concentrate on market learning capabilities, developing external resources while integrating this learning internally (Weerawardena et al., 2006). In the banking industry, embracing innovation and competitor orientation strategies requires higher marketing capabilities, improving performance (Theodosiou et al., 2012). Such innovation-oriented strategies mobilize more marketing activities and allow banking institutions to generate and implement new ideas more efficiently, delivering superior services and monitoring competitors' actions closely, to offer superior value to customers (Theodosiou et al., 2012). Drawing upon boundary theory (Leifer and Huber, 1977), a taxonomy of innovation-based strategies is presented by Stock and Zacharias (2011), emphasizing the need for extensive boundary-spanning activities for proactive customer-oriented and top-down innovation strategies. These activities benefit from superior customer knowledge generated by the marketing department, resulting in enhanced innovativeness and financial performance in new product programs. Furthermore, firms adopting technological innovations like e-business strategies benefit from incorporating technology opportunism and MO complementary capabilities into their marketing capabilities, thereby enhancing overall performance (Voola et al., 2012).

The second dimension offers a contextual view on innovation-based strategies linked to MIC. Mohr and Sarin (2009) highlight the impact of market-driving and customer co-creation capabilities in achieving breakthrough innovations in high-tech industries. In the case of dysfunctional competition, customer orientation capabilities positively moderate innovation performance, while competitor orientation capabilities do not (Liu and Atuahene-Gima, 2018). Specific marketing capabilities related to product packaging, development, sales, and pricing are crucial for firms to create technical and non-technical innovations, fostering sustainable consumption behavior and competitive advantage (Mariadoss et al., 2011). Additionally, the impact of two marketing capability categories—outside-in and inside-out capabilities—on company performance is studied in European

engineering countries, revealing the effectiveness of inside-out capabilities in firms accustomed to a product-centric innovation strategy, with a weaker relationship between MO and business performance (Jaakkola et al., 2010).

Theoretical perspectives

Studies within this cluster mainly base their rationale on strategic MO theory when exploring marketing capabilities and its influence on innovation and firm performance (Kohli and Jaworski, 1990; Narver and Slater, 1990).

Market orientation

MO is a pivotal concept in marketing (Smirnova et al., 2011), rooted in the idea of focusing on meeting customer needs and wants more effectively than competitors (Kotler, 1994). MO can be summarized according to three main perspectives (Hult et al., 2005; Mohr and Sarin, 2009):

- MO as a corporate culture prioritizing the interest of customers (Deshpandé et al., 1993)
- MO as an organizational culture encompassing customer and competitor orientation, and inter-functional coordination (Narver and Slater, 1990)
- MO from an information-processing viewpoint, involving organization-wide market intelligence generation, dissemination, and responsiveness (Jaworski and Kohli, 1993)

The works of Narver and Slater (1990), and Kohli and Jaworski (1990), are widely used to investigate the link between MO and MIC. Narver and Slater view MO as an organizational culture that can influence marketing innovation strategies and firm performance (O'Cass and Ngo, 2011; Webb et al., 2011) through the mediation of its three components: customer orientation, competitor, and inter-functional coordination (Atuahene-Gima, 2005; Liu and Atuahene-Gima, 2018). Viewing MO as a culture aligns with efforts to be learning-oriented and learning-organized (Hurley and Hult, 1998). Other researchers refer to MO as a market-focused learning activity that positively influences innovation ((Mavondo et al., 2005; Olavarrieta and Friedmann, 2008). Jaworski and Kohli (1993) state that "a market orientation essentially involves doing something new or different in response to market conditions; it may be viewed as a form of innovative behavior". Literature also confirms the positive link between MO and product innovation, new product performance, and the relationship between product/market exploration and exploitation (Kyriakopoulos and Moorman, 2004; Liu and Atuahene-Gima, 2018; Lukas and Ferrell, 2000).

1.6.2. Green cluster: MIC and knowledge

Central themes

Papers within the green cluster analyze four main subtopics of knowledge related to MIC: knowledge activity management, knowledge operant resources, the complementarity of knowledge assets, and the strategic orientation of marketing knowledge.

Knowledge activity management

It plays a significant role in MIC and receives continuous attention in marketing literature. Articles highlight customer knowledge management as crucial for innovation within marketing. For example, Falasca et al. (2017) emphasize how MIC mediate the link between customer knowledge management and product innovation performance, especially in high-tech industries and new ventures aiming to globalize (Khavul et al., 2010). There's a persistent focus in marketing on managing exchange relationships, both externally (market-based learning and network relationships) and internally (internal learning capabilities, organizational memory, and brand equity knowledge management), contributing to product innovation strategy (Camisón and Villar-López, 2011; da Costa et al., 2018; Grönroos, 1995; Hunt, 1983; Levitt, 1983; Sharma et al., 2017; Weerawardena et al., 2015). The quality of marketing's relationships within the firm's value chain significantly influences innovation performance, particularly in international operations (Xu et al., 2018). The learning activity within marketing shapes innovation by reconfiguring routines, skills, behavior, and assets to improve innovation capabilities and create a competitive advantage (Jarratt, 2004).

Knowledge operant resources

Linking knowledge to marketing innovation assets is vital in the value-creation process, emphasizing the significance of operant resources within Service-Dominant Logic (S-D) (Vargo and Lusch, 2008, 2004). S-D Logic suggests an increased focus on skills and knowledge (operant) resources in value creation, rather than merely physical resources (operand). For instance, Ngo and O'Cass (2009) demonstrates that a firm's possession of superior operant marketing-based capabilities enhances the proposed value-in-offering. This value-in-offering, judged and consumed by the customer, is augmented by the firm's ability to communicate about its products and services, position them effectively within the market, and differentiate them from those of its competitors, alongside an operant innovation-based capability. In business-to-business (B2B) service firms, O'Cass and Sok (2013) assert that innovation-driven value creation and perceived value-in-use by customers rely on the relationship between operant marketing services capabilities and transformational leadership (Jung et al., 2003). This leadership involves management style and employee behaviors. In knowledge-intensive service contexts, such as professional service firms, Hogan et al. (2011) highlight the importance of innovation

capability and marketing-focused operant resources, like novel promotional approaches in the value creation process.

Complementarity of knowledge assets

This theme aligns with the RBT (Amit and Schoemaker, 1993; Barney, 1991) that emphasizes how the combination of knowledge-based marketing assets with other firm resources leads to sustained competitive advantage. In the context of small and medium-sized enterprises (SMEs), marketing capabilities (serving as an interrelated bundle of market-based skills) positively impact firm performance when paired with innovation and learning capabilities (O'Cass and Sok, 2012; Sok et al., 2013). The complementary effect is strengthened when firms combine ordinary capabilities linked to profits, such as innovation capability with dynamic marketing capability (Zahra et al., 2006). For example, marketing agility capability (i.e., a proactive marketing knowledge-based ability to sense and respond to opportunities swiftly) can improve customer satisfaction (Zhou et al., 2019). Superior customer and product performance arise from possessing superior resources and capabilities within specific functional areas.

Resources and capabilities only hold value when deployed in combination (Ketchen et al., 2007; Slotegraaf et al., 2003). Studies by O'Cass and Sok (2012) emphasize the significant impact of resource capability complementarity (i.e., marketing resource capability and innovation resource capability) on customer and product performance within functional areas. At an international level, combining knowledge management with dynamic marketing ability or a marketing department's level of agility can significantly impact innovation capability and competitiveness (Boso et al., 2019; Chatterjee et al., 2022).

Strategic orientation of marketing knowledge

Strategically directing marketing knowledge assets can positively influence innovation. Martín-de Castro (2015) emphasizes the significance of marketing knowledge capabilities in high-tech industrial markets for gaining a competitive advantage through innovation process orientation. Managing these capabilities relies on strategic marketing orientations, such as market orientation, which rewards a better understanding of customer preferences with higher innovation performance (Lüthje, 2004), and an outside-in view (Day, 2014), which encourages more collaborative innovation through intensive knowledge exchange (Chesbrough, 2006).

Another strategic marketing orientation focuses on entrepreneurial orientation and its influence on profits through innovation (Arunachalam et al., 2018). The entrepreneurism–marketing relationship is analyzed through two marketing capability dimensions: architectural capabilities that involve a firm's response to market changes, and specialized capabilities that allow value to be extracted from products and services (Vorhies et al., 2009). Findings highlight the positive impact of entrepreneurial

orientation on performance through innovation at higher levels of both marketing capability dimensions (Arunachalam et al., 2018). Entrepreneurial strategic orientation now encompasses the emerging field of entrepreneurial marketing (Jones and Rowley, 2011), showing a degree of complementarity between entrepreneurial orientation and MO, and driving product performance innovation (Ahmadi and O'Cass, 2016).

Theoretical perspectives

This literature utilizes various theoretical lenses to build its foundation, including RBT (Barney, 1991; Vorhies et al., 2009), capability-based view (Amit and Schoemaker, 1993; Grant, 1991), dynamic capabilities (DC) (Teece et al., 1997), positional advantage (Day and Wensley, 1988), absorptive capacity (Cohen and Levinthal, 1990), S-D Logic (Lusch and Vargo, 2014), signaling theory (Erdem et al., 1999), contingency theory (Siggelkow, 2011), organizational learning (Levitt and March, 1988), and open innovation (Chesbrough, 2006). Due to their prevalence, I selected two main theoretical principles to explain this research stream's rationale: the RBT–DC relationship and organizational learning.

RBT–DC relationship

The RBT and DC theories are extensively used in this cluster to establish the link between MIC and knowledge. Strategic marketing literature also indicates a well-established correlation between RBT and DC, which are often paired (Boso et al., 2019; O'Cass and Sok, 2012). RBT asserts a firm's control over valuable, scarce, and hard-to-replicate resources (Barney, 1991) that offer a competitive advantage. To utilize these resources, firms must cultivate various organizational capabilities (Collis, 1994), either operational or dynamic (Helfat, 1997; Winter, 2003). Dynamic capabilities involve organizational processes relating to resource reconfiguration in changing markets (Eisenhardt and Martin, 2000), sensing and seizing opportunities, and adapting routines (Teece et al., 1997). In today's information-driven era (Huang and Rust, 2013), the marketing function collects knowledge from diverse sources for both business processes (Fosso Wamba, 2017) and product innovation (Zhan et al., 2017). Marketing functions as an open information ecosystem, consistently learn from their business environment and adapt organizational behaviors to accommodate new resource needs. Hence, marketing capabilities are widely considered dynamic, as indicated by Sharma et al. (2016) discussing the impact of dynamic marketing capabilities in product innovation, R&D expenditures, and brand equity development. Dynamic marketing capabilities characteristics (i.e., responsiveness and efficiency in cross-functional processes like product development, supply chain management, and customer relationship management (Srivastava et al., 1999) aid in creating and delivering customer value while adjusting to market changes (Fang and Zou, 2009). For example, customer relationship management not only addresses current customer needs, but also anticipates future trends, fostering brand equity (Day, 2011).

Organizational learning

Organizational learning is deeply tied to MIC and knowledge and represents an organization's capacity to process and integrate knowledge for improved performance (Jerez-Gómez et al., 2005). Often seen as an adaptive capability, it signifies how an organization changes over time, encapsulated in routines. Research drawn upon the RBT–DC relationship frequently emphasizes organizational learning. Falasca et al. (2017) propose that knowledge creation involves organizational learning capabilities, and dynamic marketing capabilities manage the analytical and perceptual processes, leading to insights, resource redeployment and product-related innovations. Camisón and Villar-López (Camisón and Villar-López, 2011) explore organizational learning capabilities as precursors to non-technical innovation, comprising both organizational and marketing innovation (Damanpour, 1991), and their impact on sustained competitive advantage. They establish a strong link between organizational learning capabilities and marketing innovation, where organizational learning fosters creativity, and generates new knowledge and ideas. This process leads to the development of innovative marketing tools for product differentiation, distribution, promotion, or pricing (Camisón and Villar-López, 2011). Lastly, Weerawardena et al. (2015) delve into learning and innovation, and their impact on early internationalization. Their research outlines a system of dynamic capabilities that consists of two parts: a market subsystem focused on market learning capability and marketing capability, and a socio-technical subsystem encompassing network learning capability and internally focused learning capability.

1.6.3. Yellow cluster: MIC, and drivers and mediators of innovation

Central themes

The research within this cluster analyzes how MIC are related to firm performance, through drivers and mediators of innovation.

Drivers of innovation

Tellis et al. (2009), the second most cited document in the cluster, discusses how corporate culture across nations drives the marketing commercialization practices of radical innovations. It may serve as a stronger predictor of financial performance than other popular drivers such as capital, labor, and government regulations. Another potential source for radical innovation connected to firm performance lies in a firm's marketing department ability to acquire customers by investing in entirely new technology, skills, and processes (Arnold et al., 2011). The drivers of innovation may also vary in specific analytical contexts. For example, Hortinha et al. (2011) extend the view to

an international context by comparing two strategic drivers of innovation success: technology and customer orientation, two dimensions rooted in the MO culture of the marketing function. Their influence may vary depending on a firm's export experience. Fang et al. (2011) suggest that dynamic environmental contexts, defined as the extent to which industry demand changes rapidly and unpredictably (Kohli and Jaworski, 1990), can drive innovation and marketing customer assets management; these strategic configurations resulting in increased firm performance.

Mediators of innovation

This second theme refers to the different factors that may mediate MIC and innovation performance. De Luca and Atuahene-Gima (2007), the most cited paper within this cluster, bases its approach on the knowledge-based view of the firm (Grant, 1996) and investigates the differential effects of market knowledge dimensions on product innovation, and their relationships with cross-functional collaboration and the firm's performance. These authors suggest that knowledge is a necessary but not a sufficient condition for competitive advantage and that effective knowledge integration mechanisms are key to succeed in product innovation connected to firm's performance. Organizational knowledge mechanisms also become necessary when firms operate internationally and acquire external knowledge through strategic alliances or networks (Zhang et al., 2010). The third most cited paper within the cluster (Yalcinkaya et al., 2007) explains how exploration and exploitation capabilities are linked to product innovation and market performance, in an international context. Specifically, the authors reveal how a firm can convert its resources into exploitation and exploration capabilities through the mediating effect of dynamic marketing and technological resources, thereby influencing the degree of product innovation and market performance. Mu (2015) demonstrates that marketing capability from an outside-in perspective (i.e., the capability of a marketing department to develop internal market intelligence competencies by sensing the market, engaging with customers, and linking with partners to acquire external knowledge (Day, 2014)) is mediated by exploitation and exploration mechanisms. Lastly, ambidextrous innovation is studied as a mediator between corporate strategies and firm performance, particularly for high-tech industries. For instance, Hugues et al. (2010) empirically find that ambidextrous innovation codetermines both marketing differentiation and cost leadership advantages corporate strategies, and together these link to performance gains of export ventures. Firms are ambidextrous in their innovation activities when corporate-level exploratory and exploitative strategies interact with operational-level exploratory and exploitative capabilities across multiple functional areas, resulting in product-level positional advantages (i.e., new product differentiation or new product cost efficiency (O'Cass et al., 2014).

Theoretical perspectives

This cluster included two main theories: absorptive capacity (Cohen and Levinthal, 1990), and exploration and exploitation (March, 1991).

Absorptive capacity

As defined by Cohen and Levinthal (1990), absorptive capacity is a firm's ability to grasp, use, and leverage new external knowledge for commercial purposes, encompassing customer or technology insights (Xiong and Bharadwaj, 2011). This concept underlines the importance of prior knowledge in fostering innovation, as highlighted in the knowledge-based view of the firm, which emphasizes the critical role of knowledge in gaining a competitive advantage (Grant, 1996). A process-oriented understanding of absorptive capacity suggests that a firm's capacity to absorb external knowledge is influenced by prior related knowledge through three sequential processes: knowledge exploration, retention, and exploitation (Lane et al., 2006). This capacity allows a firm's employees to assess and adapt external knowledge to generate fresh ideas (Nag and Gioia, 2012), fostering innovation (Fabrizio, 2009). This process is well-established in marketing literature, where marketing departments develop their market knowledge capabilities and disseminate this knowledge within the firm to identify opportunities for new product and service development (Drechsler et al., 2013). Reviews of absorptive capacity indicate that absorptive capacity routines encompass various process dimensions (Volberda et al., 2010) aimed at acquiring and assimilating external knowledge (potential absorptive capacity), and transforming and utilizing acquired knowledge (realized absorptive capacity) (Zahra and George, 2002). Within this research cluster, absorptive capacity serves to showcase the internal best practices a firm should adopt to leverage external knowledge for successful innovation and improved firm performance. For instance, some researchers have studied mechanisms for knowledge acquisition to cultivate alliances and networks internationally (Zhang et al., 2010), while others have focused on the significance of technology and market orientation processes as determinants for acquiring external knowledge (Lichtenthaler, 2016).

Exploration and exploitation

The exploration and exploitation perspective involves firms adjusting their resources in rapidly changing environments (March, 1991; Siggelkow and Levinthal, 2003). Often termed the "ambidextrous view" (Gupta et al., 2006), it aids in processing market knowledge collected by the marketing department. Exploration entails introducing new product development competencies to create value through activities such as search, variation, and experimentation (Atuahene-Gima, 2005). Exploitation emphasizes deploying existing product competencies incrementally by addressing customers' current needs (Mu, 2015). Firms oriented towards customers and technology tend to have more exploratory innovation capabilities and explore new business opportunities. These facets

are seen as the mechanisms a firm needs to master in order to extract relevant information from the marketing ecosystem that can be used in the product development process (Mu, 2015; O'Cass et al., 2014). Ambidextrous innovation closely aligns with corporate strategies that aim to improve existing products and create new ones, generating both explorative and exploitative innovations (Hughes et al., 2010).

1.6.4. Red cluster: MIC and innovation performance

Central themes

The research within this cluster looks at two key aspects of MIC and innovation performance. Firstly, it explores "how" MIC facilitates innovation through three subtopics: the "MIC type–innovation type" interface, co-creation innovation activities, and data-driven competencies. Secondly, it explores "what" outputs are produced when MIC facilitate innovation, focusing on value as an innovation performance output.

The "MIC type–innovation type" interface

It involves diverse innovation perspectives, such as radical, sustainable, service, technical, and non-technical innovations, and influences innovation performance through marketing competencies. In the pharmaceutical industry, the synergy between marketing and technological capabilities helps major firms to achieve breakthrough innovations (Sorescu et al., 2003). Covin et al. (2016) propose a configurational approach illustrating that organizational capabilities, entrepreneurial marketing, risk-taking and proactive behavior drive radical innovation, enabling the capture of external resources. Marketing competences like discovery, incubation, acceleration, and commercialization also help firms to achieve success in novel innovations (O'Connor and DeMartino, 2006). Entrepreneurial marketing drives non-technical innovation success, particularly in SMEs (Chaston, 1997). Brand management marketing capability contributes to corporate and social responsibility innovations, like cause-related marketing, by enhancing customer satisfaction and firm reputation (Christofi et al., 2015). Marketing related to sustainable innovations attracts eco-conscious consumers and enhances a firm's reputation among the public (Varadarajan, 2017). Marketing facilitates new green product development by reconsidering traditional models and resolving the trade-off between green product prices and environmental sustainability goals (Sharma and Iyer, 2012). In the retail industry, firms create interactive service innovations that are heavily reliant on the marketing department's ability to understand cumulative consumer effects and offer a ubiquitous customer experience (Berry et al., 2010).

Co-creation innovation activities

This research explores co-creation innovation activities based on S-D Logic (Vargo and Lusch, 2004) and looks at two subtopics: the participation of customers in the new

product development process, the involvement of suppliers in the innovation process. Firstly, studies emphasize the importance of customer involvement in the new product development process. Customers are seen as bidirectional creators that influence various stages of co-creation, such as opportunity recognition, customer-based funding, development and testing, wider commercialization, and ongoing feedback (Blazevic and Lievens, 2008). Marketing capabilities facilitate knowledge co-production through mutual interactions that influence different innovation tasks (detection, development and deployment) of the service innovation process (Coviello and Joseph, 2012). Intrinsic motivations (e.g., the brand–self connection, self-esteem and self-determination (Hsieh and Chang, 2016)), extrinsic motivations, socialization/belonging to a group, financial rewards (Akman et al., 2019; Fernandes and Remelhe, 2016), and expected values (e.g., social, emotional, utilitarian, value-for-effort) drive collaborative innovation. Great relationship management, especially at the idea generation and market screening stage, may reduce some of the initial costs associated with traditional marketing research (Filieri, 2013). In addition, the establishment of close customer–supplier relationships during new product development helps to improve both the efficiency and effectiveness of the process (Lin and Huang, 2012).

Secondly, the attitude of suppliers toward co-innovation and involvement in the new product development process depends on key relationship factors, such as the strength of buyer–supplier communications, anticipated long-term returns, trust levels, and inter-dependence levels (Yeniyurt et al., 2014). Effective B2B social media practices enhance supplier–buyer interactions (Wang et al., 2016). In B2B contexts, seller identity, social comparisons, and customer collaboration also foster co-innovation (Wang et al., 2016).

Data-driven competencies

They are an integral part of modern innovation, with digitalization reshaping firm strategies (Wetzels, 2021) in both B2B and business-to-consumer (B2C) environments, and marketing practices increasingly emphasizing data-driven approaches (Wedel and Kannan, 2016). The marketing research focuses on three main data-related topics: the Internet of Things (IoT), big data, and privacy concerns. Ng and Wakenshaw (2017), the second most cited paper within this cluster, highlights the role of the IoT in fostering customer-centric innovations by enabling day-to-day consumer situations visibility, product differentiation, personalized services, and alternative marketing department structures for a more platform-thinking culture. Wright et al. (2019) discuss big data's influence on business innovation, proposing a Business-to-Business-to-Consumer (B2B2C) approach to enhance value and competitiveness. De Luca et al. (2021) explore big data investments in service innovation, emphasizing real-time responsiveness and data-driven strategies. Finally, privacy concerns are linked to MIC and innovation success. Strategies to address them while leveraging data for marketing innovation include regulatory policies, trust-building, and consumer-oriented information control (Bleier et al., 2020). Miltgen et al. (2016) show how trust levels and the perception of risk can affect

consumers' acceptance of IT innovations amid privacy concerns in the context of pervasive IT innovations.

Value as an innovation performance output

Aligned with the S-D Logic principles (Lusch and Vargo, 2014; Vargo and Lusch, 2004), the value theme explores various aspects of value creation. Firstly, Ballantyne et al. (2011) look at reciprocal value propositions, a powerful means of communicating value creation to a wide range of stakeholders. Ranta et al. (2020) explore supplier firms' value creation logics in the circular economy, emphasizing how marketing capabilities can leverage sustainability in marketing value communication efforts, resulting a source for achieving competitive advantage. Secondly, Sánchez-Gutiérrez et al. (2019) emphasize how management capabilities in customer relationships can enhance customer value creation, which aligns with research by Ulaga and Eggert (2005) on how better value exchange alignment with customers can lead to greater firm competitiveness. In addition, Rubera and Kirca (2017) explore the trade-off between customer satisfaction and firm value in the context of innovation, and the way marketing can create value for both customers and investors. Thirdly, MIC's pivotal role in orchestrating value necessitates firms and industrial marketers to structure, bundle, and manage their activities. This has an impact on connected marketing areas such as value proposition, the form of relationships, capability management, and tactical focus (Lindgreen et al., 2012). In cases of disruptive value innovation, marketing acts as a value orchestrator across functions and firms, to connect the activities of multiple project members, which drives inscription of value on business model innovation (Simmons et al., 2013).

Theoretical perspectives

This literature stream covers the topics of service innovation, co-creation, and value creation, mainly drawing upon S-D Logic (Vargo and Lusch, 2004). I also note reference to social exchange theory (Bandura, 1986; Emerson, 1976), RBT (Barney, 1991), and DC (Teece et al., 1997), as previously mentioned.

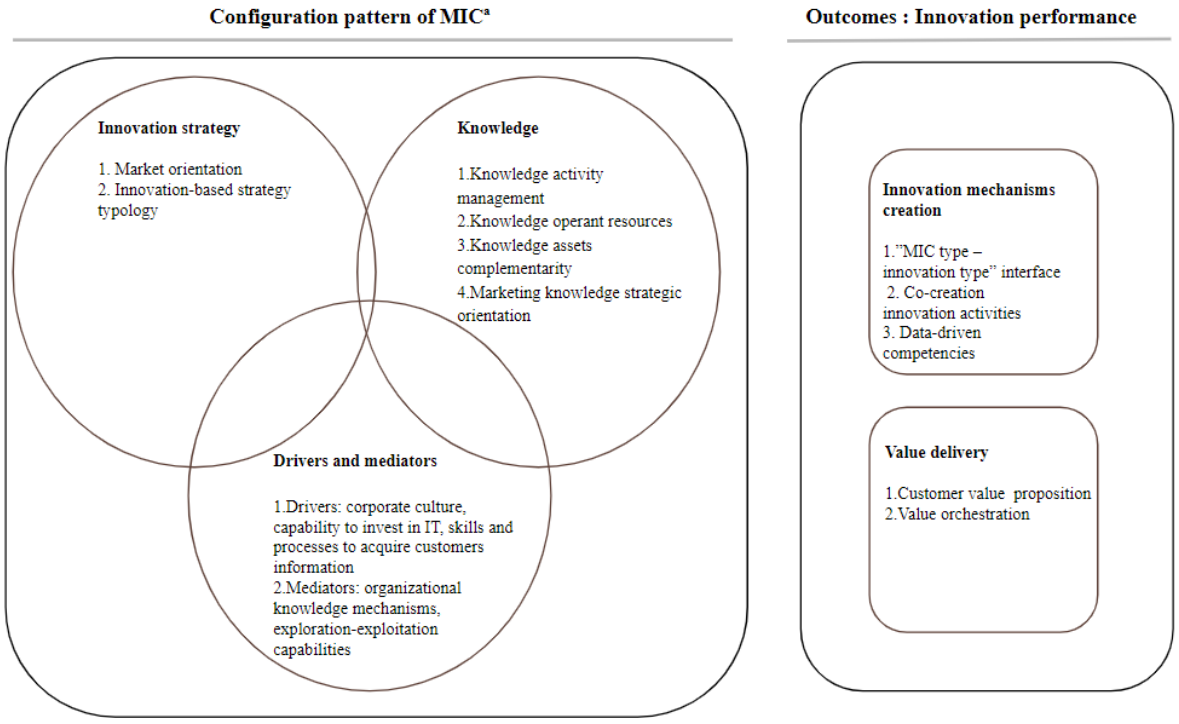
Service-Dominant Logic

S-D Logic emphasizes customer involvement in value co-creation through resource sharing and interaction with suppliers. Unlike traditional marketing where firms sell to customers, S-D Logic focuses on a collaborative marketing approach involving both sellers and buyers in a reciprocal process of value co-creation (Lusch and Vargo, 2014; Vargo and Lusch, 2004). The customer is the final arbiter of value-in-use derived from interaction with goods and other physical resources (Lusch and Vargo, 2014; Vargo and Lusch, 2004). Goods and physical resources are viewed as mechanisms for service distribution and their value is determined when used (Ballantyne et al., 2011; Lusch and Vargo, 2006). The value

propositions are fundamental in SDL, functioning as a marketing means to communicate reciprocal value in providing and receiving services (Vargo and Lusch, 2008), and marketing capabilities play a crucial role in nurturing the relationships that shape value propositions for innovation (Lindgreen et al., 2012). SDL highlights the management of knowledge through firm–customer collaborations and emphasizes the role that continuous dialogue plays in knowledge creation (Vargo and Lusch, 2004). It details how marketers can leverage customer relationships and online communities, by studying social and individual factors driving customers' participation (Akman et al., 2019), particularly in the ideation stage of new product development (Filieri, 2013). S-D Logic marks the evolution of customers from passive buyers to active value co-creators (Prahalad and Ramaswamy, 2003). It underscores the importance of marketing "with" customers rather than "to" customers (Vargo and Lusch, 2004) by actively engaging them in service innovation, often facilitated by the IoT or investments in big data technologies (De Luca et al., 2021; Ng and Wakenshaw, 2017; Wright et al., 2019).

1.7. Research agenda propositions

The integrated research framework (Figure 2-6.), produced as part of this study, synthesizes how researchers have studied MIC and its interconnected themes so far. It is designed to help researchers find information on what is already known about MIC, identify gaps, and propose specific thematic points for further research. Based on this framework, I present some suggestions and open opportunities for future research below.



[a] MIC: Marketing Innovation Capabilities

Figure 2-6. Integrated framework summarizing literature research streams on MIC

Firstly, studies highlight the importance of integrating the knowledge assets and market-based resources of the marketing department into innovation strategies to achieve sustained competitive advantage. Specifically, during the early stages of product development, effective marketing capabilities are crucial (Filieri, 2013). The literature review identifies various methods that marketing departments can use to gather information about the market, competition, and external environment. These methods aim to create an information ecosystem that can be disseminated and incorporated into an innovation-based strategy. Methods include engaging with online communities, pursuing partnerships, managing customer relationships, utilizing open innovation (Chesbrough, 2006), and conducting traditional marketing research.

However, excessive information can pose risks. It may lead to the need for expensive, sophisticated IT equipment or the recruitment of overly specialized marketers, which can be detrimental to decision-making and responsiveness (Eppler and Mengis, 2004). To address this, new types of marketing capabilities are needed. I suggest further research into these capabilities using the framework of specialized and architectural marketing capabilities as classified by Vorhies et al. . Specialized marketing capabilities reflect task-specific marketing activities, while architectural capabilities provide the planning and coordination mechanisms that ensure effective deployment of these marketing program-level activities.

Both types of marketing capabilities, and their integration, are significant drivers for firms to adapt to the new reality of market over-abundant data. Thus, by managing market information, firms can better guide marketing innovation. Effective deployment requires both specialized and architectural capabilities: (1) to allocate task-specific marketing activities and (2) to orchestrate them. Improved classification and codification of market insights will enhance information accuracy and quality, thereby facilitating the decision-making process for innovation. Based on these insights, I propose the following:

> **Proposition 1:** *Researchers need to examine the marketing knowledge system to enhance the quality and precision of its insights, thereby improving outputs related to innovation. This examination should include an analysis of the required architectural and specialized marketing capabilities.*

Secondly, the review indicates a transformation in how marketing conducts its innovation endeavors. Market orientation (Kohli and Jaworski, 1990) has strongly linked MIC to market philosophy. However, the practice of capturing customer and competitor information has evolved toward a data-driven approach, involving big data, analytical resources, and capabilities (Ashrafi and Zare Ravasan, 2018; De Luca et al., 2021; Wright et al., 2019). This shift suggests that marketing departments need to invest in new customer relationship management programs that merge traditional marketing research with data-driven practices and experimental, entrepreneurial methods (Maklan et al., 2008). As Wetzels (2021) stated:

Unstructured data, big data, and digital tools, such as crowdsourcing, will show us the road to new insights. Co-creation with customers and other network parties will open new doors for innovation in the emerging experience economy. Emerging digital technologies will provide new approaches to study and understand phenomena in innovation management.

This statement aligns with our findings, showcasing how MIC can enhance innovation performance by developing data-driven competencies and engaging in customer co-creation to create value. This customer-centric approach significantly alters the innovation strategies of companies, leading to a shift toward increased service offerings and the development of comprehensive global solutions. Co-creation improves interactions with customers, leveraging their expertise to develop solutions that better meet their needs (Preikschas et al., 2017). Although the pursuit of customer experience is well-documented in the B2C realm, especially in retail (Berry et al., 2010; Foroudi et al., 2016), it poses challenges in B2B engineering contexts, where external connections do not always correlate with innovation success (Jaakkola et al., 2010). B2B firms need to establish programs and tools to adopt a customer-centric approach to innovation, a recognized facet of firm performance. However, current research on enhancing marketing practices with a data-driven approach is limited (Engel and Ebel, 2019; Sultana et al., 2022), and there is a lack of studies proposing how to adapt B2C data-driven marketing practices to enhance B2B marketing practices for creating customer-centric innovation. Therefore, I propose the following:

Proposition 2: *Investigate B2C data-driven marketing practices connected to the creation of customer-centric innovation to foster the development of B2B data-driven marketing practices connected to the creation of customer-centric innovation.*

Thirdly, surprisingly, the review scarcely acknowledges human resources as a significant asset that firms could leverage to enhance their MIC capabilities and maintain a competitive advantage. This oversight is notable as the marketing department has sometimes been criticized for its perceived lack of accountability, leading to debates about the role of a Chief Marketing Officer (CMO) within the firm's C-suite (Moorman and Day, 2016; Verhoef and Leeflang, 2009). Understanding the evolving role of marketing is crucial to reconcile its position within a firm and amplify its influence. Incorporating new or refined human skills into innovation-based strategies presents a research opportunity for the marketing community. Nath and Mahajan (2011) illustrate the significant impact a CMO can have when the marketing team controls the sales department, which can lead to increased innovation within a firm. This supports the view of marketing as a pivotal role that extends across departments, enhancing collaboration and influencing business model innovation (Simmons et al., 2013).

The marketing department is expanding its boundaries, adopting vertical organization structures, and platform-thinking. It has enhanced its Information and Communication Technologies (ICT) capabilities, improving customers understanding with the aim of serving them better (Rust and Huang, 2014). While the marketing role is crucial in facilitating customer value creation, there are questions about whether the current marketer profile meets these demands. Attributes such as entrepreneurial orientation, agility, proactive responsiveness, digital experience, and analytical competencies describe the evolving marketer profile (Chierici et al., 2019; Mariani and Wamba, 2020; Miles et al., 2015; Poolton et al., 2006; Zhan et al., 2017). These skills align with advancements in AI, IoT, computation, and data analysis, which have transformed the marketing environment (Rust, 2020). Rust (2020) advises marketing managers to recruit individuals capable of understanding complex, dynamically connected systems and blending technical, analytical, managerial skills, and soft competencies like empathy. These skills, combined with AI, will aid CMOs in setting innovation priorities based on data. Therefore, I propose the following:

> **Proposition 3:** *Marketing research must explore the new skills required by marketers to effectively pursue their innovation strategies, thereby enabling CMOs to maintain their influence within the C-suite.*

Finally, MIC research predominantly relies on quantitative methods, utilizing data from databases and surveys across various contexts such as domestic or international markets, country comparisons, specific industries, or types of companies. The analyzed papers include only a few qualitative studies (15%) and mixed-method studies (5%). Consequently, the results often present a static view of MIC, potentially overlooking a process-oriented perspective. There is a recognized paradigm shift in how marketing generates knowledge within the market system. This shift is not solely due to new technological tools or procedures but also reflects an innovative capability that is outward-looking and connected to networks involving various stakeholders. The emerging marketing information ecosystem is becoming a standard for firms that wish to remain competitive in the innovation race. Thus, there is a need for increased attention to real-world experiences and to explore the dynamics of ground realities by employing more constructivist approaches.

In their editorial, Lindgreen et al. (2021) emphasized that qualitative methods are crucial for various theory development efforts, including generation, elaboration, and testing, as well as critical theory endeavors. Case studies and interviews, for example, can help develop these theories by addressing 'how' and 'why' questions (Cui et al., 2018). Hence, MO has attracted significant attention from researchers for decades, providing insights into how and why MIC contributes to innovation performance. While MO remains relevant by linking marketing to its primary function—listening to the customer—I argue that there is room for improvement in its process-information perspective (Kohli and Jaworski, 1990), particularly in adapting to the new digital reality. Moreover, marketing

management research could benefit from adopting more mixed-method efforts, where qualitative studies complement quantitative research. This approach can aid in testing hypotheses suggested by qualitative insights (Johnson et al., 2007). The complementarity between qualitative and quantitative studies may enhance our understanding of MIC by, firstly, improving our comprehension of their raison d'être and their evolution, and secondly, by testing their effects, antecedents, and consequences. Based on this analysis, I recommend the following:

> **Proposition 4:** *Marketing research needs to explore why MIC are necessary for innovation and what processes govern them by conducting further qualitative research and subsequently employing mixed methods.*

1.8. Discussion

1.8.1. Theoretical implications

This review emphasized the importance of MIC when it comes to a firm's innovation strategy. Academic scholars have directed considerable attention towards MO (Kohli and Jaworski, 1990; Narver and Slater, 1990), considering it to be a strong strategic contributor to this relationship. This construct is defined to understand and satisfy customers and other relevant stakeholders (Day, 1994; Narver and Slater, 1990), an activity strongly related to the marketing function. With the primary objective of innovation being the development of new or modified products and processes that meet customer needs, MO and innovation are intrinsically linked constructs (Augusto and Coelho, 2009; Hauser et al., 2006). New research topics in marketing and innovation are often linked to digitalization, the servitization of offerings, and solution-oriented offerings. More than ever, they demonstrate the necessity for marketing departments to stay connected to the market, generating relevant insights to design customer-centric products or services. Therefore, this study confirmed the theoretical relevance of continuing to use MO as a foundation to explore MIC. The cultural approach to MO is represented by the three organizational cultural traits of customer, competitor, and technology orientation (Gatignon and Xuereb, 1997; Narver and Slater, 1990; Voss and Voss, 2013). My review found that, surprisingly, little attention has been given to technology orientation so far, despite the road to innovation management being digital, and a high level of technological orientation being a key success factor in data-driven innovation. I believe the technological dimension of MO should therefore be actively developed.

Another theoretical perspective views value as a crucial foundation for explaining innovation performance, especially when linked to the SDL (Vargo et al., 2008) of a firm's

offerings. The review of MIC highlighted how marketing can create value for customers either through a customer value proposition or by enhancing value for both firms and customers through a reciprocal value proposition (Ballantyne et al., 2011; Lindgreen et al., 2012). There have been several calls for researchers from both B2B and B2C marketing communities to further explore the concept of value to generate theory, especially in today's digitalized era of innovation (Chandler and Lusch, 2015; Payne et al., 2017; Ranta et al., 2020; Skålén et al., 2015). Digital marketing capabilities refer to a firm's ability to use digital technologies to interact with customers and partners in targeted, measurable, and integrated ways. These interactions aim to create new forms of value, overcoming barriers of distance and time (Kannan and Li, 2017; McIntyre and Virzi, 2019; Sridhar and Fang, 2019). These new capabilities present an opportunity to advance research on MIC by analyzing the value concept connected to innovation as a driver of a new form of innovation—data-driven innovation.

1.8.2. Managerial implications

The MIC review is highly relevant for managers looking to enhance the impact of their marketing departments on innovation activities, especially in heavy industries or engineering-focused firms. These types of firms generally focus more on R&D than on marketing for their innovation practices. I underlined how market-based assets deployed by the marketing department can drive innovation performance, though the provision of more services and solution-centric offers. This would require such firms to take a more open and customer-centric approach to innovation. Therefore, I recommend managers develop training programs to educate employees, especially engineers, to create new product and service offerings by understanding the 'job-to-be-done' for their customers (Christensen et al., 2016). This shift in mindset from product-centricity to a more digital- and marketing-based approach may also require input from the CEO to effectively drive the change forward. Social and psychological dimensions (e.g., trust, open interactions, a sense of belonging, openness to change), as well as operational dimensions (e.g., process codification, best practices, and user cases), will need to be considered if firms wish to make this change on a significant level.

1.9. Conclusion

This literature review provides a broad overview of the extensive MIC knowledge found in academic articles. Extracted from marketing journals, I examined four key MIC research streams: (1) MIC and innovation strategy, (2) MIC and knowledge, (3) MIC, and drivers and mediators of innovation, and (4) MIC and innovation performance. This analysis produced an integrated framework that interlinks four research areas, supporting a strategic marketing research agenda. Thematically, it proposes exploring architectural

and specialized marketing capabilities to effectively codify the over-abundant market insights, advance B2B data-driven marketing practices for innovation, and examine new skills marketers need for innovation strategies to maintain the influence of CMOs in the C-suite. Methodologically, it suggests conducting qualitative studies and using mixed methods to explore the necessity of MIC for innovation and its governing processes.

While this study extensively reviewed MIC literature using a bibliometric method to understand past, present, and future research directions, it has several limitations. Firstly, it lacks empirical testing of the analyzed research streams. Secondly, due to the inclusion/exclusion criteria employed, some potentially relevant studies may have been excluded, which might reflect an interpretative bias in the paper selection. Thirdly, interpreting MIC through bibliographic coupling might not capture all relevant data, and introducing additional knowledge variables or contingencies could enhance the integrated framework by revealing causal relationships or determined effects. However, by gathering state-of-the-art information on MIC, I aim to establish a cornerstone for scientific studies in marketing organization and provide guidance for marketers looking to assess their investments in marketing capabilities by understanding their impact on innovation performance.

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2. ARTICLE 2 - Data-driven innovation capability of marketing: a systematic review and research agenda

2.1. Summary of Article 2

The main author is this article is Ludivine Ravat.
The co-authors are Pr. Aurélie Hemonnet-Goujot and Pr. Sandrine Hollet-Haudebert.

Article 2 follows the connected research objective of conceptualizing DDIC of marketing, by answering the following question:

How to conceptualize DDIC of marketing ?

Findings revealed: (1) a 'CIMO-logic' framework (Context, Intervention, Mechanisms, Output) for the DDIC of marketing building process: an explanation synthesis of its components, dynamic phases and connected dimensions, and (2), a definition proposal of DDIC of marketing.

The box 2-2. below summarizes highlights and status for Article 2.

HIGHLIGHTS OF ARTICLE 2

- *The paper systematically reviews the construct of data-driven innovation capability of marketing, based on 48 relevant scientific papers published between 2015 and 2022*
- *It investigates the construction, components, underlying processes and related dimensions of DDIC of marketing.*
- *The synthesis reveals a three-phase process for building the data-driven innovation capability of marketing: (1) constructing, (2) articulating and (3) leveraging.*
- *It identifies resources and capabilities to deploy three distinctive routines for data-driven innovation activities*
- *An overall framework is presented, integrating additional dimensions: (1) contextual role of big data, (2) companies' intangible resources and (3) consequences for DDI.*
- *It contributes to advancing knowledge on digital marketing capabilities connected to innovation.*

CURRENT STATUS OF ARTICLE 2

1. *Article presented at the international academic conference of* ***the Academy of Innovation, Entrepreneurship, and Knowledge*** *(ACIEK), Madrid, Spain, June 21-23, 2023*
2. *Article submitted to the* ***International Journal of Management Reviews****, ranked 3, AJG 2021 and currently under revision and resubmission, minor revision, round 3, June 2024.*

Box 2-2. Key takeaways from Article 2

2.2. Abstract

Several industries are increasingly adopting big data for innovation, leading to a transformation of their marketing capabilities in terms of new product and service development. While this emerging data-driven paradigm in marketing innovation capabilities is often investigated for firm-specific operational purposes, a strategic organisational approach by marketing departments is gaining momentum to drive innovation and bolster competitive advantage. This study draws on various theoretical perspectives and research findings in the fields of marketing, information systems, innovation, operational research, economics, and management and organisation studies, and it systematically reviews the construct of data-driven innovation capability of marketing. Based on 48 relevant scientific papers published between 2015 and 2022, we investigate its construction, components, underlying processes and related dimensions. The synthesis reveals a three-phase process for building the data-driven innovation capability of marketing: (1) constructing, (2) articulating and (3) leveraging. Among those, resources and capabilities are identified to deploy three distinctive routines for data-driven innovation activities: (1) generating an 'outside-in' information ecosystem, (2) disseminating data-driven insights and (3) developing the data-driven innovation offer. It also integrates the dimensions of the contextual role of big data, companies' intangible resources and the consequences for data-driven innovation into an overall framework to provide a detailed picture of this capability. This work synthesises knowledge on the data-driven innovation capability through the marketing department lens, thus contributing to advancing our understanding of digital marketing capabilities and enriching the theory around organisational and strategic marketing connected to innovation. This paper concludes with suggested avenues for further research.

Keywords

Digital marketing capabilities, B2B marketing, Data-driven innovation, Big Data, Systematic literature review.

2.3. Introduction

Big data (BD) has become the new gold standard for companies. BD is the large-volume, high-velocity and heterogeneous data that emerges from the increasing digitalisation of transactions and everyday experiences (McAfee et al., 2012). Legacy firms harness the power of data and digital ecosystems to develop data-driven innovation (DDI): a series of innovation processes that apply techniques (such as BD analytics) and technologies (e.g. machine learning, deep learning and artificial intelligence) to extract meaningful value from data to generate innovative results (Sultana et al., 2022a). DDI initiatives can manifest as operational enhancements, as seen with Ford's use of augmented and virtual reality for paint-job quality checks, or as research and development efficiency gains, as with Infineon's machine learning integration for smarter microcontroller design. For marketing departments, extracting insights from an increasingly rapidly expanding array of BD sources (Du et al., 2021) is a primary capability that guides its DDI activities. As the interface between a firm and its markets (Moorman and Day, 2016), marketers leverage customer data to reimagine products and services in the new competitive strategy paradigm driven by digital. Amazon, for instance, has innovated by using marketing analytics and cloud technologies to develop value-added service offers to its customers, like Amazon Web Services, which monetises data. By incorporating Internet-of-Things (IoT), firms like Hilti have redefined value propositions to boost the operational efficiency of their construction firm customers, thereby improving satisfaction rates[11]. The more marketing harnesses digital technology to understand consumers, the better the DDI outcomes, as shown by Caterpillar's telematics- and sensor-driven products, revealing opportunities to develop new, less expensive and higher-margin equipment products that are better suited to customer needs[12].

However, DDI is not foolproof, as demonstrated by Google Plus, which was launched in 2011 and discontinued in 2017. The social networking platform failed despite Google's data resources and predominant marketing analytics capabilities enabling the capture, analysis, orchestration and deployment of data for innovative idea generation (Gupta and George, 2016; Mikalef et al., 2018), mainly due to a lack of differentiation, limited user engagement and some strategic missteps[13]. This underlines the need for precise marketing innovation capabilities and the ability to organise them for DDI success.

Innovation capabilities grow from a company's skill in acquiring, assimilating and applying knowledge resources – like physical, human or organisational assets (Amit and Schoemaker, 1993; Day, 1994)– which it incorporates into new products or services (Weber and Heidenreich, 2018) for growth and competitive advantage (Chang et al., 2017). In marketing, this innovation journey requires the use of market-based capabilities

[11] https://www.motius.com/case-studies/optimizing-quality-assurance-with-hilti
[12] https://youtu.be/kBwrRnB_II8
[13] https://www.productmonk.io/p/google-plus

(Arunachalam et al., 2018) which combine skills, knowledge and resources within organisational processes for innovation and meeting market demands (Day, 1994; Moorman and Day, 2016; N. A. Morgan et al., 2018). Effective marketing capabilities are vital for quickly capitalising on opportunities, outperforming competitors and enhancing firm performance (Akdeniz et al., 2010; Theodosiou et al., 2012; Vorhies and Morgan, 2005). Marketing's insight into customer needs is key for successful innovation and products (Griffin and Hauser, 1993; Hoffman et al., 2010; O'Cass and Weerawardena, 2009; O'Driscoll et al., 2000) as it links the innovation and marketing capabilities essential for developing a firm's competitive advantage (Weerawardena, 2003).

In this 'information-hungry' and 'information-intensive' era (Huang and Rust, 2013), BD has revolutionised marketing (Wright et al., 2019) and its capabilities to capture knowledge about customer needs and past experiences for product innovation (Zhan et al., 2017). Marketers aim to exploit diverse data sources to uncover insights and opportunities for new products and services (Chandy et al., 2017; Troilo et al., 2017). This significant digital transformation has reshaped the marketing department landscape, thus necessitating an examination of the new, distinct capabilities derived from BD (Du et al., 2021; Mikalef et al., 2018; Moorman and Day, 2016; Morgan et al., 2019), especially those required to implement the DDI capability (DDIC) of marketing. Management research is increasing focusing on pinpointing key organisational innovation capabilities (Furrer et al., 2008; Weber and Heidenreich, 2018), specifically considering the marketing department perspective (Galante et al., 2013; Weerawardena and Mavondo, 2011). We argue that clarifying how to build DDIC within marketing departments for new product and service development – by identifying the constitutive elements and connected dimensions – is a noteworthy concern for scholars. For marketing practitioners, gaining insights into how to strategise innovation in the digital age is also important.

DDIC of marketing, a rapidly evolving field grounded in empirical, multidisciplinary research, addresses the mutable challenges of business-to-business (B2B) interconnectivity and multifunctionality, especially in innovation decision-making (Cederlund, 2014). Interdisciplinary literature offers varied insights to enrich yet fragment the concept. Marketing research has begun to explore DDIC theoretically (Sultana et al., 2022a, 2022b), focusing on broader company capabilities without delving into the marketing-specific aspects. Some studies have assessed DDIC's impact on marketing, such as data product performance, without detailing the strategic construction in marketing departments. Information systems scholars consider BD analytics to be a key resource for DDI (Mikalef et al., 2019; Mikalef and Krogstie, 2020), but they focus on its corporate benefits while overlooking the marketing capabilities. Despite the mixed findings from marketing and information systems research on innovation outcomes (Lehrer et al., 2018; Papa et al., 2021; Xie et al., 2016), there is a need to 'distil phenomena into sharp distinctions that are comprehensible to a community of researchers' (Suddaby et al., 2010, p.346).

Positioned at the crossroads of mainstream management disciplines, the DDIC of marketing needs to be clearly demarcated to enhance scholarly communication productivity and to foster theoretical and empirical creativity (Suddaby et al., 2010). We therefore undertook a systematic review of multidisciplinary literature to integrate BD, innovation and marketing into a cohesive concept (Ward and Reed, 1983) for defining the DDIC of marketing. This review serves as a strategic platform (Breslin et al., 2020) aimed at enriching the understanding of DDIC of marketing by introducing new conceptual angles grounded in theory to ensure precise literature classification.
Our aim is threefold: to contextualise DDIC within marketing departments; to gather evidence of its components and underlying processes to establish a construction model; to propose an overall conceptual framework detailing the construction process, components, related variables and possible relationships for a comprehensive explanation of the concept.

The following research questions guided our systematic literature review:

- RQ1: What is the contextual role of BD technologies in building the DDIC of marketing?
- RQ2: What resources, capabilities, underlying mechanisms and building process are required for the DDIC of marketing?
- RQ3: Is there evidence of complementarity between the DDIC of marketing and companies' resources?
- RQ4: To what type of innovation output does the DDIC of marketing contribute?

We have contributed to revealing four thematic categories. The first depicts the contextual role of BD technologies in building the DDIC of marketing, with BD as both a provider of heterogeneous information resources and an accelerator of information exchange. The second theme describes and breaks down the process of constructing the DDIC of marketing. We capture its essential characteristics through a process perspective that is typical of DDI endeavours and that is, to date, often disregarded in digital marketing capabilities studies connected to innovation. The third theme stresses how the DDIC of marketing complements companies' intangible resources, which include a data-driven culture, top management support and an organisational learning capability. The last theme elucidates the consequences of such a capability for innovation. It systematically identifies the topic of customer-centric innovation and details the main subdimensions, namely service orientation, value creation and co-creation.

The paper is organised as follows. The first section provides a theoretical framework for this study. In the second section, we explain the review methodology. The third section establishes the review's descriptive findings and convergence points. The fourth section presents our analytical findings. In the fifth section, we identify opportunities for further research. The last section provides theoretical and managerial contributions before setting out the study limitations and conclusions.

2.4. Theoretical framework

We present our results using the theoretical backgrounds of market orientation (MO) theory (Jaworski and Kohli, 1993), resource-based theory (RBT) and capability-based view (Amit and Schoemaker, 1993; Barney, 1991; Barney, 1986; Wernerfelt, 1984), and dynamic capabilities (DC) theory (Teece, 2007) to better reflect the evidence presented (Denyer and Tranfield, 2006; Pawson, 2002), to challenge some theoretical propositions and to advance the operational applicability of the results for marketers (Rojon et al., 2021).

2.4.1. Market orientation theory and digital marketing capabilities

Our research is anchored in digital marketing capabilities, which can be defined as a company's ability to use digital technology-enabled processes to interact with customers and partners in a targeted, measurable and integrated way to create new forms of value (McIntyre and Virzi, 2019; Sridhar and Fang, 2019; Wedel and Kannan, 2016). MO theory (Jaworski and Kohli, 1993) has recently been used to describe digital marketing capabilities, and it generally constitutes a pertinent reading grid for analysing marketing capabilities. Homburg (2022) treats MO as an organisational contingency that impacts digital marketing capabilities, Moorman and Day (2016) include MO among marketing capabilities and Kozlenkova et al. (2014) argue that marketing capabilities are in essence market-oriented. MO is also positively associated with innovation capability improvement (Kirca et al., 2005; Ngo and O'Cass, 2012). Our review highlights MO as a process-perspective interpretation typical of innovation, enterprise and technology evolution analysis, and it argues for the importance of following the Jaworski and Kohli (1993) process perspective. Those authors describe MO as a three-dimensional process that: (1) generates market intelligence, (2) disseminates information throughout the organisation and (3) responds to identified market needs by developing new offers. By integrating a process-oriented rationale, our study differs from previous ones that have considered MO as an antecedent of DDIC (Sultana et al., 2022a). Consequently, MO constitutes our first theoretical pillar for contextualising DDIC within a marketing department.

2.4.2. From resource-based theory to capability-based view

Digital marketing capabilities, mostly studied using RBT, highlight how a company's heterogeneity and complementary resources and capabilities drive competitive advantage and performance (Barney, 1991; Slotegraaf et al., 2003; Vorhies et al., 2009). RBT explains the role of innovation in creating marketing resources and capabilities to boost long-term performance (Dutta et al., 1999; Srinivasan et al., 2002) and examines the impact of BD technologies in marketing innovation and firm success (Akter et al., 2016; Erevelles et al., 2016; Gupta et al., 2016). Innovation is a primary source of sustained competitive advantage (Day and Wensley, 1988; Hurley and Hult, 1998). The capability-based view, which is rooted in RBT, focuses on how marketing innovation capabilities support this advantage (Mol and Birkinshaw, 2009) by emphasising the need for a distinctive set of intangible resources such as knowledge, skills and competencies of the marketing team (Amit and Schoemaker, 1993; Barney, 1991; Barney, 1986; Wernerfelt, 1984). Resources are defined as the assets a company owns and controls, and capabilities are the glue that holds these assets together and allows for their strategic deployment (Amit and Schoemaker, 1993; Day, 1994). These marketing innovation capabilities are crucial for delivering value and enhancing new product and service performance to a level that is challenging for others to develop and imitate (Calantone et al., 2002; Ngo and O'Cass, 2009). They include acquiring and assimilating new knowledge to foster innovation (Weber and Heidenreich, 2018) and secure a competitive advantage. Thus, using RBT and the capability-based view as a second theoretical foundation, we aim to meticulously describe the nature of the elements that composed the DDIC of marketing.

2.4.3. Dynamic capabilities and DDIC of marketing

Lastly, to differentiate and maintain its 'capability differential' (Coyne, 1986), marketing continuously reinvests itself to enhance its innovation capabilities and prevent imitation (Mahoney, 1995). In a dynamic environment, marketing departments must sense and seize opportunities by mobilising resources and continually renewing their organisation to sustain their DDI efforts (Teece et al., 1997). Digitalisation has shifted marketing towards data-driven operations, thus necessitating the development of specialised skills, methods and operational modes for effective DDI. The construction of DDIC of marketing involves accumulating market knowledge and investing in capabilities for their activation and codification (March, 1991; Zollo and Winter, 2002). DDIC of marketing can be seen as a dynamic capability that enables marketing departments to systematically evolve their operational innovation routines for better efficiency and quick market adaptation (Teece et al., 1997; Zollo and Winter, 2002). This aligns with DC theory by highlighting the need for ongoing adaptation by integrating, reconfiguring, gaining and releasing resources to innovate with BD technologies (Eisenhardt and Martin, 2000; Teece et al., 1997). Dynamic

marketing capabilities are crucial as they allow firms to learn from the market and inform DDI strategies (Cao et al., 2019; Guo et al., 2018), yet research on building these capabilities is limited (Barrales-Molina et al., 2014; Mikalef et al., 2019; Quach et al., 2020). Through this third theoretical background, we aim to address this gap and propose a model for developing DDIC of marketing, outlined in three dynamic phases. Each phase illustrates how marketing can orchestrate its resources and capabilities to fulfil its DDI routines.

To frame the DDIC of marketing holistically, we applied a network approach (Barabási and Albert, 1999; Granovetter, 1973; Håkansson and Snehota, 1989; Krackhardt et al., 2003) as visualised in Figure 2-7.. This method views the DDIC of marketing as a network of interconnected nodes, i.e. theories – encompassing MO, RBT-capability-based view and DC – and edges, i.e. their interactions. It enables a comprehensive understanding of the DDIC of marketing by illustrating the complex interplay and emergent properties and dynamics among these theories to provide a unified and theory-driven perspective of its explanation.

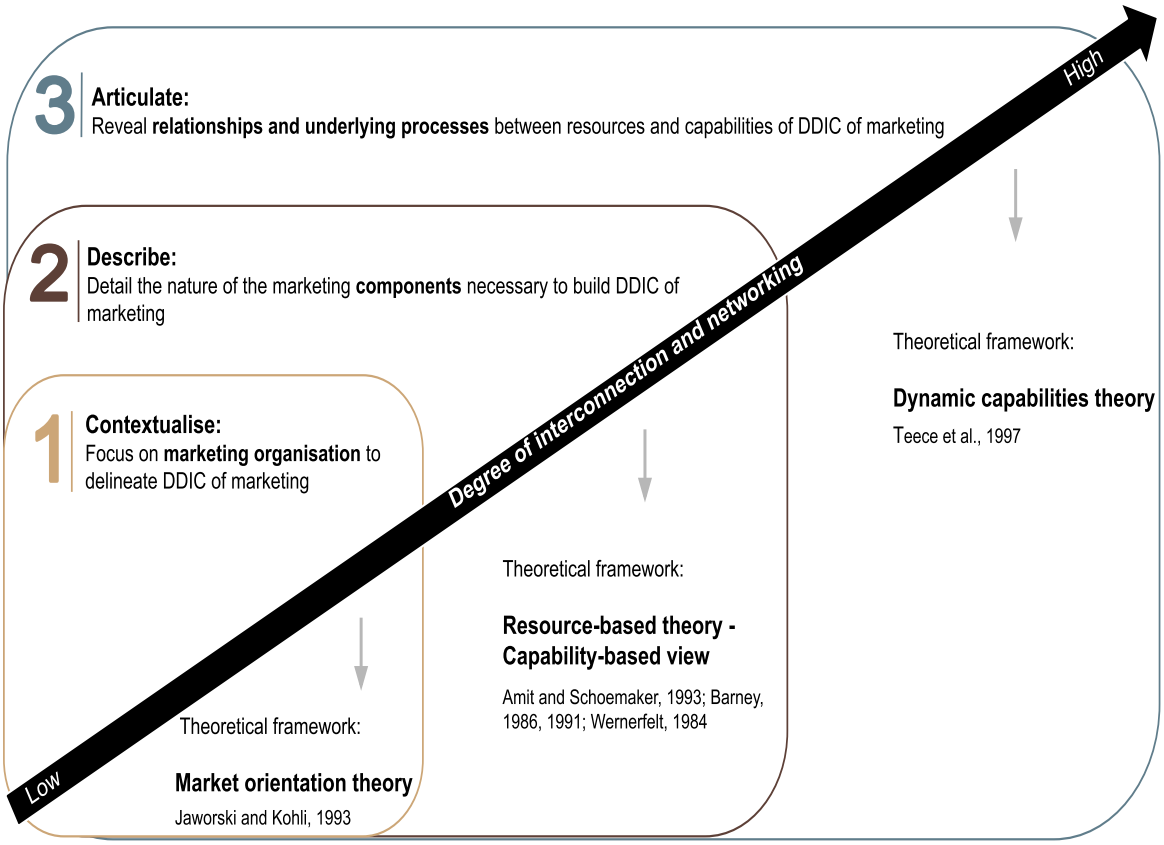


Figure 2-7. A holistic theoretical framework for conceptualising the data-driven innovation capability of marketing using the network approach

We now detail the methodology we employed to establish the dimensions and connections between various aspects of the DDIC of marketing.

2.5. Methodology

Widely adopted for systematic reviews in management science (Rojon et al., 2021), Tranfield et al. (2003) present a three-stage methodology for collecting, analysing and synthesising the literature regarding a research question. We describe the steps in the following subsections.

2.5.1. Planning the review

To define the DDIC of marketing, we established a clear set of objectives with an explicit and reproducible methodology. We followed the PRISMA[14] 2020 protocol (Liberati et al., 2009; Moher et al., 2015) based on a list of checkpoints that detail the rationale, the methodological and analytical a priori approach (Moher et al., 2015) and the most

[14] PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses

frequently applied guidelines for systematic reviews in management (Pussegoda et al., 2017). This ensures that we extract concepts without risk of omission, study misclassification or misrepresentation of key information (Webster and Watson, 2002), and helps us to execute the main tasks of identifying, screening and disclosing the review sample (Hiebl, 2023). Our main purpose was, first, to identify, categorise and synthetise the state of the art of our topic and, second, to inform the resulting opportunities, avenues for future research and contributions.

2.5.2. Conducting the review

Research identification

We identified the relevant research by searching through a broad range of multiple-domain databases, so this review both draws from and speaks to different disciplinary silos (Breslin et al., 2020; Fan et al., 2022). The recommended median number of databases for conducting systematic reviews is three (Hiebl, 2023). The most frequently used databases are EBSCOhost and Web of Science (WoS), and also Scopus and Google Scholar (Hiebl, 2023). We decided to use the highly recommended resources WoS, Scopus and Google Scholar, as our objective was to obtain the most comprehensive citation count (Lasda Bergman, 2012). The WoS database's selective approach has produced a curated collection of documents, mainly journal articles written in English (Martín-Martín et al., 2019). The Scopus database is probably the best tool currently available for electronic literature search, particularly for articles published after 1995 (Tukker, 2015), and Google Scholar is considered to be the most comprehensive academic search engine (Gusenbauer, 2019). Lastly, we employed complementary dominant database Business Source Complete (through EBSCOhost) because it specifically includes a large selection of marketing, business and management journals.

Database search

We translated our research object – the DDIC of marketing – into a search equation using the Boolean operators search. We first identified search terms that are standardised and used by electronic databases as a convenient way to categorise articles, which allowed for efficient searching (Atkinson and Cipriani, 2018). The four standardised terms we identified were 'data-driven', 'innovation', 'capability' and 'marketing' – our four themes. Second, we broadened the search, as the DDIC of marketing is a recent subject, and selected the most relevant synonyms and keywords to form groups related to each theme. We then used the 'OR' operator to find articles that contained at least one of the search terms within every theme group. Lastly, we used the 'AND' operator to join our four theme groups together, narrowing the retrieved literature down to articles that contained all the concepts (Atkinson and Cipriani, 2018) and giving a precise result for the articles that could be evaluated for our subject. Every Boolean operator search was performed using

the database function that combined 'TITLE', 'KEYWORDS' and 'ABSTRACT' at the same time.

Search engine search

Since the Google Scholar search engine does not use the Boolean operators search, we used the standardised terms mentioned above and selected a shortlist of the most relevant keywords and synonyms to characterise them, before establishing the search strings by combining them (Table 2-6.).

Table 2-6. Web of Science, Scopus, EBSCOhost – Business Source Complete and Google Scholar search queries for a systematic review of the data-driven innovation capability of marketing

1. Databases: **WoS, Scopus, EBSCOHost – Business Source Complete** Search using Boolean operators' method query	
Keywords and synonyms theme 1: DATA-DRIVEN	'Data-Driven' OR 'Datadriven' OR 'Big Data' OR 'IoT' OR 'Big Data Analytics' OR 'Big Data Analytic' OR 'Analytics' OR 'Analytics Management' OR 'Artificial Intelligence'
	AND
Keywords and synonyms theme 2: INNOVATION	Innovation' OR 'Innovations' OR 'Services creation' OR 'Products creation' OR 'Product creation' OR 'Products development' OR 'NPD' OR 'Innovativeness'
	AND
Keywords and synonyms theme 3: CAPABILITY	'Capability' OR 'Capabilities' OR 'Resource-based view' OR 'Resource-based theory' OR 'Resource-based' OR 'RBT' OR 'Marketing competencies'
	AND
Keywords and synonyms theme 4: MARKETING	'Marketing' OR 'BtoB Marketing' OR 'Industrial Marketing' OR 'Marketing organization' OR 'Marketing department' OR 'Marketing function' OR 'Marketing structure'
2. Search engine: **Google Scholar** Manual search method query	
Keywords and synonyms theme 1: DATA-DRIVEN	Shortlist of the most relevant keywords and synonyms: 'Big Data', 'Analytics'
Keywords and synonyms theme 2: INNOVATION	Shortlist of the most relevant keywords and synonyms: 'Services', 'Product Development'
Keywords and synonyms theme 3: CAPABILITY	Shortlist of the most relevant keywords and synonyms: 'Capabilities', 'Resource-based'
Keywords and synonyms theme 4: MARKETING	Shortlist of the most relevant keywords and synonyms: 'BtoB Marketing'
	➔ 48 combined search strings

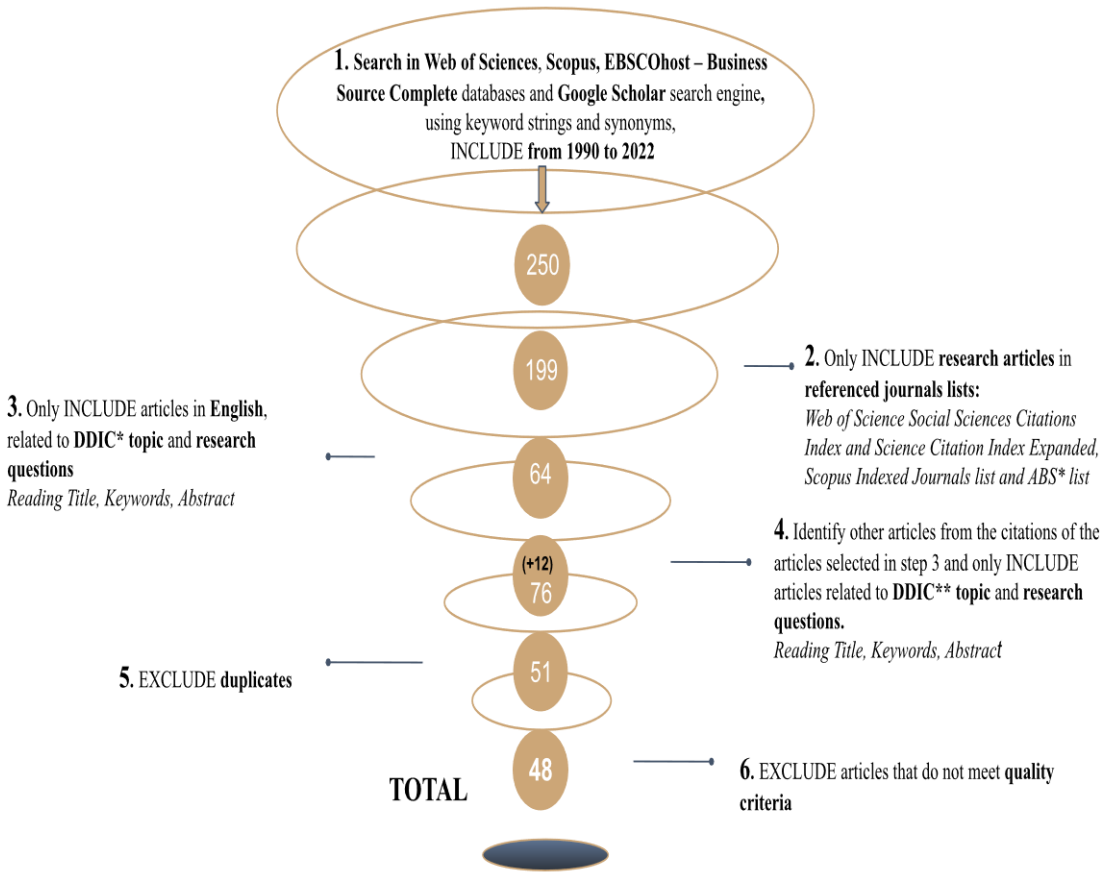
From the 250 documents identified, we selected the most appropriate studies according to our inclusion and exclusion eligibility criteria, which were inspired by the works of Mathiassen et al. (2004), Tranfield et al. (2003) and Webster and Watson (2002).

Inclusion criteria

We used four key inclusion criteria. First, based on our search strings, we opted to review research documents across a broad time span (1990–2022), in line with the median of 20 years for systematic reviews in management (Rojon et al., 2021). This first step gave us 250 documents. Second, we decided only to include research articles published in referenced journals indexed in recognised lists: the WoS Social Sciences Citations Index and Science Citation Index Expanded, the Scopus Indexed Journals list and the Association of Business Schools (ABS) list (n = 199). Third, we only included research articles written in English, and those in line with our objective of conceptualising the DDIC of marketing by answering the four stated research questions. To determine this, we thoroughly and meticulously read the title, keywords and abstract of each extracted research article. It is also worth noting that we did not include two articles that were initially referenced: one that had been retracted and another that was classified as a research article by mistake in the database (n = 64). Fourth, we scrutinised the most relevant citations from the identified articles. By reading the titles, keywords, and abstracts of the papers, this step led us to add 12 more documents (n = 76).

Exclusion criteria

We used two exclusion criteria. First, we removed duplicates (n = 51). Second, we added quality criteria to limit any risk of internal and external validity bias (Tranfield et al., 2003). Quality assessment is important during screening assessment (Briner and Denyer, 2012; Sharma and Bansal, 2023). We opted to use Sweeney et al.'s (2019) criteria, which are not so strict as to exclude too many papers, but which also ensure quality, independent of their ranking consideration (Rojon et al., 2021). More precisely, this quality audit inspected the clarity of the research question, the appropriateness of the methodology and the rigour with which it was employed, the size of the sample selected, the specifications of theoretical frameworks and measurement approaches and the validity of the research findings. Two articles were excluded for lacking a theoretical framework and one for the validity of its research findings. As a result, we were left with a total of 48 papers we could use to define the conceptual boundaries of the DDIC of marketing. Figure 2-8. synthesises the systematic review process.



*ABS: Association of Business Schools; **DDIC: Data-driven innovation capability of marketing

Figure 2 8. Systematic review of the funnel process for researching the data-driven innovation capability of marketing

Data extraction and synthesis

Data about the papers were entered into an Excel spreadsheet, listing authors, title, journal, research domain, publication date, keywords, research topic, supported theories and main results. Next, we applied a systematic approach to identify the common themes that occurred throughout the sample (Braun and Clarke, 2006). One researcher coded evidence from the selected studies to raise first-order emerging categories and to develop key thematic categories through the dimensionality, abstraction or comparison methods (Miles and Huberman, 1994). Then the two other researchers discussed the identified themes, their adoption and connection, and revision emerged by consensus (Reid and Plank, 2000). The themes that emerged were based on the degree of consensus shared between the articles (Tranfield et al., 2003).

2.5.3. Reporting and dissemination

The third stage is presented below. We summarise our descriptive findings in the following section, and a second section explains our analytical findings by integrating the discovered themes into a conceptual framework.

2.6. Descriptive findings

Our analysis shows a fast-growing topic with significant interdisciplinary input from European scholars, mainly in marketing and information systems, rooted in organisational theories.

2.6.1. A topic gaining momentum

Figure 2-9. shows the surge in DDIC of marketing research, from modest beginnings in 2010 to the spike from 2016 to 2022, with 93.75% of the studies (45 out of 48) being published during that time. Of those, 38 were empirical, peaking in the last three years with 19 papers, half of the empirical research in this timeframe.

The first conceptual study appeared in 2016, and only two mixed-methods papers have emerged, the first of which was in 2020. Research has leaned towards quantitative methods since 2019, with 18 quantitative studies versus six qualitative. Meanwhile, five conceptual papers were introduced from 2019 to 2022, representing 71.42% of the conceptual output in the significant 2016–2022 period.

This trend underscores management sciences' rising interest in DDIC of marketing, thus emphasising the importance of synthesising these insights through a systematic literature review to establish a foundational base for future research.

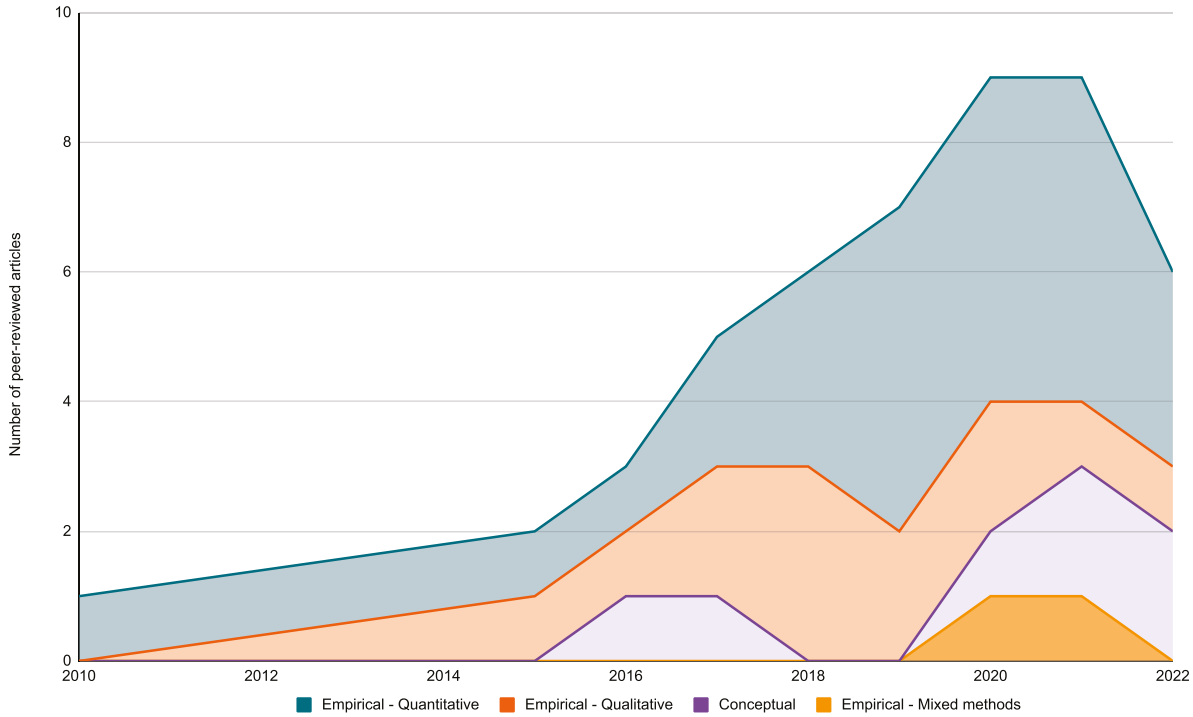


Figure 2-9. Growth of the number of peer-reviewed articles, classified by research type

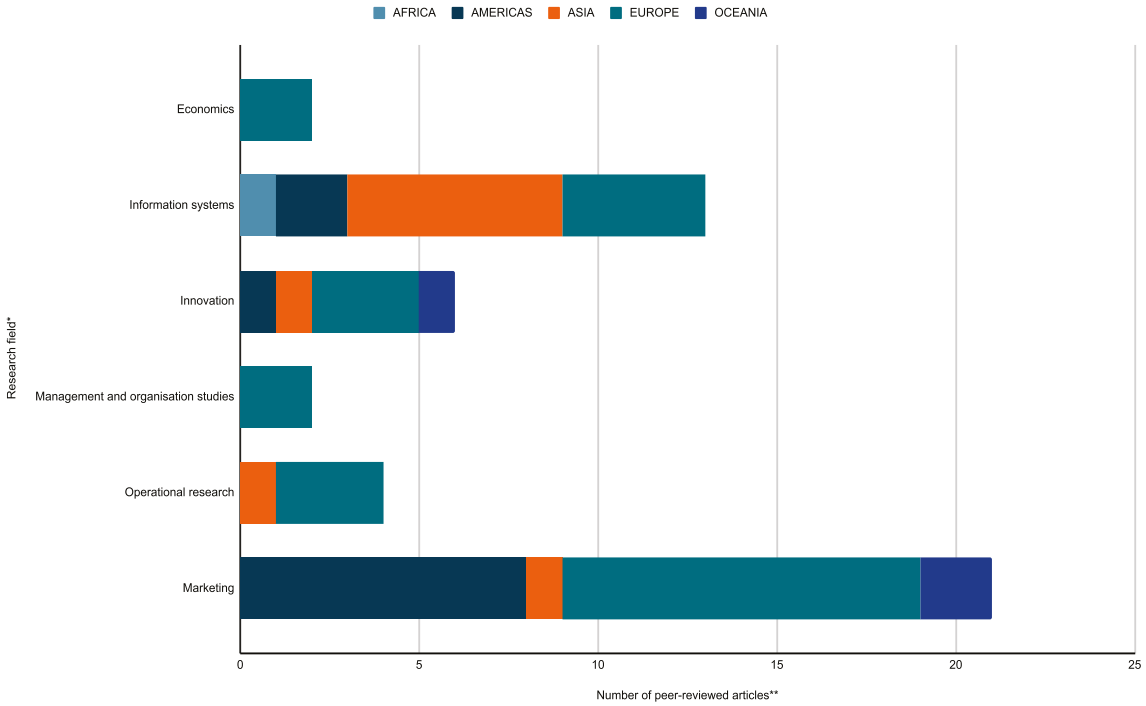
2.6.2. Interdisciplinary contributions from European authors, mainly in marketing and information systems research

Figure 2-10. presents an analysis of the research fields extracted from the systematic review resulting from a classification by domain of the identified peer-reviewed scientific journals. It emphasises the significance of this subject for marketing research, particularly in B2B marketing, with 10 of the 21 marketing papers focusing on B2B.

The review shows a strong intersection between marketing and information systems, with 70.8% of the papers (34 out of 48) exploring their complementarity. This underscores the importance of bridging these fields to enhance theoretical and practical insights for information technology (IT) and marketing management in response to market demands.

A breakdown by the nationality of the first authors reveals significant European participation, which is responsible for half of the studies (24 out of 48), mainly in marketing (n = 10) and information systems (n = 4), and it also covers innovation (n = 3), operational research (n = 3), economics (n = 2), and management and organisational studies (n = 2). This confirms the interdisciplinary nature of the research. Contributions from other regions include the Americas (n = 8), mainly focusing on marketing, and Asia (n = 6), emphasising information systems. The UK is the top contributing country (n = 11),

followed by the USA (n = 9), with a primary focus on marketing, and Norway (n = 4), with a focus on management and organisational studies.

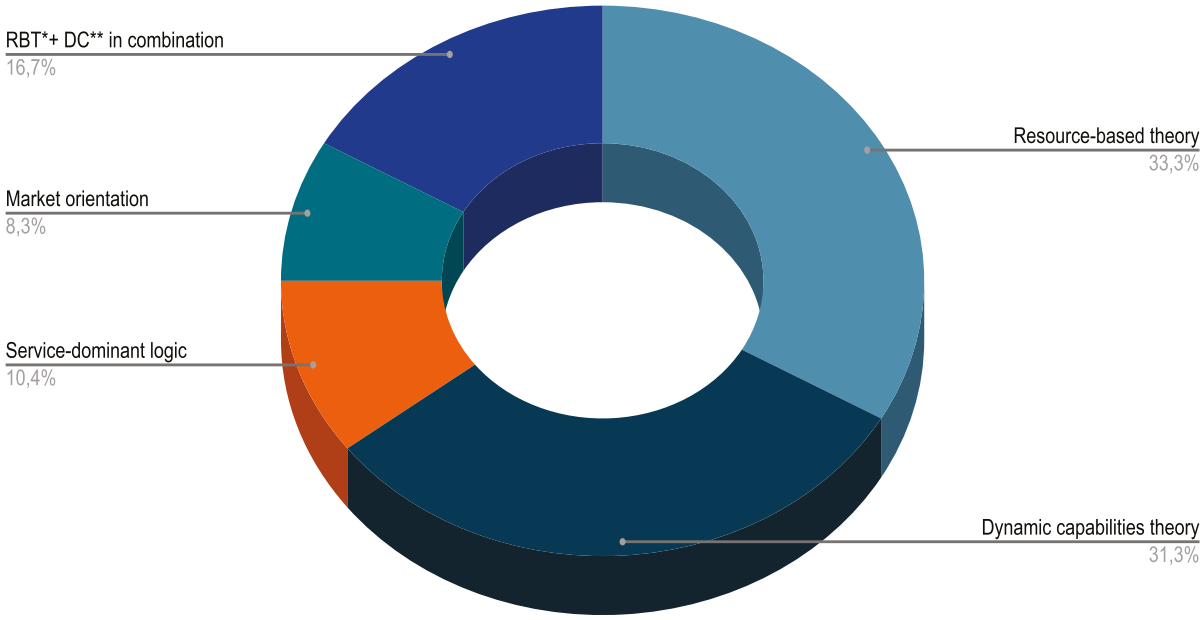


*Classified by peer-reviewed journal related domain; **Classified by nationality of first authors

Figure 2-10. Research field and article origins

2.6.3. A topic anchored in organisational theories

Figure 2-11. shows the major theoretical foundations included in the selected papers. The two most cited theories were RBT (n = 16) and DC theory (n = 15), which were often used in combination. (n = 8), thus confirming this as a reliable theoretical framework for our analytical study. MO theory was also mentioned in some of the selected articles (n = 4), frequently used to describe marketing capabilities. We consequently assess these theories to be suitable, particularly by association, for framing our narrative synthesis. Lastly, some of the articles referred to service-dominant logic (n = 5) to explain the innovation outputs derived from the use of the DDIC of marketing.



*RBT: Resource-based theory; **DC: Dynamic capabilities

Figure 2-11. Most-cited theories in the selected articles

2.7. Analytical findings

2.7.1. An explanatory architecture to conceptualise the DDIC of marketing

The first step of the analytical process consisted of choosing a synthesis type for our findings about the DDIC of marketing. We chose the narrative explanation synthesis type (Rousseau et al., 2008) to build and advance theory by formalising our knowledge of marketing capabilities derived from BD for innovation topics. Explanation synthesis is rooted in a critical realism approach (Rousseau et al., 2008). It explores a clear and specific question regarding a practical problem (Pawson, 2002), such as how to conceptualise the DDIC of marketing to face the new DDI reality. This approach enables us to incorporate evidence from various methods and then organise and interpret it through an explanation synthesis (Rousseau et al., 2008). Explanation synthesis starts by articulating likely underlying mechanisms, before interrogating the available evidence to establish whether and where these mechanisms are applicable (Rousseau et al., 2008). We are in line with these precepts as we aim to build knowledge about the DDIC of marketing, its underlying assumptions and the main dynamics of construction. Moreover, by accepting multiple forms of empirical information and theoretical dimensions, we

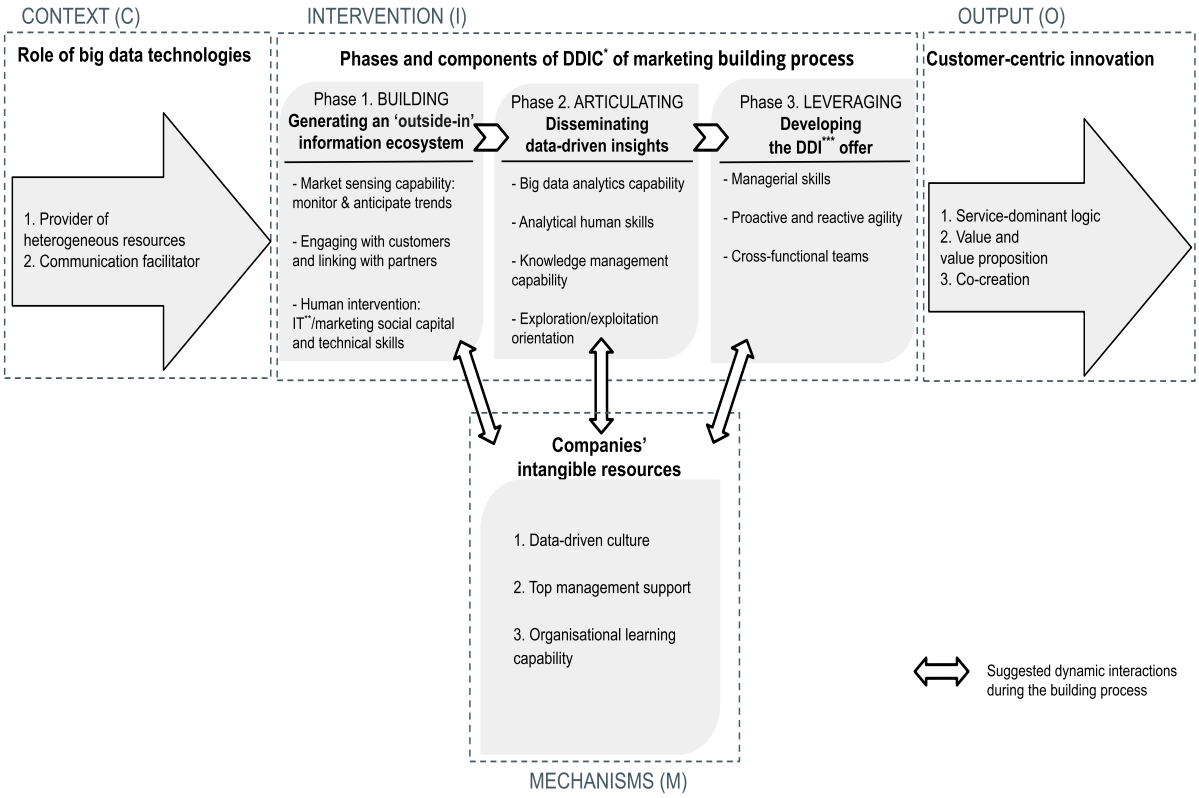
suggest a pragmatic way to interpret the phenomenon, thus increasing its chances of application by marketers (Rojon et al., 2021).

The second step entailed choosing a framework for our analytical results. We chose a formative framework by Denyer et al. (2008) for our analysis, ideal for our critical realist approach. This 'CIMO-logic' framework helps understand how interventions (I) work and can invoke certain generative mechanisms (M) in specific contexts (C) to find solutions by producing outcomes (O). Commonly used to structure propositions derived from systematic review findings (Rojon et al., 2021), it structures our review findings by investigating how in the specific context of BD technologies (C), interventions (I) - i.e., the DDIC of marketing building process - can be implemented - and activate companies' intangible resource mechanisms (M) to create customer-centric innovation outcomes (O). Additionally, Denyer et al. (2008) stress interventions (I) – i.e. the DDIC of marketing building process – as a central hub of the explanation analysis because it is interconnected with the three other dimensions (C, M and O). Our focus on constructing DDIC of marketing underscores our use of CIMO-logic to structure our findings. Moreover, a formal model integrates and analyses diverse, evidence-based information by describing its relevant contribution to the theory (Pawson, 2002), aligning with our goals to compile varied insights on DDIC of marketing and enhance the relevance of RBT- capability-based view, DC, and MO theories. This approach systematically organises the coded dimensions and their connections. Overall, the 'CIMO-logic' framework effectively develops DDIC of marketing knowledge, offering both theoretical insights and practical solutions for managerial challenges in building DDIC (Denyer et al., 2008).

It is worth noting that the selected studies can be classified simultaneously into several of the blocks in our framework (see Appendix 2-1.).

2.7.2. An overall conceptual framework for the DDIC of marketing

This part summarises each theme's key insights. The first subsection of the synthesis presents our results on the DDIC of marketing via an overall conceptual 'CIMO-logic' framework proposition (Figure 2-12.). The second subsection presents a DC view of the underlying processes of DDIC of marketing construction.



*DDIC: Data-driven innovation capability; **IT: Information technology; ***DDI: Data-driven innovation

Figure 2-12. A CIMO-logic framework for the DDIC* of marketing building process: an explanation synthesis of its components, dynamic phases and connected dimensions

Components of the DDIC of marketing (I)

First, our analysis outlines the building process of DDIC of marketing by identifying the required resources and capabilities. Drawing on Jaworski and Kohli's MO theory (1993), we mapped our findings about the DDIC of marketing through a three-phase process: (1) building, (2) articulating, and (3) leveraging, during which the marketing department deploys distinctive routines for DDI; namely, (1) generating an 'outside-in' information ecosystem, (2) disseminating data-driven insights, and (3) developing the DDI offer. We confirm that the DDIC of marketing is a procedural, knowledge-driven capability, codifying and articulating knowledge for DDI activities. This enables marketing to build DDIC to adapt to changes and uncertainties (Day, 2006; Teece, 2007), by exploiting current information and exploring new ones for improved innovation.

(1) Building – Generating an 'outside-in' information ecosystem

The first phase consists of routinely extending the organisational boundaries of marketing by looking at the markets' external information ecosystems and leveraging capabilities both inside and outside the organisation (Dąbrowska et al., 2019). This perspective echoes the outside-in view of Day (2014), who suggests that companies develop market-based information capabilities by sensing the market, engaging with customers and linking with partners. By incorporating an outside-in orientation in the DDIC of marketing capability building, our analysis tends to overcome MO or marketing capability from an inside-out perspective (Day, 2011; Vorhies and Morgan, 2005), suggesting too much attention is paid to customers' expressed needs, rather than their latent needs (Mu and Di Benedetto, 2011). We underlined the importance of external market information, such as sensing the market, engaging with customers and linking with partners to set and manage customers' current and future expectations.

Market sensing capability: monitor and anticipate trends

We use 'market sensing' to refer to the ability of marketing to monitor market dynamics and anticipate future trends by detecting signals and emerging opportunities that inform the changing needs of customers and the market environment (Mu, 2015). Processing information from the business ecosystem is of paramount importance to marketing, and studies note how crucial it is to adapt resources according to market changes, such as implementing an IT infrastructure that is sufficiently reliable, flexible and modular to connect internal and external information sources (Ashrafi and Zare Ravasan, 2018). This infrastructure needs to be complemented by an environmental scanning capability that can acquire and use data from the external environment to assist innovation processes (Duan et al., 2020). Several authors emphasise the ignorance-based view or culture of discovery – i.e. focusing on what we do not know – to support environmental scanning marketing operations (De Luca et al., 2021; Erevelles et al., 2016), giving a proactive view of the DDIC of marketing as a capability that is open to capturing new consumer trends.

Engaging with customers and linking with partners

Engaging with customers' refers to a company's ability to create intimate relationships with its customers (Park et al., 2010) and to help its marketing better respond to customers' expressed and latent needs. Zhan et al. (2017) present a framework for accelerated innovation by incorporating customer connection and engagement, Chierici et al. (2019) encourage engagement with customers through social media interactions and Mu (2015) insists on customer engagement as a contributor to new product performance. Lastly, the outside-in view holds partner linkages to nurture a market sensing capability, and capitalising on different partners' knowledge resources can help with discovering new opportunities and refining and maximising the value of existing resources. Knowledge sourced from various stakeholders – such as providers, customers, consultants and competitors – influences innovation process performance (Trantopoulos

et al., 2017). Companies partnering with BD analytics companies tend to consider them a natural extension of their own innovation infrastructure (Mariani and Wamba, 2020).

Human intervention

It is a major resource that supports outside-in information ecosystem generation. First, interaction between marketing and IT departments facilitates knowledge sharing and marketing information ecosystem building to improve innovation performance. Based on the social capital literature (Nahapiet and Ghoshal, 1998), IT–marketing complementarity can be developed through structural technological BD linkages that facilitate a common understanding of collective goals (Shuradze and Wagner, 2021). Other authors suggest that mixing IT competencies with marketing talent can lead to DDI (Sultana et al., 2022a). Second, our study identifies the shift in marketers' skills towards technicity. Marketing departments engage in vigilant learning by sifting through emerging techniques, analytics services and software applications before betting on those that are most likely to match customer needs (Johnson et al., 2019). Today's managers are looking for people who are capable of deploying inductive techniques to interpret hidden insights that will serve innovation (Erevelles et al., 2016) and, if necessary, to subcontract the work to specialist companies (Mariani and Wamba, 2020).

(2) Articulating – Disseminating data-driven insights

The second phase consists of analysing, either reactively or proactively, the data-driven insights produced by the outside-in information ecosystem for innovation purposes. Data-driven insights are the use of current and historical data to progress from not knowing how to solve a problem to knowing how to solve it (Ghasemaghaei and Calic, 2019). The DDIC of marketing allows for the development of descriptive (i.e. current trends of consumption), predictive (i.e. future trends of consumption) and prescriptive insights (i.e. the best course of action to take advantage of current and future patterns) to address innovation concerns (Ghasemaghaei and Calic, 2019). We identified four capabilities: BD analytics capability, analytical human skills, knowledge management capability and the exploration/exploitation orientation.

BD analytics capability

This provides a central resource from which insights can be extracted when building the DDIC of marketing. It is key to interpreting the large quantities of raw data, both structured and unstructured, contained in large data warehouses, also known as data lakes. Half of the studies reviewed mentioned establishing a BD analytics capability in marketing departments to foster DDI. Gupta and George (2016) were the first to detail how to build a BD analytics capability by combining tangible, basic, technological data resources with human technical and analytical skills and organisational capital resources.

Mikalef et al. (2019) explains how combining an analytics infrastructure with analytical human skills and a data-driven organisational culture leads to innovation. Further research shows how marketing analytics positively impact the ability to manage innovation development (Cao et al., 2022).

Analytical human skills

Our review highlights the necessity of recruiting people with the analytical capability to handle information and retain the most suitable for innovation purposes. According to Dubey et al. (2020), analytical marketers are the guardians of the quality and visibility of the information used for innovation. To derive higher value from the available information, managers need to consider this analytical capability as crucial and to employ experts with broad knowledge to refine data and classify it according to innovation needs (Ashrafi and Zare Ravasan, 2018).

Knowledge management capability

This activity is strongly linked to marketing departments and has been identified as a necessary resource for sharing insights. It has a positive effect on companies' competitive performance through the mediating role of marketing analytics and service innovation management (Rahman et al., 2020). Trabucchi and Buganza (2019) propose a model for managing customer knowledge throughout the innovation process by considering information not only as something that can be generated on purpose for innovation, but also as a by-product to be exploited for upgraded managerial applications.

Exploration/exploitation orientation

Lastly, the exploration/exploitation orientation allows marketing departments to adapt to the market environment (March, 1991). Through this, marketers can take advantage of market opportunities before they become obvious and introduce innovation competencies to satisfy both existing and new customers. Exploration can be defined as an organisational emphasis on introducing new product and service development competencies for value creation, by exploring activities such as search, variation, experimentation, flexibility and discovery (March, 1991). Exploitation reflects an organisational emphasis on deploying incremental existing product competencies for value creation (Mu, 2015), by questioning which discovered insights can better serve the customers' existing needs. The exploration/exploitation orientation drives insights dissemination and reinforces a customer-centric approach to new product performance (Ghasemaghaei & Calic, 2019; Johnson et al., 2019).

(3) *Leveraging – Developing the DDI offer*

The final phase demonstrates how marketing can act by using the extracted insights for developing innovation outputs to deliver superior value to customers. We highlight three evidence-based resources: marketers' managerial skills, proactive and reactive agility, and cross-functional teams.

Managerial skills

The perfect marketer profile for DDI achievement is a combination of technical, analytical and managerial skills. In particular, marketers need to consider which insight to bet on before launching offers to match customer needs. This role is usually entrusted to senior management, who must be able to engage all stakeholders on the basis of data-driven insights (Johnson et al., 2019). Their managerial skills contribute to identifying the right business questions and hypotheses for testing, and thus success here relates directly to the managers' business acumen (Mariani and Wamba, 2020). Managerial intuition is imperative for developing a clear understanding of the marketing analytics extracted by the technical teams, and for deciding how to explore and/or exploit the data-driven insights (Gupta and George, 2016; Mikalef et al., 2019).

Proactive and reactive agility

Agility is very important; this is the ability to both sense and respond expeditiously to customer-based opportunities for innovation and competitive action (Hajli et al., 2020), confirming both a reactive and proactive approach. The DDIC of marketing is deeply rooted in agility. The descriptive and predictive BD features included its composition enable companies to better sense and respond to customer needs, which positively influences agile deployment and contributes to innovation success (Shuradze et al., 2018). Receiving large numbers of online reviews can also enable a company to gain insights and deal with change that happens all the time, enhancing product developers' motivation to leverage data collection and integration tools, which in turn increases customer agility (Zhou et al., 2019). Sultana et al.'s (2022b) findings focus on market agility for DDI achievement, as a capability to envision and respond competently to market opportunities or uncertainties (Li et al., 2021). They show how market agility acts as a catalyst between DDIC and firm performance.

Cross-functional teams

Managers must develop mutual collaborations with other functional managers in order to implement DDI. For example, the accelerated innovation process developed by Zhan et al. (2017) suggests that cross-functional teams work on separate elements of projects based on marketing analytics and collaborative technological platforms.

The contextual role of BD technologies (C)

Second, this review shows that BD technologies play a contextual role in enabling innovation through the intervention of DDIC of marketing, leading to innovation success and a competitive advantage (Chatterjee et al., 2021). BD technologies enhance marketing departments by enriching their knowledge, capabilities, and processes, thus boosting innovation (Cao et al., 2022; Ghasemaghaei and Calic, 2019). We explore two key functions of BD technologies: as a provider of heterogenous resources and as an enabler of communication.

Heterogeneous resources provider

We previously reported heterogeneity as a major foundation of the RBT perspective. Companies possess different resources, even if they operate within the same industry, that can explain how they perform better than others and generate sustained competitive advantage (Peteraf and Barney, 2003). Many of the studies we reviewed attribute the heterogeneity of resources to the deployment of BD technologies such as social networks, analytics or IoT. Researchers assume that proactive and reactive social media listening is a great monitoring tool for gauging customers' expressed and latent needs, and thus it exerts a positive influence on a company's innovation capability (Chierici et al., 2019). The 3Vs of BD (McAfee et al., 2012) – volume, variety and velocity – can explain why BD is distinct from traditional data. To benefit from the size, diversity and high-speed nature of BD, marketing departments need to implement analytics to gain meaningful knowledge and insights for managing new product development (Cao et al., 2015). Using analytics can impact innovation, particularly by enhancing product newness and meaningfulness thanks to the data-driven insights extracted from IT (Duan et al., 2020). IoT technology has also been rapidly adopted by B2B companies to collect data, analyse data and promote new offers, and this is closely related to the density of information resources (Ng and Wakenshw, 2017).

Communication facilitator

By facilitating communication, internally and externally, companies can reduce their time-to-market and innovation costs (Zhan et al., 2017) to reach the right customer, at the right time, with the right information. This results in improved innovation processes by moving progressively towards DDI. The main significant BD technologies that make communication smoother are platforms, clouds and Artificial Intelligence (AI). A company being able to handle external knowledge from multiple sources, such as customers, competitors, universities or consultants, is critical for innovation success (Trantopoulos et al., 2017). The company can develop digital service platforms that support customer group communication and enable information collection and transmission, in order to promote rapid innovation (Xie et al., 2016). Adopting cloud computing positively affects organisational innovativeness by connecting people and companies quickly and directly

(Wright et al., 2019). The new B2B innovation paradigm is therefore to see platforms and clouds not in the restrictive sense of storing data, but as digital technologies capable of accelerating communication across the internal and external ecosystem (Papa et al., 2021; Wright et al., 2019). Finally, Petrescu et al. (2022) examined the B2B innovation role played by AI, by showing how it facilitates communication and increases efficiency between B2B companies. An AI climate-driven service analytics capability helps B2B companies exchange information faster with their customers – for example, to solve problems – and thus positively influences innovation (Akter et al., 2021).

Companies' intangible resources (M)

Third, we looked at the complementarity between the DDIC of marketing and companies' intangible resources, referred to as 'mechanisms' (M). We underlined a dynamic interaction process between companies' intangible resources and the DDIC of marketing, as these two dimensions readjust, renew and reconfigure themselves when connected to each other. Three intangible resources can trigger the deployment of the DDIC of marketing: a data-driven culture, top management support and an organisational learning capability.

Data-driven culture

A data-driven culture is an important component for the effective deployment of BD initiatives (Abbasi et al., 2016), particularly in innovation project settlements. Kiron, Ferguson and Prentice (2013) refer to data-driven culture as 'a pattern of behaviours and practices by a group of people who share a belief that having, understanding and using certain kinds of data and information plays a critical role in the success of their organisation' (p. 18). Associated with one constitutive element of the DDIC of marketing, BD analytics, a data-driven culture positively influences innovation capability (Mikalef and Krogstie, 2020). It is thus pertinent to diffuse the culture of data-driven decision-making throughout the innovation decision-making process, particularly during the environment scanning stage (Duan et al., 2020). Chatterjee et al. (2021) highlight that a data-driven culture strongly influences product and process innovation, thus making the company more competitive. As such, marketing departments that are able not only to integrate BD analytics into their innovation capability but also to couple them with the company's data-driven culture will extract superior value from such associations (Mariani and Wamba, 2020). In addition, when greater voice is granted to the use and interpretation of marketing analytics, momentum increases for a data-driven culture (Johnson et al., 2019).

Top management support

Some of the reviewed papers included top management support as a factor that influences innovation. For example, if senior management encourages the use of analytical tools in

the marketing department, this will have an effect on marketing decision-making and product development management activities (Cao et al., 2019). This requires top management to understand the innovation opportunities enabled by BD analytics. Top management and the marketing department need to work hand in hand to establish processes, governance structures, data skills competencies and a strategic roadmap that can harness existing and new data assets with which to innovate (Mikalef et al., 2019). Effective leadership support encourages new ideas, thus enhancing product innovation and company performance (Chatterjee et al., 2021). Leaders support marketing departments because their analytics capabilities in terms of innovation decision-making meet return-on-investment (ROI) requirements by making profitability visible. As for marketers, delivering early ROI on marketing analytics investments is essential for convincing top management to increase budgets that will further reinforce the strategic use of the DDIC of marketing (Johnson et al., 2019).

Organisational learning capability

An organisational learning capability is anchored in organisational learning theory (March, 1991) and it refers to the concentrated efforts of company members to exploit existing knowledge, to continuously explore new knowledge to keep up with unpredictable market conditions (Teece, 2015) and to contribute to innovation capabilities. Supported by an organisational learning capability, the DDIC of marketing can disseminate insights extracted from its information ecosystem and proactively or reactively adapt to the market's response by reconfiguring or developing structures, processes and new routines accordingly. Operationally speaking, based on these data-driven insights, it is critical for companies both to support existing procedures and to develop new routines to ensure that the DDIC of marketing is fully leveraged (Ghasemaghaei and Calic, 2019). Organisational learning has become a complementary facet of BD-based marketing capabilities. Mu (2015) notes that marketing capabilities, such as the DDIC of marketing, are important for companies as long as they are able to align their organisational structural factors with product innovation requirements. Finally, processing BD analytics enables marketing departments to better understand markets, customers, products, services and companies to improve their learning capabilities accordingly, resulting in more customer-oriented innovation. This leads us to the last theme revealed by our explanation analysis, which details the main dimensions of the customer-centric innovation output (O).

Customer-centric innovation (O)

Fourth, we determined that the innovation type derived from the DDIC of marketing is customer-centricity. Research shows BD analytics help firms understand customer needs, and marketing arrange resources in a data-rich environment by adopting a customer-centric approach, leading to innovation success (Shuradze et al., 2018; Zhan et al., 2018). Applying data-driven marketing to innovation means transitioning the marketing

philosophy from unqualified commitment to customer-centricity (Johnson et al., 2019). Three major dimensions are related to customer-centric innovation: service-dominant logic, value and value proposition, and co-creation.

Service-Dominant Logic

The first link connecting customer-centricity and innovation is Service-Dominant Logic (Vargo and Lusch, 2004). S-D logic combines data analytics and service innovation in search of value for users (Vargo et al., 2008). Research stresses the positive influence of AI and service analytics on B2B service innovation (Akter et al., 2021). Petrescu et al. (2022) contextualise the prevalence of themes such as customer service solutions, innovation and marketing for AI adoption in B2B settings, and formulate an integrative framework based on service-dominant logic. Any insight disseminated by marketing departments can potentially be transformed into a useful service for customers and profitable revenues for companies. It is then relevant to manage the marketing information ecosystem because it positively affects service innovation (Rahman et al., 2020). Thanks to BD, marketers reinforce their exploration/exploitation approach for innovation, resulting in more service offerings and better competitive advantage, thus blurring the boundaries between service industries and the goods sector (De Luca et al., 2021).

Value and value proposition

Scholars identify value as a second crucial element of innovation output. More precisely, service-dominant logic focuses on new ways to create customer value through service processes, and how the value of an innovation is not delivered to the customer as a product but as a promise of value creation, i.e. value propositions (Lehrer et al., 2018). Service innovation is also seen as the creation of value propositions, which are generated when companies deliver resources (e.g. information, knowledge or skills). The role of the DDIC of marketing is therefore essential for providing the necessary resources, through information ecosystem generation and insights dissemination, to incorporate superior value into service innovations. The customer-based structure that organisations develop around the exploitation of BD technologies can ensure that customers' expressed and latent needs are addressed through the development of new products and services that meet the requirements for customer value creation (Mu, 2015) and allow customer value appropriation to be achieved (Chierici et al., 2019). Insights from the DDIC of marketing help companies to develop more meaningful new products for customers (Duan et al., 2020), who consider them to be of superior value to previous product offerings.

Co-creation

The literature invokes co-creation between companies and customers as the last dimension linked to innovation. For example, through the exploitation of IoT technology,

customers can be involved in new product development processes by co-creating alongside the brand, with the aim of receiving a personalised offer (Ng & Wakenshaw, 2017). Depending on the applicable type of BD information, customers can play a variety of roles in co-creation: buyer, ideator, designer, intermediary (Xie et al., 2016), provider of data information and analyst for marketing innovation activities through online reviews (Jiwat & Zhang, 2022; Zhang & Xiao, 2020). BD technologies turn customers from passive to active participants in the innovation process, thus enhancing strategic value for both customers and companies (Trabucchi & Buganza, 2019). Some researchers extend the scope of innovation collaboration to include open innovation (Chesbrough, 2006), which entails the flow of external and internal knowledge from multiple sources into innovation practice. For instance, knowledge-intensive marketing innovation activities such as DDI are enhanced by the heterogeneous, open innovation ecosystem that marketing is capable of establishing and managing (Papa et al., 2021).

Underlying processes of construction for the DDIC of marketing

This second analytical subsection puts forward a complementary reading grid for the construction of the DDIC of marketing by exploring it as a system of dynamic digital marketing capabilities. The review identifies DC as a strong theoretical explanation of the link between BD, marketing capabilities and innovation. For marketing science, digital marketing capabilities are characterised by a high degree of adaptability to sense and respond rapidly to marketplace changes (Day, 2011). This significant trait is anchored in DC theory (Teece, 2007), which argues that organisations adapt to changing environments by: (1) sensing opportunities and threats, (2) seizing opportunities and (3) maintaining competitiveness through reconfiguring resources. For example, Johnson et al. (2019) identify three sub dynamic abilities for building a marketing BD analytics capability to innovate in fast-moving markets: vigilant learning, probing and learning, and organisational redesign. Marketing analytics are also dynamic because they allow for sensing, seizing and reconfiguring activities to meet innovation objectives (Cao et al., 2019). However, surprisingly few studies in strategic marketing have operationalised digital marketing capabilities by describing the specific underlying processes and routines that lead to sustained competitive advantage (Capron and Mitchell, 2009; Day and Schoemaker, 2016). Supported by Conboy et al.'s (2020) classification of the processes underlying DC, we address that gap by reporting our resources and capabilities findings from the DC point of view to explain the routines embedded in the DDIC of marketing that prove it is a dynamic capability (Figure 2-13.).

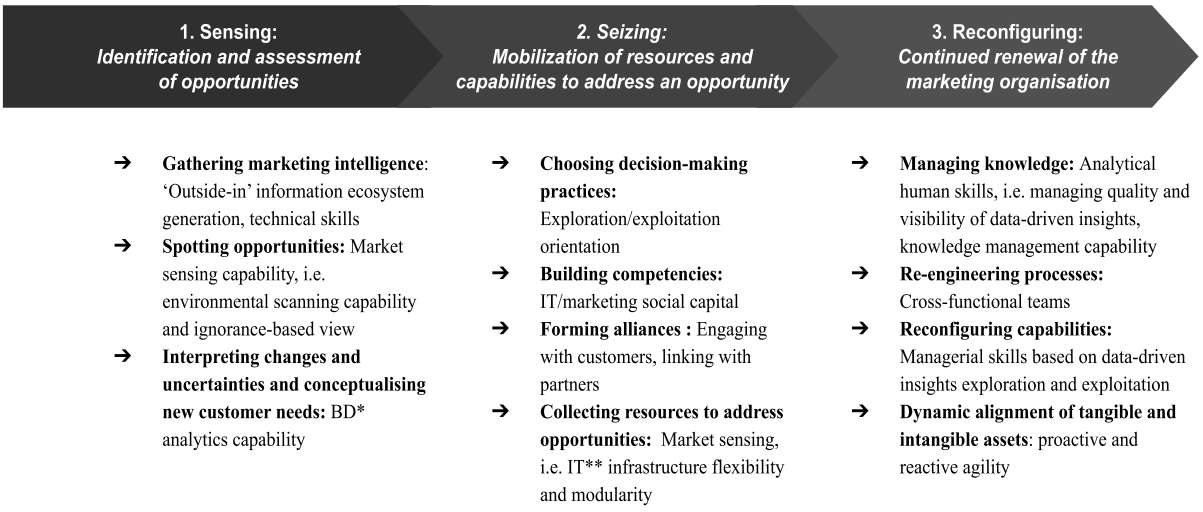


Figure 2-13. A dynamic view of the data-driven innovation capability of marketing

Definition proposal

Supported by this extensive interdisciplinary literature review, we propose the following definition for the DDIC of marketing:

> *The DDIC of marketing is a dynamic, market-oriented and processual capability related to the development of new offerings, forming part of digital marketing capabilities, that generates an 'outside-in' information ecosystem, disseminates the extracted data-driven insights and develops DDI offers, either proactively or reactively, by orchestrating tangible, intangible and human resources.*

2.8. Opportunities for future research

Based on the building blocks of our framework – (1) constructing, (2) articulating and (3) leveraging – and the proposed definition, we discuss the main aspects of nurturing future marketing and innovation research according to three perspectives: dynamic capability view, customer-centric innovation and market-orientation–digitalisation approach.

2.8.1. Extend the dynamic capability view of DDIC of marketing

Our analysis offers a dynamic perspective on DDIC of marketing, recommending further research from the dynamic capability viewpoint to enhance understanding of integrating

and orchestrating marketing resources and capabilities for sustained competitive advantage in the digital landscape.

First, we highlight the role of BD technologies in supporting the development of the DDIC of marketing. The new, open and dynamic digital paradigm (Hagberg et al., 2016) requires marketing to make informed decisions about adopting recent technologies, like extended reality technologies. This can be facilitated by integrating learning mechanisms that systematise tacit knowledge to ensure dynamic alignment with market developments. These learning mechanisms, essential for building the DDIC of marketing, result from a blend of marketing knowledge and deliberate investments to codify it (Zollo and Winter, 2002). They are evident in adapting and renewing digital tools to improve their operational modes, to address market turbulence and to continue capturing market share by delivering DDIs. The specific nature of these learning mechanisms warrants further exploration.

Second, our model, leveraging RBT, analyses the integration of complementary marketing resources for developing DDIC of marketing. Such integration suggests a competitive advantage that is hard for rivals to match in fast-changing markets (Kozlenkova et al., 2014). Integrating traditional and digital marketing capabilities is known to be beneficial (Homburg and Wielgos, 2022). However, despite the growing interest in DDI in the marketing and innovation literature (Akter et al., 2021; Rahman et al., 2020; Sultana et al., 2022b, 2022a; Trabucchi and Buganza, 2019), the interaction between DDIC of marketing and traditional marketing capabilities for competitive advantage remains underexplored. The link between RBT and DC is well-documented (Boso et al., 2019; O'Cass and Sok, 2012), with RBT focusing on a firm's unique resources (Barney, 1991) while DC leverages these resources effectively (Helfat, 1997; Winter, 2003). Applied to our model, there is thus a particular interest in determining which dynamic phases' capabilities subsystem could best complement and enhance traditional marketing capabilities for competitive advantage, thus addressing B2B managers' challenges in using data from traditional marketing intelligence in the new digital era (Lilien, 2016).

Third, the study suggests that the DDIC of marketing, as an emerging capability, requires careful orchestration of its inherent resources within the marketing department (Morgan et al., 2019). Prospective studies might delve into the process of strategic orchestration of these resources during the developmental of DDIC of marketing, prioritising the foundational stages to guarantee effective deployment. This process may entail the ability to manage resources with flexibility and adaptability for successfully steering through the complexities introduced by digitalisation and innovation (Sirmon et al., 2011). In the context of orchestrating the DDIC of marketing life cycle, the significance of these dynamic features warrants investigation, particularly by determining when to activate specialised processes for reconfiguring operational modes, upgrading resources, integrating new ones, adapting tools and skills or coordinating knowledge.

2.8.2. Embrace a customer-centric approach to examine the impact of the DDIC of marketing on innovation outcomes

Our study reveals customer-centricity as a specific innovation outcome derived from the DDIC of marketing. This notable paradigm impacts value creation and innovation typology connected to DDIC of marketing, and further studies may enrich our findings.

Firstly, implementing DDIC of marketing positively impacts value creation by enhancing customer-centric value propositions (Li et al., 2021). The marketing literature identifies the customer value proposition as a strategic tool for showcasing an organisation's ability to deliver superior value to targeted customers (Payne et al., 2017). Although the term 'value proposition' is widely used (Ballantyne et al., 2011), its definition, especially regarding DDI and customer-centricity, remains vague (Chandler and Lusch, 2015; Skålén et al., 2015). Elements like personal relationships, expert know-how, time savings (Ulaga and Eggert, 2006) and differentiators such as performance, relationship, co-creation value and price(Ngo and O'Cass, 2012) contribute to the composition of the customer value proposition. Yet the specific contribution of the constitutive elements of DDIC of marketing to enhancing these aspects of the value proposition for DDI, particularly in industrial settings, is underexplored. This research gap warrants attention, particularly in terms of its practical implications, to guide companies regarding which resources of DDIC of marketing to leverage for strengthening specific components of the value proposition with a view to the successful deployment of DDI strategies.

Secondly, adopting a customer-centric approach significantly transforms B2B companies' innovation strategies, leading to a greater focus on servitisation, a dimension closely connected to S-D Logic that suggests a shift towards using skill- and knowledge-based resources – named 'operant' – to create value instead of relying solely on physical, data-based resources – named 'operand'. It would be particularly interesting to explore how specific operant resources within the DDIC of marketing contribute to servitisation. S-D Logic promotes customer involvement in this process, enabled by resource sharing and interactions with firms, where sellers and buyers both engage in creating value together (Vargo and Lusch, 2004). This supports our reasoning for including more customer-centricity to examine the impact of the DDIC of marketing on innovation outcomes. Indeed, a servitisation-oriented innovation approach emphasises the importance of managing knowledge resources through company–customer collaborations and the need for ongoing dialogue to enhance knowledge creation (Vargo and Lusch, 2004). This type of customer-centric operant resources of the DDIC of marketing, mostly included in the 'generating an outside-in ecosystem' routine identified in our model and connected to data-driven servitisation strategies, merits further investigation.

2.8.3. Explore the intersection of market orientation, digitalisation and DDIC of marketing

This review signals a shift towards data-informed marketing innovation strategies leveraging digital tools to gain insights on customers and competitors. It emphasises that MO is integral to the process of building DDIC of marketing. We encourage marketing researchers to pursue investigations into how market-oriented knowledge, digitalisation and DDIC intersect to enhance competitive advantage, thereby offering new opportunities for DDIs.

First, the initial research could start by examining the development of digital ecosystems, focusing particularly on how open digital platforms facilitate robust knowledge exchange for DDIs (Chesbrough, 2006). Digitalisation significantly transforms ecosystems and value chains, both upstream and downstream, (Iansiti and Lakhani, 2014; Jacobides et al., 2018), changes interactions across company boundaries and improves relationships with suppliers and customers (Porter and Heppelmann, 2015). This transformation broadly impacts all partners involved in DDI projects. The marketing department, leveraging MO, can adopt an open, digitalised approach to extract valuable insights into consumer preferences for product design (Li et al., 2015). Companies that engage in open innovative collaborations with a diverse array of stakeholders are more willing to seize opportunities for creating value in products and services (Santoro et al., 2018). Digital platforms amplify the conversion of knowledge into business insights for innovation, with digitalisation being crucial in evolving innovation ecosystems through stakeholder collaboration to boost user experiences and ecosystem value (Helkkula et al., 2018). Therefore, exploring the specific role of open collaborative platforms connected to MO and DDIC of marketing is warranted.

Second, exploring the contributive role of digital co-creation practices related to DDIC of marketing presents a promising research avenue for deepening our understanding of the concept. Digitalisation enables integrated interactions between manufacturers and customers for co-creating value by facilitating new ways to engage with customer resources, processes, and outcomes (Grönroos and Voima, 2013). For example, companies expand the breadth of interaction through more servitisation offerings, and also deepen interactions through closer customer strategic partnerships (Lenka et al., 2017). Investigating the interplay of digitalisation, DDIC of marketing and co-creation processes may yield insightful perspectives on enhancing a firm's competitive advantage. It is worth questioning whether a robust DDIC of marketing positively influences innovative co-creation practices, given the marketing department's crucial role in fostering close customer relationships. The level of digitalisation of market-oriented resources in the marketing department is another significant factor that may affect the intensity of co-creation practices, and it represents an area of interest for the research community.

Table 2-7. provides suggested research questions for each of the research avenues outlined above.

Table 2-7. Suggestions for research avenues and selected research questions

Research avenues	Level of analysis	Research questions
Extend the dynamic capability view of DDIC of marketing*	Learning mechanisms Resources complementarity Resources life cycle	• What is the nature of the learning mechanisms that can assist marketers in deciding to adopt digital and technological resources for building DDIC of marketing? • Which subsystem of identified capabilities from each dynamic phase of our DDIC process best combines with traditional marketing capabilities to achieve competitive advantage? • When should specialised processes be activated for reconfiguring operational modes, upgrading resources, integrating new ones and adapting tools and skills to orchestrate the DDIC of marketing life cycle?
Embrace a customer-centric approach to examine the impact of the DDIC of marketing on innovation outcomes	Value and value proposition Servitisation	• Which resources of DDIC of marketing should be leveraged to strengthen specific components of the value proposition for the successful deployment of DDI strategies? • Which specific operant resources of DDIC of marketing, mostly included in the 'generating an outside-in ecosystem' routine contribute to data-driven servitisation strategies?
Explore the intersection of market orientation, digitalisation and DDIC of marketing	Open digital platforms Co-creation practices	• What can be the contributive role of open digital platforms connected to DDIC of marketing? • What can be the contributive role of digital co-creation practices connected to DDIC of marketing?

*DDIC: Data-driven innovation capability

3. Contributions

3.1.1. Theoretical contributions

An integrated framework and a dynamic capability perspective were developed to examine DDIC through the marketing department lens. Consistent with the fact that DDIC is a growing concept in the strategic and organisational marketing literature, we believe that such primary academic research offers a theoretical basis for conceptualising the DDIC of marketing, which will serve as a foundation for future investigations. Our paper aligns with the recommendation from Jones and Gatrell (2014) that a systematic literature review should have something original, interesting and insightful to say about the field or topic it is reviewing. First, our paper provides an original theoretical contribution, as we intended to build a knowledge platform about the DDIC of marketing within the specific spectrum of marketing, thus advancing understanding of the field of digital marketing capabilities (Herhausen et al., 2020; Homburg and Wielgos, 2022; Lenka et al., 2017; Li et al., 2021).

Second, this review is particularly interesting because it proposes an initial step towards closing the gap in understanding the composition of digitised marketing capabilities claimed by several researchers (Moorman and Day, 2016; R. E. Morgan et al., 2019; Parida et al., 2019; Verhoef and Bijmolt, 2019), consequently providing new theoretical advancement in the strategic marketing domain. Indeed, by integrating a market-oriented view of the DDIC of marketing in its composition, we corroborate the widespread interpretation of marketing capabilities as strategic vehicles in the service of market responsiveness (Day, 1994; Jaworski and Kohli, 1993). We also integrate an outside-in view (Day, 2014) of its composition, and offer a proactive approach for this data-driven capability. Moreover, we explain how the DDIC of marketing can be regarded as a novel source of temporary competitive advantage in an increasingly uncertain, aggressive and rapidly evolving environment. This is particularly relevant as traditional sources of competitive advantage are eroding (D'Aveni et al., 2010). In this context, managers are seeking strategic flexibility to attain a series of temporary advantages by disclosing the dynamic underlying processes (Dagnino et al., 2021). This can be achieved by adopting an exploitation/exploration orientation (Tushman and Anderson, 1986), incorporating greater modularity in their process architectures (Worren et al., 2002) or fostering agility capabilities (Sharma et al., 2017) within the components of the DDIC of marketing.

Lastly, our theoretical contribution is insightful because it presents an overall framework for the DDIC of marketing, including its components and its connections to other issues: context, mechanisms, and outputs. More precisely, we laid out a three-phases process for

its construction: (1) building – generating an 'outside-in' information ecosystem, (2) articulating – disseminating data-driven insights and (3) leveraging – developing the DDI offer. We verified that the DDIC of marketing is a processual architectural capability, whose collected, diffused and used market-based knowledge extracted using BD technologies is codified and articulated within firms' mechanisms to achieve DDI projects. This organisational structural alignment with the DDIC of marketing validates organisation theorists who suggest that organisational alignment helps firms to provide concrete guidelines on how they should implement their business strategy (Kaplan and Norton, 2005). We finally stressed that BD technologies, through the implementation of the DDIC of marketing, promote a service-centric innovation approach. A possible cause may lie in the agility capability, which forms part of the DDIC of marketing, already conceded by prior researchers to be a facilitator of service innovation (Chatfield and Reddick, 2018).

3.1.2. Managerial contributions

Our managerial contributions are fourfold. First, we hope this study will serve as a guideline to marketers that can translate into a step-by-step investment roadmap to drive their DDIC implementation project. We particularly recommend that they pay special attention to human resources, which our evidence-based scrutiny has revealed to be a core component of every phase. The new data-driven marketing collaborator profile includes technical skills to enable searches for unexpected insights, analytical skills to exploit those insights proactively and reactively for innovation purposes, and managerial skills to set innovation priorities based on the data. This new marketing human resources paradigm entails the recruitment challenge of ensuring that suitable talent is in place for conducting DDI projects.

Second, we demonstrated a dynamic view of the DDIC of marketing, which can imply that companies should consider the dynamic features of flexibility, modularity and malleability, for example, when acquiring the necessary resources to build the DDIC of marketing.

Third, we identified the complementary role of companies' intangible resources as facilitators of the settlement of the DDIC of marketing. Concretely speaking, marketing managers should assess whether strategic leaders are inclined to change the rules of the game of their innovation strategy to become data driven. Moreover, as data-driven culture is still in its infancy in some B2B industries, it would also require practitioners to consider change management workshops alongside the implementation process that can, at the same time, nurture the organisational learning capability of firms, which appears to be an important enabler for building the DDIC of marketing.

Fourth, we pointed out that some innovation outputs, like the development of more service offerings, increased customer value and the co-creation innovation process. For

managers willing to follow these innovation outputs as particular business objectives, our study gives them evidence of the utility of implementing the DDIC of marketing to attain these commercial goals.

3.2. Limitations

Although this study represents a systematic literature review of the relationship between BD, marketing capabilities and innovation, it is not without its limitations. The research method employed to select evidence-based studies may have excluded relevant studies from the sample due to the inclusion and exclusion criteria used.

Furthermore, the selection of the papers may have suffered from the researchers' interpretative bias. Besides that, the researchers' decision to interpret the DDIC of marketing by means of an explanation synthesis framework may not have totally avoided the loss of relevant data. Some additional knowledge blocks, like antecedents, variables or contingencies, could enhance the construction model by disclosing causes or determined effects. However, we attenuated this limitation by considering the DDIC of marketing as a nascent phenomenon, and we think we managed to establish a solid theoretical starting point for the research.

Our last point lies in the very nature of our research: the theoretical construct. While our goal was to map the extensive multidisciplinary literature on the DDIC of marketing, our analysis did not test any of the propositions empirically.

3.3. Conclusions

We conducted a systematic review to conceptualise the DDIC of marketing and gather state-of-the-art knowledge on this emerging 'hot' topic that is gaining attention in the strategic management context. Specifically, our methodological approach helps to extend established theories, i.e. MO, RBT-capability-based view, and DC, in a fresh manner by combining them with findings from multidisciplinary literature to analyse a recent and rising construct. Through the 'CIMO-logic' framework, we delineated the building blocks of DDIC of marketing into a comprehensive framework, including its key phases, components, routines and connected dimensions, following a structured, rigorous, replicable procedure so that the research community can contribute additional insights on the subject. We interpreted DDIC in the context of the marketing department as a three-phase, process-oriented capability before proposing a definition. Finally, we provided room for debate by suggesting future research avenues, as summarised in a table. Lastly, we discussed the theoretical and managerial implications of our research. We hope our research advances marketing as a practice by closely linking the concerns of researchers and practitioners.

3.4. References

Publications included in the systematic review are denoted with an asterisk.

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3.5. Appendix

Appendix 3-1. Articles included in the systematic review on data-driven innovation capability of marketing, classified by analytical themes, following the "CIMO-logic" approach

	Main Author	Date	Country	**Theme 1 : Role of big data technologies - context (C)**	**Theme 2 : Components of DDIC* of marketing - intervention (I)**	**Theme 3 : Companies' intangible resources - mechanisms (M)**	**Theme 4 : Customer-centric innovation - output (O)**
1	**Papa**	2021	*IT*	-Heterogeneity of internal and external resources -Accelerator of information exchanges: social media	-Capability of developing outside-in information ecosystem -Capability of establishing and managing partnerships -Knowledge management		Open innovation
2	**Akter**	2021	*AU*	-Accelerator of information exchanges: AI**, service BDAC***	-Complementarity IT**** infrastructure/marketers human skills -BDAC		Service innovation
3	**Akter**	2021	*AU*	-Accelerator of information exchanges: platforms			
4	**Rahman**	2020	*IN*		-Knowledge management -BDAC		Service innovation
5	**De Luca**	2020	*UK*	-Heterogeneity: internal and external resources of BD***** analytics	-Ignorance based-view -BDAC -Exploration/Exploitation orientation -Agility		Service innovation
6	**Hajli**	2020	*UK*	-Heterogeneity: internal and external resources of BD analytics	-Capability of developing an information ecosystem -Agility		Service innovation
7	**Johnson**	2019	*USA*	-Heterogeneity: internal and external resources of BD analytics and business intelligence	-Marketers technical capabilities -Marketers managerial skills -BDAC -Collaboration : IT/marketing -IT Infrastructure	-Data-driven culture (technology opportunism) -Top management support	
8	**Cao**	2019	*UK*	-Heterogeneity of BD analytics resources	-BDAC	-Top management support	-Service innovation -ROI-oriented innovation -differentia-tion innovation
9	**Wright**	2019	*UK*	-Accelerator of information exchanges: platforms and clouds	-Complementarity IT infrastructure/marketers human skills -IT Infrastructure		-Value creation -Service innovation -ROI-oriented innovation

10	**Shuradze**	2018	*DE*	-Heterogeneity of BD analytics	-Collaboration: IT/marketing -BDAC -Agility		
11	**Johnson**	2017	*USA*	-Heterogeneity of BD analytics resources	Exploration/Exploitation orientation	-Organisational learning	
12	**Ng**	2017	*UK*	-Accelerator of information exchanges: IoT******			-Co-creation, collaborative innovation (platforms) -Customer experience -Service innovation : differentia-tion
13	**Erevelles**	2016	*USA*		-IT infrastructure -Technical skills -Ignorance-based view		
14	**Li**	2021	*UK*	-Heterogeneity of resources: AI, data plateforms	-Capability of developing an information ecosystem -Capability of establishing and managing partnerships -Knowkedge management		-Service innovation -Co-creation -Customer experience
15	**Xie**	2016	*CN*	-Heterogeneity of resources: data platforms	-Capability of developing an information ecosystem -Capability of establishing and managing partnerships -Knowkedge management		-Co-creation, collaborative innovation
16	**Mu**	2015	*USA*		-Capability of developing an outside-in information ecosystem -Capability of establishing and managing partnerships -Exploration/Exploitation orientation -Capability of engaging with customers		-Value creation
17	**Mikalef**	2020	*NO*		-BDAC	-Data-driven culture (technology opportunism) -Organisational learning	
18	**Trabucchi**	2019	*IT*	-Heterogeneity of resources: data platforms and BD analytics	-Knowledge management		-Value creation -Co-creation
19	**Ghasemaghaei**	2019	*CA*		-BDAC -Capability of developing an outside-in information ecosystem -Exploration/Exploitation orientation	-Organisational learning	-Service innovation -ROI-oriented innovation -Differentia-tion innovation

20	**Zhan**	2017	*UK*		-Capability of developing an information ecosystem -Capability of establishing and managing partnerships -Capability of engaging with customers -Cross-functional teams creation	-Data-driven culture	-Service innovation -ROI-oriented innovation (cost reduction and time-to-market reduction)
21	**Mariani**	2020	*UK*	-Heterogeneity of resources: data platforms	-Capability of developing an information ecosystem -Capability of establishing and managing partnerships -Cross-functional teams creation -BDAC -Technical skills -Managerial skills	-Data-driven culture	
22	**Cao**	2022	*UAE*	Heterogeneity of resources: BD analytics	-BDAC -Knowledge management		
23	**Wei**	2021	*CN*	-Accelerator of exchanges: IoT	-Knowledge management		-Service innovation -ROI-oriented innovation -Differentia-tion innovation
24	**Ashrafi**	2018	*IR*	Heterogeneity of resources: BD analytics	-Knowledge management -Analytical skills -IT infrastructure : flexibility -Information quality assessment -BDAC		
25	**Zhou**	2018	*CN*	Heterogeneity of resources and accelerator of exchanges: social media	-Agility		
26	**Chierici**	2019	*IT*	Heterogeneity of resources and accelerator of exchanges: social media	-Knowledge management -Capability of engaging with customers		-Value creation -Service innovation -ROI-oriented innovation (risks reduction)
27	**Trantopoulos**	2017	*CH*	-Heterogeneity of resources and accelerator of information exchanges: platforms	-Capability of developing an information ecosystem -IT infrastructure -Capability of establishing and managing partnerships -Knowledge mangement		-Value creation
28	**Mikalef**	2019	*NO*	-Heterogeneity of resources: BD analytics	-BDAC -Managerial capabilities -Complementarity IT infrastructure/marketers human skills	-Organisational learning -Data-driven culture -Top management support	
29	**Chatterjee**	2021	*IN*	-Heterogeneity of resources: BD analytics	-Environment scanning capability -Knowledge management	-Data-driven culture -Top management support	

30	**Lehrer**	2018	*CH*	-Heterogeneity of resources: BD analytics	Complementarity IT infrastructure/marketers human skills -BDAC		-Value creation -Value proposition -Service innovation -Personalisa-tion and customer experience
31	**Sultana**	2021	*AU*		Complementarity IT infrastructure/marketers human skills -Agility		
32	**Dubey**	2021	*UK*	-Heterogeneity of resources: BD analytics	-BDAC -Capability of establishing and managing partnerships		
33	**Guptaa**	2016	*USA*	-Heterogeneity of resources: BD analytics	-Managerial skills -Technical skills -IT infrastrcuture -BDAC	-Data-driven culture -Organisational learning	
34	**Aljumah**	2021	*UAE*	-Heterogeneity of resources: BD analytics	-Capability of developing an information ecoystem -Information quality assessment -BDAC		
35	**Duan**	2020	*UK*	-Heterogeneity of resources: BD analytics	-Environment scanning capability	-Data-driven culture	-Value proposition
36	**Zhan**	2018	*UK*	-Heterogeneity of resources: BD analytics	-BDAC -Capability of engaging customers -Capability of establishing and managing partnerships -IT infrastructure	-Data-driven culture	-Co-creation, collaborative innovation
37	**Petrescu**	2022	*USA*	-Accelerator of information exchanges: AI	-Capability of establishing and managing partnerships -IT infrastructure -Knowledge management		-Service innovation -Value creation -Collabora-tive innovation
38	**Jiwat**	2022	*FR*	-Heterogeneity of resources: BD analytics	-Knowledge management -BDAC		-service innovation -Differentia-tion innovation -Co-creation, collaborative innovation
39	**Hänninen**	2018	NO	-Heterogeneity of resources: platforms	-Capability of developing an information ecosystem - Knowledge management		
40	**Pikkarainen**	2022	NO	-Accelerator of information exchange: platforms	-Capability of establishing and managing partnerships	-Organisational learning	-Service innovation -Co-creation
41	**Masrianto**	2022	ID	-Heterogeneity of resources: multiplying IT and digital supports	-Capability of developing an information ecosystem	-Data-driven culture (digital transformation) -Top management support	

42	**Manser Payne**	2021	USA	-Heterogeneity of resources: AI	-Knowkedge management - IT infrastructure -BDAC -Capability of developing an outside-in information ecosystem		-Service innovation -Co-creation
43	**Wamba-Taguimdje**	2020	CM	-Heterogeneity of resources: AI	-Agility -Information quality assessment - Knowledge management		-Personalisa-tion
44	**Moreno**	2020	BR	-Heterogeneity of resources: BD analytics	-Marketers technical capabilities -Marketers managerial skills -Capability of developing an information ecosystem	-Organisational learning	
45	**Lei**	2015	SG	-Heterogeneity of resources: data mining, machine learning	-BDAC -Information quality assessment		-Personalisa-tion -ROI-oriented innovation (decision support system)
46	**Coreynen**	2017	BE	-Accelerator of information exchanges:	-Capability of developing an outside-in information ecosystem: engaging with customers -Analytical skills -Knowledge management -IT infrastructure -Managerial capabilities -Information visualisation		-Service innovation
47	**Peltier**	2020	USA	-Heterogeneity of resources and accelerator of information exchanges : platforms	-Capability of developing an outside-in information ecosystem: engaging with customers, linking with partners		-Service innovation -Value co-creation
48	**Trainor**	2010	USA	-Heterogeneity of resources: e-commerce websites, intranets, extranets, customer relationship management systems, sales force automation	-IT infrastructure -Capability of developing an outside-in information ecosystem: engaging customers	-Data-driven culture -Top management support	

PART 2: EXPLORATORY STUDY

1. **<u>ARTICLE 3</u> - Exploring how to develop data-driven innovation capability of marketing within B2B firms: toward a capability model and process-oriented approach**

1.1. Summary of Article 3

The main author is this article is Ludivine Ravat.
The co-authors are Pr. Aurélie Hemonnet-Goujot and Pr. Sandrine Hollet-Haudebert.

Article 3 follows the connected research objective of exploring the components and underlying processes of DDIC of marketing, by answering the following question:

How to build DDIC of marketing?

Findings revealed an overall process-oriented and dynamic view framework for DDIC of marketing: potential enablers, three-phase capability building, and potential consequences.

The box 3-1. below summarizes highlights and status for Article 3.

HIGHLIGHTS OF ARTICLE 3

- *The paper depicts the data-driven innovation capability of marketing for B2B firms.*
- *It presents a three-phase capability model: ideation, analysis, and deployment.*
- *Each phase is composed of resources, routines, and learning mechanisms.*
- *It also unveils potential enablers and consequences linked to the capability model.*
- *Finally, it offers an overall process-oriented framework.*

CURRENT STATUS OF ARTICLE 3

1. *Article presented at the international academic conference of* ***the Industrial Marketing Management Summit****, Bamberg, Germany, January 19-20, 2023*
2. *Accepted December 2023 and published April 2024 in the* ***Industrial Marketing Management Journal****, ranked 3, AJG 2021*

Box 3-1. Key takeaways from Article 3

1.2. Abstract

The increasing digitalization of innovation activities is reshaping how marketing organizations practice innovation, and, to date, little research has studied the data-driven innovation capability of marketing. Given the essential role played by B2B marketing departments in new product and service development, this paper takes an abductive approach to elucidate how the data-driven innovation capability of marketing can be constructed by identifying its constituent elements and underlying processes. It draws upon the existing literature on digital marketing capabilities applied to innovation and 17 in-depth interviews with B2B managers. The paper proposes a capability model for the data-driven innovation capability of marketing that articulates building blocks according to three major phases: (1) ideation, (2) analysis, and (3) deployment. It reveals the resources and competencies for operationalizing three successive routines to: (1) generate a knowledge ecosystem, (2) disseminate data-driven insights, and (3) design an answer. Each routine is facilitated by three distinct learning mechanisms that (1) capture, (2) articulate, and (3) codify, throughout the innovation phases. Furthermore, potential enablers and consequences are identified to offer an overall process-oriented framework. This study provides valuable guidance to marketing managers by determining the critical resources, routines, and learning mechanisms for engaging in data-driven innovation.

Keywords

Data-driven innovation capability, Digital marketing capabilities, Marketing strategy, Capability model, Dynamic capabilities, Business-to-business firms.

1.3. Introduction

"The road ahead is digital for innovation management, and there is no way back" (Wetzels, 2021). A root cause of this lies in the digitalization of firms (Cooper, 2021) impacting innovation practices in every industrial sector. Digitalization involves the use of digital technology to provide new value-creating and revenue-generating opportunities (Parida et al., 2019). For example, digital technologies like clouds and platforms led Amazon to monetize its data as a strategic innovative product, provided through Amazon Web Services, for its business-to-business (B2B) customers. The company Hilti embeds the Internet of Things (IoT) when creating smart devices for its B2B customers in the construction industry, thus enabling it to customize users' application profiles to improve their operational performance by using the collected data.

Yet, in 2022, 40% of marketing organizations, of which two thirds are B2B, had still not been convinced to have the right systems in place for fully capturing insights to align with their marketing innovation roadmap (The CMO Survey, 2022). Leveraging marketing data remains a challenge, and marketers are in a constant search for tools, methods, resources, and capabilities that may help them to master and modernize their existing technologies to enhance business value. This is particularly so in the innovation field, where it is reported as the number one priority (Salesforce Research, 2022).

Marketing departments play a prominent role in developing data-driven innovation (DDI), which is described as a series of innovation processes that apply techniques (such as big data analytics) and technologies (e.g., machine learning, deep learning, and artificial intelligence) to extract meaningful value from data to generate innovative results (Sultana et al., 2022a). As the interface between the customer and the company (Day & Montgomery, 1999), marketers leverage knowledge-based capabilities, such as analytics, because they are linked to product innovation processes, thus allowing the extraction of meaningful insights to generate critical understanding of customer needs (Chandy et al., 2017).

Surprisingly, despite the evident impact of digitalization on firms' capabilities (Lenka et al., 2017), particularly in the realm of innovation activities, there is limited understanding of what constitutes DMC. These capabilities involve a company's ability to use digital technology-enabled processes to interact with customers and partners in a targeted, measurable, and integrated manner to create new value (McIntyre & Virzi, 2019; Sridhar & Fang, 2019; Wedel & Kannan, 2016). While digital marketing research has made strides in bridging the gap between the digitalization and marketing literature (Kannan & Li, 2017; Lamberton & Stephen, 2016; Yadav & Pavlou, 2014), few studies have investigated the competencies and mechanisms required for developing these capabilities, especially within the B2B context and for innovation purposes. This scarcity is remarkable, as researchers (Kannan & Li, 2017; Moorman & Day, 2016; Parida et al., 2019; Verhoef &

Bijmolt, 2019) and practitioners (Galante et al., 2013; Sayre et al., 2012) have urged scholars to explore the constituent elements of DMC.
Consequently, our research motivation is to unravel the construction process of the data-driven innovation capability (DDIC) of marketing within B2B firms. Despite their valuable contributions, the few empirical studies to address DMC are subject to at least four limitations. First, recent literature has taken a holistic approach to scrutinizing DMC (Herhausen et al., 2020; Homburg & Wielgos, 2022; Wang, 2020), but it has not directly focused on innovation as a specific conceptualization scope. Second, few studies have examined the necessary resources and underlying processes for establishing DDIC (Lenka et al., 2017; Mikalef et al., 2018; Sultana et al., 2022b, 2022a), especially within the industrial context. Third, the research still lacks a thorough understanding of DDIC from a marketing analytics perspective (Cao et al., 2019; De Luca et al., 2021). Lastly, to the best of our knowledge, no study has demonstrated a process orientation in the construction of DDIC of marketing, yet the operational and dynamic nature of marketing capabilities entails a need to understand how they are orchestrated (Morgan et al., 2019) for B2B firms.

Based on these identified B2B research gaps, we propose two research questions:

1. How can a capability model be developed for DDIC of marketing in B2B firms?
2. What resources and processes are required to develop DDIC of marketing?

First, our approach involves reviewing the existing literature on DMC to highlight the aforementioned research gaps and proposing a theoretical capability model to frame the components and underlying mechanisms of DDIC of marketing. We then present our qualitative study, which entails 17 in-depth interviews spanning various sectors. Using an abductive approach that combines interview data with relevant literature and theory on DMC and innovation, we conduct a thematic analysis and present our findings through a capability model encompassing phases, routines, resources, competencies, and learning mechanisms. Finally, we identify potential enablers and consequences, and we integrate them into an overall process-oriented framework to provide a comprehensive understanding of DDIC of marketing. We then present the theoretical and managerial implications before examining the limitations and related avenues for future research.

From a theoretical perspective, this paper contributes to the literature on DMC in the B2B context by developing a capability model showing how marketing organizations can leverage digitalization for innovation. From a managerial perspective, it provides managers with an inventory of the essential routines, resources, competencies, and learning mechanisms needed for the effective implementation of DDIC of marketing.

1.4. Theoretical background

1.4.1. From digital marketing capabilities to data-driven innovation capability

We have identified some valuable contributions to DMC made by B2B marketing research, some of which has endeavored to analyze DMC from the marketing micro-level perspective by either connecting it to the innovation perspective or describing its components (Table 3-1.).

Regarding the connection of DMC with the innovation theme, Cao et al. (2019) note that the use of big data advances the use of marketing analytics, with a resulting positive impact on marketing decision-making and product-development management capability. Johnson (2017) highlights that marketing exploration and exploitation capability[15] are both drivers of big data integration and contribute to new product revenues. Business analytics and information technology (IT) infrastructure are positively associated with marketing's market orientation capability to achieve innovation performance (Ashrafi & Zare Ravasan, 2018), and investing in big data technologies helps marketing departments to have better customer knowledge for developing service innovations (De Luca et al., 2021). Nevertheless, few contributions from the innovation perspective explain the DDIC components and how to mobilize them. One notable study to address those aspects is Mikalef et al.'s (Mikalef et al., 2018) review discussing the components of big data analytics capabilities and their potential for generating business value through innovation.

Some researchers have helped to advance our understanding of the composition of DMC (Herhausen et al., 2020; Lenka et al., 2017; Wang, 2020). We note in particular Herausen et al.'s (2020) depiction of the four main categories of competencies related to DMC: channels, social media, digital relationships, and digital technologies, and Lenka et al.'s (2017) detailing of the three underlying subcomponents of digitalization capabilities, namely intelligence capability, connection capability, and analytic capability.

Some recent literature has also explored the specific components of DDIC and propounded a theoretical perspective on this concept (Sultana et al., 2022a, 2022b). Those authors define DDIC as the managerial, technological, and personnel capabilities that are required to achieve DDI. They suggest market orientation, talents, and IT infrastructure capabilities as antecedents of DDIC, which they further suggest contributes

[15] Exploration can be defined as an organizational emphasis on introducing new product development competencies for value creation, whereas exploitation attitude reflects an organizational emphasis on deploying incremental existing product competencies for value creation (Mu, 2015)

to market performance through market agility (Sultana et al., 2022a). Surprisingly, although they open a fertile area for research, those papers depict firm-level capabilities, not marketing-level resources and capabilities.

More importantly, those studies all lack an explanation of the capability-building process perspective, i.e., procedures, methods, or construction steps, and of how resources can be orchestrated and structured toward building capability (Sirmon et al., 2011). Consequently, we took a first theoretical step toward bridging this gap and enhancing our understanding of the processual aspect of DDIC of marketing. We achieved this by conducting a comprehensive literature review focused on DDIC of marketing (see Table 3-1.). We focused on the micro level of marketing capability construction and introduced a process-oriented approach for DDIC of marketing. Furthermore, we described its components, categorized into three steps, and presented our findings in a conceptual framework (Figure 3-1.). To the best of our knowledge, this systematic literature review represents the first theoretical examination of a process-oriented approach for DDIC of marketing. Therefore, our use of these results provides a first theoretical foundation and guide for executing the qualitative content analysis in our empirical study.

Table 3-1. Overview of relevant research on digital marketing capabilities

Authors (year)	**Scope of conceptualization of DMC**[a]				**Research methodology**
	Connected to innovation theme	Resources and capabilities description	Marketing department micro-level analysis	Process-oriented capability-building approach	Type
Ashrafi & Zare Ravasan (2018)	✓[b]	___[c]	___	___	Empirical
Authors (2023)	✓	✓	✓	✓	Theoretical
Cao et al. (2019)	✓	___	✓	___	Empirical
De Luca et al. (2021)	✓	___	✓	___	Empirical
Herhausen et al. (2020)	___	✓	✓	___	Theoretical and empirical
Homburg & Wielgos (2022)	___	___	✓	___	Empirical
Johnson et al. (2017)	✓	___	___	___	Empirical
Lenka et al. (2017)	___	✓	___	___	Empirical
Mikalef et al. (2018)	✓	✓	___	___	Theoretical
Sultana et al. (2022a)	✓	✓	___	___	Empirical
Sultana et al. (2022b)	✓	✓	___	___	Theoretical
Wang (2020)	___	✓	✓	___	Empirical
This study	✓	✓	✓	✓	Empirical

[a] DMC: Digital marketing capabilities; [b] ✓: Included in the study; [c] ___: Not included in the study

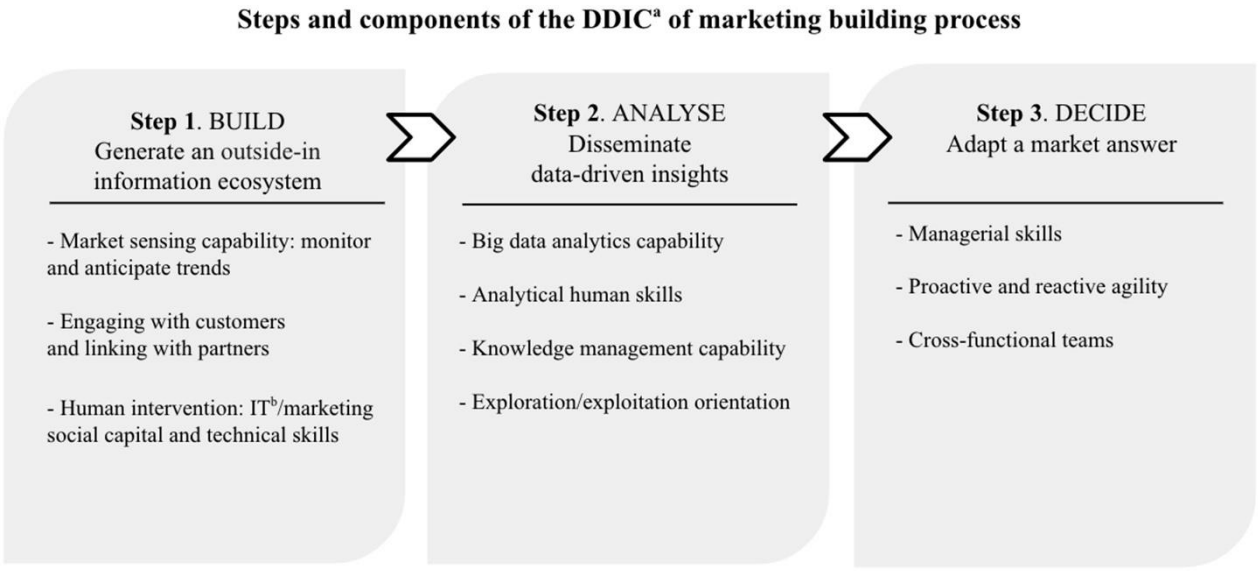


Figure 3-1. Conceptual framework of DDIC of marketing: Steps and components of the building process (Extracted from the systematic literature review on DDIC of marketing from Authors, 2023)

In the following subsection, we complement the above existing research by providing a suggested theoretical capability model that serves as our study's second theoretical pillar for framing our qualitative findings on DDIC of marketing.

1.4.2. A suggested theoretical capability model for conceptualizing DDIC of marketing

To better understand the component articulation derived from our qualitative content analysis and to enhance our comprehension of the process aspect behind DDIC of marketing, we adopted Zollo and Winter's capability model (Zollo & Winter, 2002). Following Grant (1996), Makadok (2001), Thomke and Kuemmerle (2002), and the principles of resource-based theory (RBT) (Barney, 1991), an innovation capability can be defined as a higher-order resource which is difficult to obtain or imitate and has the potential to enhance new products and services development performance (Heimeriks & Duysters, 2007). Specifically, it refers to a company's ability to acquire and assimilate new knowledge then transform it into innovative products or services (Weber & Heidenreich, 2018). Marketing organizations, as the functional link between firms and their markets (Griffin et al., 2013), employ market-based innovation capabilities which involve market-intelligence generation, dissemination, and response (Jaworski & Kohli, 1993).

Therefore, the construction of DDIC of marketing results from a combination of mechanisms involving the accumulation of market knowledge and deliberate investments to activate its articulation and codification (March, 1991; Zollo & Winter, 2002). These

learning mechanisms interact with specific actions within the DDI marketing task. DDIC of marketing can be viewed as a dynamic capability representing a learned and stable pattern of collective marketing innovation activities through which a marketing department systematically generates and modifies its operational routines to enhance effectiveness and adapt to a rapidly changing environment (Teece et al., 1997; Zollo & Winter, 2002). With the advent of digitalization, marketing has gradually shifted its innovation tasks toward data-driven operational routines. This shift requires the department to develop through organizational learning a set of systematic skills and methods to perform DDI.

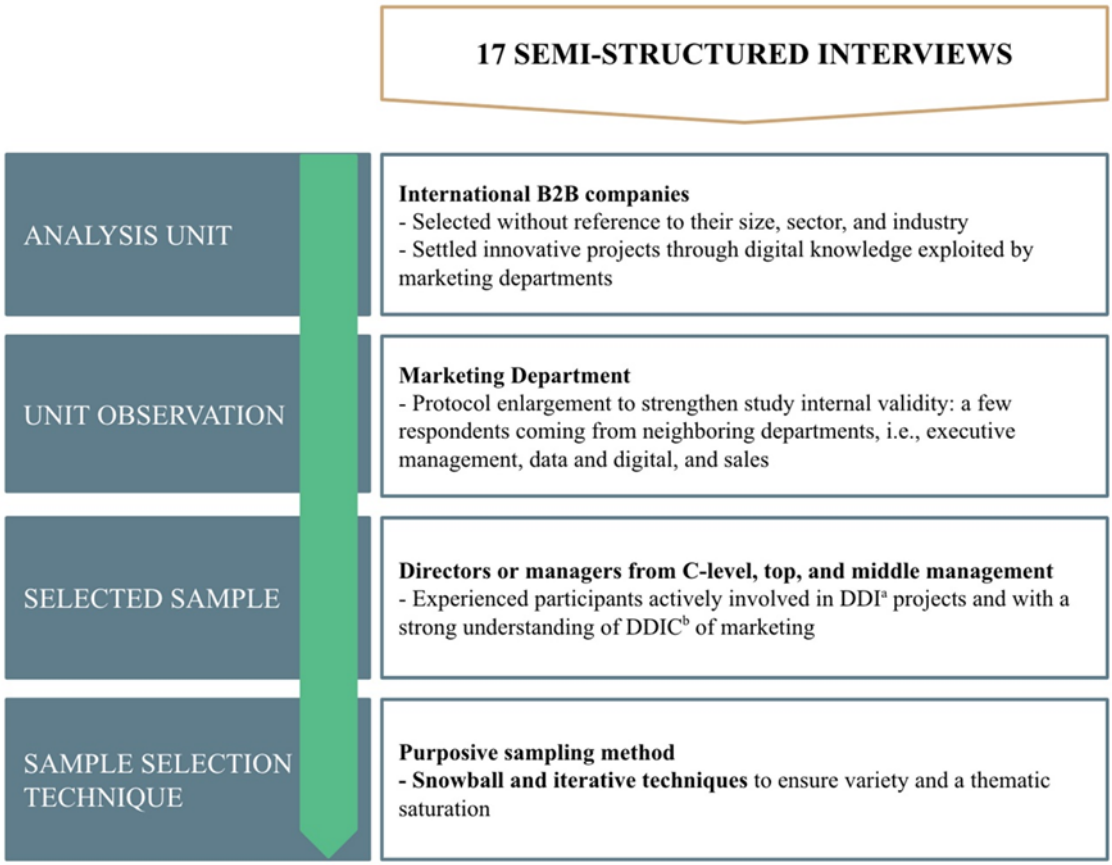
Based on this second theoretical foundation, we propose a multidimensional capability model that describes the intentional process of a marketing department modifying its existing innovation marketing routines to address the new open and dynamic digitalized paradigm (Hagberg et al., 2016). This is achieved through deliberate learning mechanisms (Eggers & Kaplan, 2013; Knott et al., 2014). We disclose routines gathered in a tightly coupled system of intertwined sets of marketing organizational knowledge, resources, and competencies (Leonard-Barton, 1992) which are identified and sequenced in three phases in our model, i.e., (1) ideation, (2) analysis, and (3) deployment.

1.5. Methodology

1.5.1. Research settings and sample selection

Innovation and capabilities topics are gaining the attention of researchers in qualitative marketing management research aimed at theory elaboration (Lindgreen et al., 2021). We opted for qualitative research as the suitable methodology and conducted 17 semi-structured interviews with experienced managers to: (1) evaluate capabilities and resources inventory of DDIC of marketing, (2) assess the predesigned process-oriented model, and (3) adjust, complete, and refine our framework. For this purpose, we suggested an approach based on “systematic combining” grounded in an abductive logic (Dubois & Gadde, 2002). The method consists in a continuous matching between theory and reality for theory elaboration, extension, and refinement. We therefore cross-fertilized the fieldwork and theoretical work by matching our in-depth interview insights with our preconceptions analytical framework and theoretical background on DDIC of marketing.

We defined our sample according to similar characteristics to represent our population and to increase our research reliability and replicability (Gephart Jr, 2004). Figure 3-2. outlines the sample selection process detailed below.



[a] DDI: Data-driven innovation capability; [b] DDIC: Data-driven innovation capability

Figure 3-2. Sample selection process for DDIC of marketing

The chosen unit of analysis was B2B companies that engaged in innovative projects through digital knowledge exploited by their marketing departments. We selected 15 companies from France, USA, Germany, and Japan, without reference to their size, type of offer, and sector, to avoid any discriminatory nature and advance the transferability and generalizability of our results. The observation unit was mainly anchored in marketing departments to be consistent with our research question, and it was enlarged for a few cases to neighboring departments, namely executive management, data and digital, and sales, to strengthen the internal validity of our work.

We selected knowledgeable and experienced interviewees actively involved in DDI projects so that they could describe multifaceted perspectives of DDIC of marketing and allow comparability across firms. Therefore, we sought to interview C-level, top, and middle management level respondents. We ensured that they had extensive understanding of DDIC of marketing. For example, one respondent has strong expertise in establishing DDI projects, is a recognized speaker at practitioner conferences, and regularly consulted on DDI issues. Finally, based on a purposive sampling method, we used both snowball and iterative techniques (Arsel, 2017; Demlehner et al., 2021) to select our participants, and the sample size was adequate to ensure variety and a thematic saturation (Akter et al., 2021; Guest et al., 2006; Kuzel, 1992).
Table 3-2. summarizes our sample characteristics.

Table 3-2. Qualitative research sample characteristics

Respondent	Type of company	Job title	Sector	Industry	Country	DDIC potential innovation type[i]
1	MNC[a]	Senior director, international marketing	Goods	Medical equipment manufacturing	USA	Product
2	SME/SMI[b]	Commercial director	Services	Marketing services and consulting	France[g]	Service
3	VSB[c]	CEO	Services	Training	France	Service
4	SME/SMI	Data analytics director	Goods	Tourism	France	Service
5	MNC	Marketing product manager	Goods	Tourism	France	Product-as-a-service
6	SME/SMI	E-marketing and communication director	Services	Marketing services and consulting	France[g]	Service
7	MNC	E-commerce director	Goods	Cosmetics	France	Product
8	MNC	Marketing director	Goods	Energy	France	Product-as-a-service
9	MNC	Chief planning officer	Goods	Automotive	Japan	Product-as-a-service
10	VSB	Marketing, data, and CRM[d] expert	Services	Marketing services and consulting	France	Data monetization offer
11	MNC	Head of data	Services	IT[f], digital services, and consulting	France	Data monetization offer
12	MNC	SME/SMI EMEA[e] vice president	Services	Sofware and Internet solutions	France	Service
13	MNC	Senior director product marketing	Goods	Semiconductors	Germany[h]	Solution approach
14	MNC	Head of product marketing	Goods	Semiconductors	Germany[h]	Solution approach
15	SME/SMI	Marketing and Commercial director	Goods	Environment	France	Solution approach
16	MNC	Vice president customer experience and CRM	Goods	Electrical and electronic appliances manufacturing	France	Product-as-a-service
17	MNC	France marketing director	Goods	Cosmetics	France	Product

[a] MNC: Multinational company; [b] SME/SMI: Small and medium enterprise / small and medium industry; [c] VSB: Very small business; [d] CRM: Customer relationship management; [e] EMEA: Europe, Middle East, Asia; [f] IT: Information technology; [g] France: respondents from the same company; [h] Germany: respondents from the same company; [i] DDIC potential innovation type: refers to innovation types identified in our study, see subsection 4.5

1.5.2. Data collection and analysis

We conducted 17 semi-structured interviews via video conference. They lasted from 43 to 96 minutes each, and they yielded a corpus of 508 pages and 210,374 words. The interviews used a question guide to analyze complex phenomena and enable the emergence of unexpected issues (Tuli et al., 2007). Open-ended questions covered topics related to: (1) the context and objectives of using digital information material in marketing department for innovation activities, (2) resources, capabilities, and processes for building DDIC of marketing, (3) obstacles and challenges in building DDIC of marketing, and (4) adjustments or renewal of marketing organization procedures or mechanisms for DDIC of marketing development. To avoid biasing respondents, the themes were not systematically presented in a particular order. To ensure the face validity of our data, we sought input from experts in digital and B2B marketing for the themes addressed in our interview guide to verify that the terminology employed in the descriptions was easily comprehensible from a managerial perspective. We also conducted iterative reviews during data collection and analysis by, for example, inviting respondents to provide hierarchical information about the essential and secondary resources and the competencies required for a DDI project. Finally, participant feedback and the researchers' reflections led to adjustments for improved question clarity and research elements.

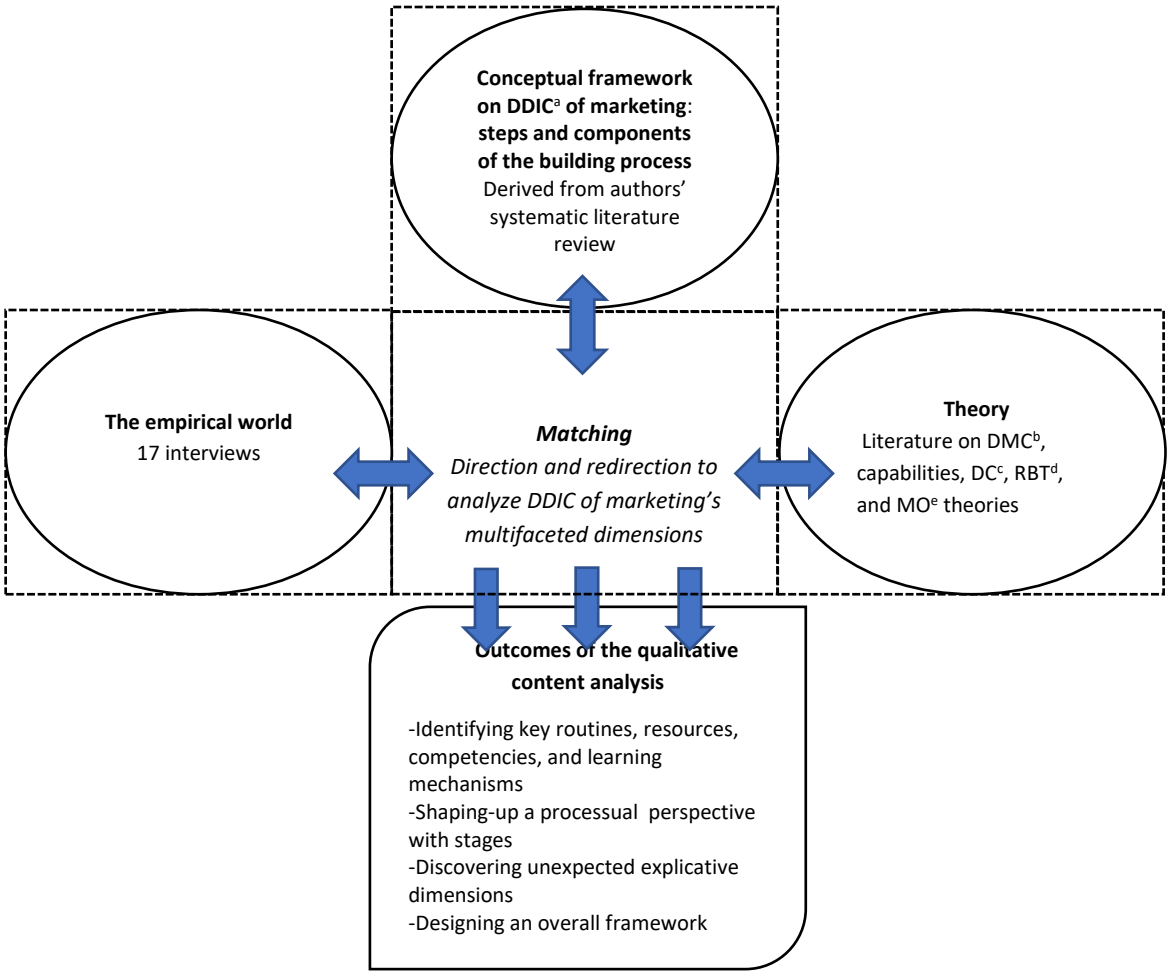
Interviews were structured into four parts: introduction, centering, deepening, and conclusion (Grawitz, 2000). The introduction covered researcher details, study objectives, and interview time span and themes, with participants given the opportunity to introduce themselves. During the centering phase, we ensured respondent relevance through storytelling questions like, "Tell us about a product or service launch based on digitalized data used by the marketing department?" In the deepening phase, we delved deeper into the various facets of DDIC of marketing by seeking respondents' examples and using follow-up questions. Finally, in the conclusion phase, we expressed gratitude and encouraged additional insights from interviewees into DDIC of marketing to cover unexpected areas of inquiry.

We recorded and used word processing to transcribe each interview. For our thematic analysis, we used NVivo software, which is commonly used in management and organization studies (Dougherty & Bowman, 1995).

We followed abductive research principles in our analysis by exploiting the systematic nature of existing theoretical models to iteratively refine our conceptualizations and research framework as we encountered unexpected findings (Dubois & Gadde, 2002). Our analysis was aimed at enhancing our understanding of DMC in the context of innovation by advancing theory elaboration on DDIC of marketing. We confronted our empirical findings with theories from the DMC, innovation, and organizational literature, using our

initial DDIC framework (Figure 3-1.) as a guide for classifying and interpreting the data. Following Miles and Huberman's coding approach (1994), the lead researcher thoroughly reviewed the interviews to extract insights related to DDIC of marketing building and processing. These insights were categorized in our deductive framework, and we added inductive codes emerging from our materials as needed. The data were continually sorted and refined during the analysis, with the results compared among researchers using differentiation, abstraction, and dimensionalization methods. To ensure the trustworthiness of our findings, we followed Tuli et al.'s (2007) suggestions. We checked whether: (1) the quoted notions were applicable beyond specific contexts, (2) multiple participants mentioned them, and (3) they provided interesting and useful conclusions beyond the obvious. The redundancy of information indicated the saturation of our results (Charmaz, 2006) and supported the validity of our findings.

Appendix 1-1. contains our codebook structure, and Figure 3-3. outlines the analysis process and results through abstraction.



[a] DDIC: Data-driven innovation capability; [b] DMC: Digital marketing capabilities; [c] DC: Dynamic capabilities; [d] RBT: Resource-based theory; [e] MO: Market orientation

Figure 3-3. An abductive approach for a results generation and processual perspective analysis of DDIC of marketing (Adapted from Dubois & Gadde, 2002)

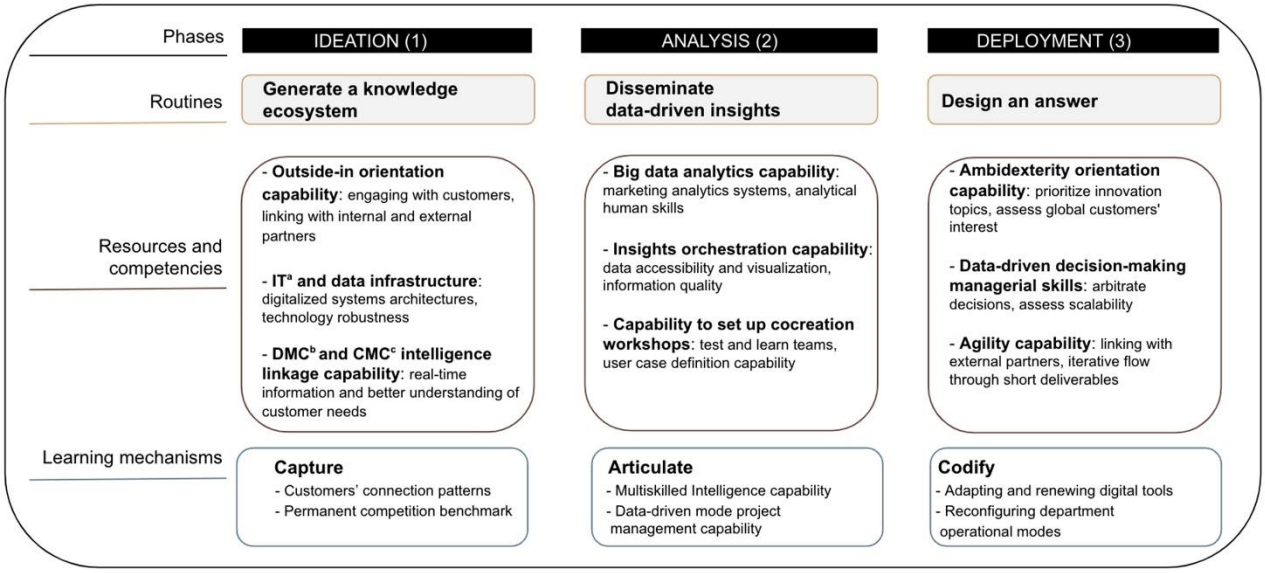
The following section outlines our findings about DDIC of marketing in two successive frameworks (Meyer et al., 2013), a capability model (Figure 4), and overall process-oriented framework (Figure 6), as illustrated by corpus verbatim reporting (Martin & Eisenhardt, 2010).

1.6. Findings

The findings indicate that DDIC of marketing is a strategic competency for B2B firms. Industrials install digital systems and processes to understand what is in the minds of end customers. By capturing current and future needs information, these systems and processes are aimed at developing more customer-centric operations to provide innovative solutions that fit end-consumer expectations, thus progressively transforming the company's value chain approach by shifting from a B2B to a business-to-business-to-consumer (B2B2C) perspective. This new mindset is a common and recurrent theme for every manager, as expounded here:

> In fact, you realize that more and more the applications are much more complex and, in fact, often we forgot to pose a very simple question to the end customer, not to the direct customer […] "What's the problem, you know, what's the problem statement?" […] to develop a product and, in fact, you will go from an aspect, how, inside-out to an outside-in view aspect […] By always having in mind what we call customer centricity, that in fact in the corner of your head when you develop your product, when you organize, when you reorganize your marketing department […] And, with actually these data collections of putting the customer really in the middle of everything. (13, Senior director product marketing)

Figure 3-4. presents our results. First, we describe the necessary building blocks by identifying key resources and capabilities, and we insert the relationships between them into a capability model composed of three major phases: (1) ideation, (2) analysis, and (3) deployment. These phases include three successive routines that marketing departments undertake: (1) generate a knowledge ecosystem, (2) disseminate data-driven insights, and (3) design an answer. These routines are performed by three respective learning mechanisms: (1) capture, (2) articulate, and (3) codify. Second, our interviews reveal unexpected dimensions of (1) potential enablers and (2) potential consequences of DDIC of marketing. We added them to the above-described capability model to offer an overall process-oriented framework (Figure 3-6.).



a IT: Information technology; b DMC: Digital marketing capabilities; c CMC: Classical marketing capabilities

Figure 3-4. A capability model for DDIC of marketing: Phases, routines, resources, competencies, and learning mechanisms

To enhance our understanding of the variations within our cross-sectional dataset and to better comprehend how we integrated the processual aspect into our model, we devised a frequency-based ranking of occurrences (Table 3-3.). We highlight below the significant resources identified for executing routines and learning mechanisms in each construction phase.

Table 3-3. Resources and competencies for routines and learning mechanisms, ranked by occurrence frequency

Phase 1 – Ideation		
Resources and competencies for routine "generate a knowledge ecosystem"	Engaging with customers	49
	Linking with external partners	47
	Linking with internal departments	27
	IT[a] & data infrastructure creation capability	21
	Industry digitalization maturity	21
	DMC[b] & CMC[c] intelligence linkage capability	18
	Technology robustness	17
	Outside-in orientation capability	15
	TOTAL	**215**
Phase 2 – Analysis		
Resources and competencies for routine "disseminate data-driven insights"	Data accessibility and visualization	49
	Big data analytics capability	33
	Capability to set up cocreation workshops	28
	Insights orchestration capability	22
	Test and learn pilot teams	18
	Information quality	16
	User case definition capability	14
	TOTAL	**180**
Phase 3 – Deployment		
Resources and competencies for routine "design an answer"	Ambidexterity orientation capability	44
	Data-driven decision-making managerial skills	40
	Agility capability	28
	Assess scalability	16
	TOTAL	**128**
Learning mechanism – Capture		
Resources and competencies	Market sensing	41
	Customers' connection patterns	12
	Ignorance-based view	5
	Permanent competition benchmark	5
	TOTAL	**63**
Learning mechanism – Articulate		
Resources and competencies	Data-driven mode project management capability	42
	Multiskilled intelligence capability	18
	TOTAL	**60**
Learning mechanism – Codify		
Resources and competencies	Adapting & renewing digital tools	44
	Reconfiguring department operational modes	21
	TOTAL	**65**

[a] IT: Information technology; [b] DMC: Digital marketing capabilities; [c] CMC: Classical marketing capabilities

Initially, the ideation phase (1) is pivotal for B2B marketing departments in DDIC development, followed closely by the analysis phase (2), with the deployment phase (3) next.

In the *ideation phase*, it is crucial for companies in all sectors to acquire the skills for looking outside for knowledge generation. These skills, such as engaging with customers or collaborating with external partners, serve as the foundation for establishing DDIC according to every respondent. Without an external ecosystem approach, the development of DDIC is inevitably questioned.

In the *analysis phase*, companies emphasize the need for data to be easily accessible, visualizable, and quickly interpretable. Data accessibility is a common challenge in establishing DDIC, regardless of the company's sector or size. Across multinational corporations, small and medium enterprises, and very small businesses, the development of big data analytics capability is also a fundamental requirement.

The *deployment phase* appears to be of lesser importance to B2B marketing departments, with 40% fewer occurrences than the ideation phase (1). This can be attributed to the emerging nature of DDI in B2B companies, which prioritize creating knowledge ecosystems over translating insights into inputs for DDI projects. It is critical to highlight that agility is a necessary skill at this stage, especially for multinational companies in the goods sector. The traditional new product development process, with its slower pace, may cause DDI projects to lag if a multinational company does not possess this agility competence.

In addition, the importance of each group of learning mechanisms seems similar when building DDIC of marketing, as indicated by their total occurrences. The most crucial learning mechanism falls under the *codify* category, specifically "adapting and renewing digital tools." It was mentioned in 15 of the 17 cases, thus highlighting the significance of continually updating digital tools as technology evolves to codify market information. Conversely, the least requested learning mechanism is in the capture category, which involves "competition benchmarking." This might be because companies are increasingly customer centric in their innovation efforts, as they prioritize customer needs and experiences over imitating competitors for efficiency.

Subsections 1.6.1 to 1.3.5 present our results in detail.

1.6.1. Ideation phase (1): Generate a knowledge ecosystem

Our data reveal that DDIC of marketing construction begins with the ideation phase. Here, the primary marketing objective is to establish a *knowledge ecosystem*, involving the acquisition, storage, and processing of digitalized business environment information (e.g., competitors, customers, and technologies) for innovation purposes. This encompasses three subdimensions: an *outside-in orientation*, *IT and data infrastructure*, and *classical and digital marketing intelligence linkage capabilities*.

The *outside-in orientation capability* involves *engaging with customers* to gather market information and *linking with external partners, internal departments, and company subsidiaries* to acquire market-based information. The respondents emphasized how important it is to *engage with customers* to understand their needs. This may be deeply ingrained in the company's mindset, as observed in the cosmetics industry:

> So, at X company, which is its strength at the beginning, it's first a customer-centric mindset, that means that it's already in the DNA to listen to the customers. But when I say listening, I mean that it was very simple, but it was reports that came in every week that our founder originally read. (17, France marketing director)

To establish a knowledge-based assets digital system, marketing departments sometimes extend relationships with *internal departments*, like IT, data, and digital, which possess the hardware competencies, or develop *links with external companies*, because the *digitalization level* of industrials can lack of maturity, as data-driven practices are still new in the B2B context. An interviewee commented on this aspect:

> Depending on the maturity, concerning the size and the organization of the company, […] it is the options in terms of organization that are not quite the same […] So, here we are, this is it, this strong, very specialized skill in data exploitation and analysis can be very easily outsourced, especially at the beginning because we don't have the means, the maturity, the culture for all that. (10, Marketing, data, and customer relationship management expert)

IT and data infrastructure refers to the *digitalized systems architectures*, platforms, and application programming interfaces that marketing organizations develop to generate a market-knowledge information ecosystem. It can be dematerialized by clouds or externally operated in software-as-a-service (SaaS) to gain flexibility and modularity for the information system. The interviewees emphasized the importance of opting for *technology robustness* to build marketing intelligence ecosystem:

> The choice of robust technology is important, that is when you take a Y Software techno, it is robust. You are more likely to succeed than if you take a techno that is not going to be up to the task. […] if you don't have a robust data model, that is to say, an object model, an account object,

> an opportunity object, […] an object of lead […] this core model, it must be well modeled. (16, Managing director)

Classical and digital marketing intelligence linkage capabilities are pointed out and commented on as a necessity when seeking *to triangulate digital information and classical information*, like surveys or panels, to have a better understanding of product or service use by the end consumer, particularly by increasing the amount of *information available in real time*, as practiced in the automotive industry:

> The objective is to try to understand better. I think, quite simply, to have access to, first of all, to cross different information from different origins […] Today, we can, little by little, have information, first of all on the real use of cars through, the connected car, the IoT […] Because indeed the big problem of surveys is the rhythm is not good, the rhythm is very slow. The internet has a more immediate side, so in fact we were looking to accelerate the vision of things and to have things that are much more dynamic. (9, Chief planning officer)

1.6.2. Analysis phase (2): Disseminate data-driven insights

The *analysis phase* involves a routine of *data-driven insights dissemination*, with the insights extracted from the knowledge ecosystem, to support the innovation roadmap. This aligns with the marketing role of evaluating the market potential of new product ideas, through a process the literature often refers to as new product development. All the interviewees demonstrated how marketers interpret data to obtain informative insights for innovation projects. The study identifies three related subcapabilities: *big data analytics capability, insights orchestration capability,* and *capability to set up cocreation workshops.*

The first critical task is establishing *big data analytics capability*, as highlighted by nearly all the interviewees. It forms the foundation for processing gathered information and selecting the most relevant for innovation purposes. Companies implement *marketing analytics* systems and require data experts with strong analytical skills, as exemplified here:

> I have a team of experts. The first thing is to make sure that we collect data from all the sites in France. The second role is to analyze this data. That's really key. You must have the right skills and the right reading of the figures. It's important. There are a lot of subjects around data, having the right teams in front of you with the right skills […] knowing how to rely on the right people and the right talents who know how to dig.
> (7, E-commerce director)

The second task is *orchestrating the insights*. The interviewees explained this activity by comparing it to a *funnel system*. First, they question which insights from the information ecosystem are sufficiently valid and qualitative to be incorporated into the innovation circuit. Second, they narrow the perspective by questioning which of those insights can drive business value. Two ingredients are necessary: *data accessibility* and *visualization* and *information quality*. For instance, the degree of *information quality* must be sufficiently reliable to ensure valid support for a data-driven process:

> In fact, we have many sources of data. What is important is to validate the quality of the data upstream. For example, we don't integrate private connected station networks by default. We only integrate them if these networks are subject to regular maintenance. And that the quality of this data is regularly monitored, that's on. We are in big data, on the notion of the veracity of the data. (15, Marketing and commercial director)

The final task involves the *capability to set up cocreation workshops* to leverage market-based insights and develop innovative solutions for customers. These workshops, led by marketing departments, can include both internal and external teams and customers. While cocreation workshops are common in the business-to-consumer (B2C) environment, they reflect the emerging customer-centric mindset in the industrial sector. Managers identify two aspects: *test and learn teams* and *user case definition capability*. *Test and learn teams* are pioneers in adopting new technologies and work processes to foster a data-driven approach to innovation management. *User case definition capability*, which is a concept borrowed from the software industry, involves studying interactions between end customers and their product or service usage. This information is structured to create potential solutions:

> We're called upon, and that's very good, for the customer journey, precisely for the marketing part of the job, that is to say, what is the journey, what are the personas, what are the uses, what are the practices? So, we are in charge of bridging the gap between the customer, the user, and the developer to create what we call user stories. (8, Marketing director).

1.6.3. Deployment phase (3): Design an answer

In the *deployment phase*, marketers focus on *designing an answer* based on the disseminated data-driven insights. The interviewees emphasized three crucial capabilities: *ambidexterity orientation capability, data-driven decision-making managerial skills,* and *agility.*

Ambidexterity orientation capability is the ability to use the current digitalized information both to exploit the current return and explore it to gain future returns *and to assess global customers' interest* in innovation alternatives. DDIC of marketing can particularly assist marketers in *prioritizing innovation topics* such as offering launches by quantifying the potential return on investment:

> So, there you have it. So, in fact, if you want in our organizations, we are on a kind of vision that increments over time. That is to say that you have both. You do permanent monitoring, and you always have a view at two, three years, and a view at five, six years. Finally, we are in a temporal depth, and we are going to pick up as we go along the operations that we do, the data that we have […] We don't project much more than that, because we know that it's not necessarily useful except for big changes today when we are saying we are going to the electric car. (9, Chief planning officer)

Most of the respondents stressed the importance of *data-driven decision-making managerial skills* in innovation management to *arbitrate decisions* of specific topics and *assess scalability* of projects. Based on their data-driven insights support, the marketing department, mostly referred to as the "business team," is a pivotal function responsible for deciding what the best innovation options are that will respect budget specifications and ensure rapid potential profitability:

> So, there was a prioritization meeting yesterday, and it was us, so the business team, the marketing team with who we could call a business analyst. […] it was to define what we want as a minimum in this because it is a minimum viable product (MVP), this first version. To stay within the budget, the schedule, and the development budget, and so it was the prioritization of features. And that's up to the marketing team. (8, Marketing director)

Lastly, *agility*, drawn from the software industry's innovation management, refers to a company's efficiency in utilizing its resources and knowledge to address opportunities like market changes, evolving customer demands, and new technologies. This agility centers on two principles: *linking with partnerships* with external entities to enhance flexibility in innovation projects, and employing *iterative processes with short deliverables*, such as developing a MVP using the design-thinking method. While common in innovation management, this practice is relatively new for B2B companies and disrupts traditional silos and gate-based product development, thus reducing the risk of late market entry. An interviewee from the marketing services sector described the iterative B2B innovation process:

> […] we work in an iterative mode and quickly release a first MVP. […] unlike companies that potentially work in what is called V-cycle in their development mode, that is to say, basically, I design the product, I write a specification that is tens and hundreds of pages long. I deliver it to the technical department, and I see it, and it happens. And in the meantime, the market has evolved, my product may already be obsolete. In fact, we try to have fairly short cycles in our implementation, from the moment we design the product from start to finish, […] it can be quite fast on the first versions of a new solution and to be able afterwards, because we confirm it with the market, to make it evolve quickly. (6, E-marketing and communication director)

1.6.4. Learning mechanisms of DDIC of marketing

This study reveals a nonlinear and evolving process in constructing DDIC of marketing. It emphasizes the integration of learning mechanisms at each stage, thus enabling marketers to execute them effectively. These mechanisms are dynamic in that they allow for the adaptation of resources and capabilities in response to marketplace changes. They enable quick responses due to their strong integration, reconfiguration, and skill-building capabilities. These learning mechanisms manifest as techniques, tools, and competencies, as described below.

The first learning mechanism is *capture*, which aids in the initial phase of knowledge system generation. It involves establishing *customers' connection patterns* and maintaining a *competitive benchmark*. Companies employ digital methods to continuously monitor the market and identify opportunities:

> […] a fairly innovative solution, which was a SaaS, to give a solution to salespeople. It allowed salespeople to have all the information on a customer prospect, or someone else in the company as well. So, there was a link between the prospect and the salesperson, who didn't necessarily know the customer, so we systematized the information, we centralized the prospect and customer information, and we gave it to all the salespeople who, all of a sudden, had something that could be used, whereas before it was so fragmented that it wasn't usable. (12, SME/SMI EMEA vice president)

The second learning mechanism, *articulate*, contributes to the successful achievement of the second step, to disseminate data-driven insights, by continuously mobilizing human competencies to address the identified opportunities. The study shows how marketers develop a *data-driven mode project management capability* and how they operationalize *multiskilled intelligence capability*, thus blurring the marketing functional perimeter, to articulate insights and bring success in the analysis phase:

> This frontier between marketing, digital, and sales is falling because, today, when you set up a website, the goal is to do business. When we launch campaigns for social networks, the goal is to build business behind it. And when we set up a campaign, the goal is also what? It's to analyze the data to see how the offer we launched is perceived and then to see the return on investment. So, for me, this borderline tends to be limited to the maximum. (3, CEO)

The third learning mechanism, *codify*, is identified by respondents as continued renewal of the marketing organization to ensure dynamic alignment with market developments. To permanently codify knowledge, marketers *adapt and renew digital tools* and upgrade their *operational modes*, thus allowing them to face market turbulence and continue to capture market share:

So, I would say definitely, yes, evolution is, it's a need as well, a need that has been more in demand in a crisis context because of COVID-19, in relation to the lack of staff, in relation to the lack of employees in different countries, then to have digital tools that really save time. So, to meet that demand so that we don't lose market share, we must innovate, and that's where that data is, […] we have to put them to music so that we can always keep the link and keep the business. (5, Marketing product manager)

1.6.5. Potential enablers and consequences of DDIC of marketing

Our abductive approach uncovered two unexpected dimensions explaining DDIC of marketing: *potential enablers* and *potential consequences*. The most relevant dimensions are discussed below, while the rest are detailed in Appendix 1-2..

Firstly, *potential enablers* are organizational resources that can impact the implementation of DDIC of marketing. Interviewees viewed them as catalyzers or facilitators. Two types of enablers were examined: *digital orientation* and *top management sponsorship*. *Digital orientation* reflects how B2B companies strategically adopt advanced digital technologies, qualified as *technology opportunism*, to capture value. This fosters a new *data-driven culture* used to promote customer-centric innovation offerings, as emphasized by an interviewee:

The most mature companies will become data centric, neither product centric nor customer centric. This is the basis for being product centric or customer centric, as it is important to become data centric today. (11, Head of data)

Secondly, the analysis of interviews revealed three key potential consequences: *customer outcomes*, *firm outcomes*, and *innovation types*. The occurrences highlight the significance of implementing DDIC of marketing from both the company's and customer's perspective.

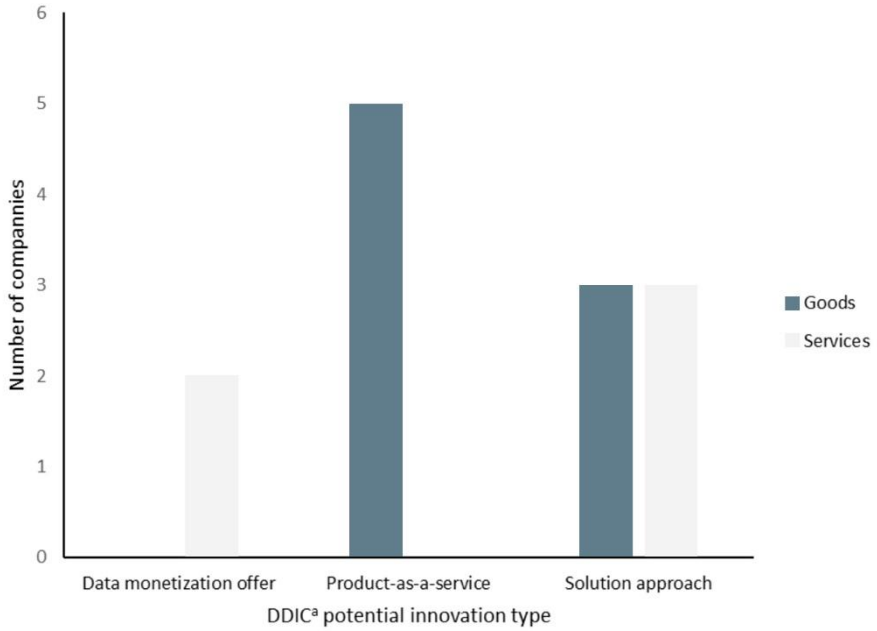
The first perspective, *customer outcomes*, relates to the new value propositions companies can offer. Interviewees discussed how their customer-centric approach strengthened *economic* and *functional value* for customers by providing *personalized offers* and enhancing usefulness, value, and appropriateness:

We have approached all our clients through this prism, so tell us what your problems are. […] we'll start with the most obvious things, the most valuable for you […] I'm going to mix all this up, knowing exactly what the costs of the different solutions available on the market are, but to offer what corresponds to an expectation and at the right price. […] you want homogeneous data everywhere so that the models respond in the same way everywhere […] because that's what the cooperative must provide to its members. (16, Marketing and commercial director)

The second perspective, *firm outcomes*, is anchored in sales increasingly derived from DDIC of marketing implementation. Three notions are connected to this: *better operational performance*, *time-to-market reduction*, and *fine-tune segmentation*. Almost all the managers emphasized *time-to-market reduction* as a major consequence derived from DDIC of marketing, as noted below:

> So, from the moment we were able to optimize the development so that it doesn't last not five years but that we use two, three years. So, for that, we have a lot of reuse of technologies that were made, we introduced novelty and innovation in relation […] that requires a little bit of development, but the goal was in fact that every three months, every quarter, we release three new products […] We also reused the same types of boxes that were used, that were there precisely for time-to-market issues. (14, Head of product marketing)

The third perspective, *innovation types*, evokes two subdimensions, *servitization* and *solution approach*, derived from DDIC of marketing. We present an overview of these potential innovation types derived from DDIC of marketing—classified by sector—identified during interviews (Figure 3-5.).



[a] DDIC: Data-driven innovation capability

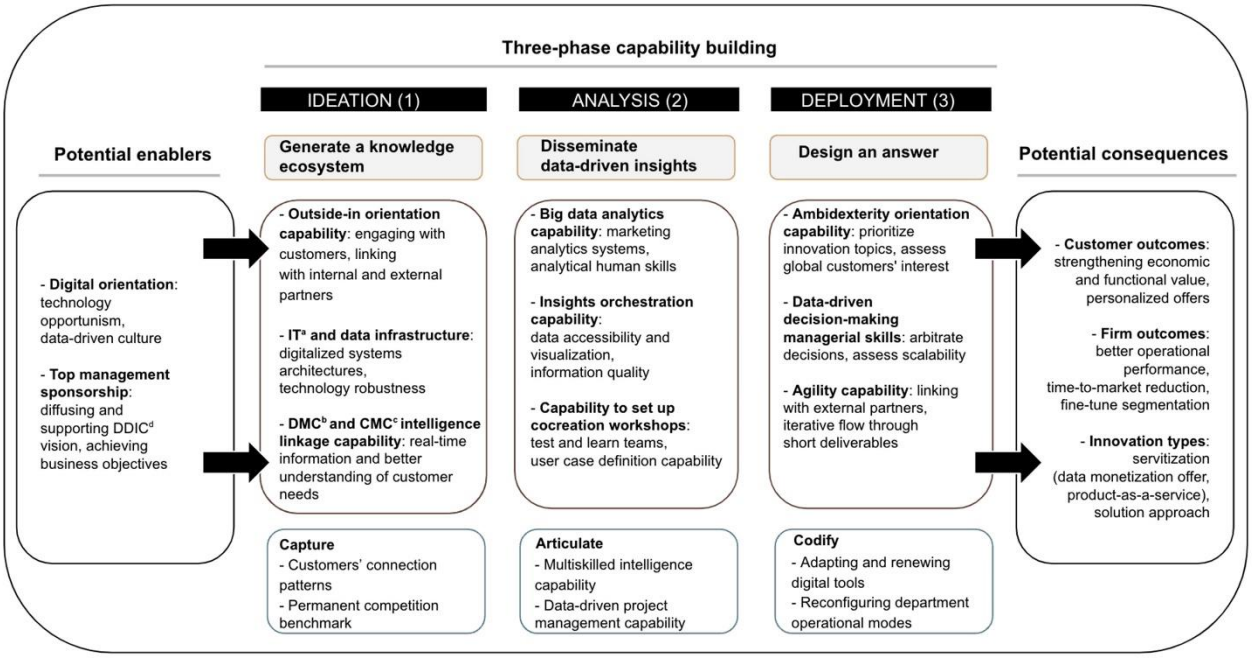
Figure 3-5. DDIC potential innovation type by sector

The *solution approach* is a shared concern for both the goods and services sectors. *Servitization* implies that any marketing-driven insight can potentially be transformed into a valuable customer service to generate profitable revenue for companies. Two specific examples of *servitization* were mentioned: *data monetization offer* and *product-as-a-service*. *Product-as-a-*service predominantly relates to goods companies. In contrast, *data monetization offer* is primarily seen in services companies and involves B2B companies selling data to their global network of partners (Figure 3-5.). *Data*

monetization offer encompasses various data assets that firms exchange to grow their business, as detailed below:

> T company monetizes its sales data to its own suppliers ZF […] We do not know which person buys which size of Gamma product or other. On the other hand, there is a fairly strong monetization of this information in the form of written dashboards when sometimes, with whole containers of Gamma products […], in fact ZF company […] do not know where they are sold, in what type of surface or what type of customer buys, and so on. And if it is monetized, if it is sold and monetized, we can imagine that there is a strong interest on the part of suppliers to receive this information, to work on it. (11, Head of data).

Figure 3-6. presents our results in an overall processual perspective framework of DDIC of marketing, including potential enablers, three-phase capability building, and potential consequences.



[a] IT: Information technology; [b] DMC: Digital marketing capabilities; [c] CMC: Classical marketing capabilities; [d] DDIC: Data-driven innovation capability

Figure 3-6. An overall process-oriented framework for DDIC of marketing: Potential enablers, three-phase capability building, and potential consequences

1.7. Discussion

This study heeds the call for better understanding of how B2B firms can build DDIC of marketing, and it provides evidence of a processual perspective of construction, including phases, routines, and learning mechanisms. We developed a capability model and overall process-oriented framework of DDIC of marketing through an abductive process based on an in-depth literature review complemented with interviews.

1.7.1. Theoretical contributions

From a theoretical perspective, this paper enriches the literature on DMC in the B2B context by combining DMC with the specific theme of innovation and focusing on the marketing organization. Further, we confirmed an additional scope of application for RBT (Barney, 1991) by corroborating the main theory-based interpretation of DMC and marketing capabilities in the B2B context. More specifically, our construct's domain goes beyond relevant studies about DMC, as shown in Table 1, and our contribution is threefold.

First, we contribute by conceptualizing a DDIC of marketing process-oriented model composed of three major phases, (1) ideation, (2) analysis, and (3) deployment, in which three main routines steps are embedded: (1) generate a knowledge ecosystem, (2) disseminate data-driven insights, and (3) design an answer. These results are in line with Jaworski and Kohli's (Jaworski & Kohli, 1993) market orientation (MO) theory, and confirmed MO as a culture rooted in DDIC of marketing. This research thus differs from previous studies on DDIC that considered MO as an antecedent of DDIC (Sultana et al., 2022a). Moreover, we deepened the market orientation-based approach by integrating an outside-in orientation capability into its composition. Echoing Day's (2011, 2014) outside-in view, our findings suggest that companies should look at their markets' external information ecosystems by leveraging capabilities both inside and outside their organizations (Dabrowska et al., 2019), engaging with customers, and linking with partners to create opportunities for new product development (Mu, 2015).

Second, we advocate that a linear processual view is not sufficient for implementing DDIC of marketing, particularly due to the evolutive aspect included in innovation and digitalization concepts. Recent research has called for further knowledge advancement to understand the dynamic process of marketing capabilities (Morgan et al., 2019). To address this perspective, we identified and operationalized three learning mechanisms alongside capability building, i.e., (1) capture, (2) articulate, and (3) codify, and we demonstrated how to apply the key learning from dynamic capabilities theory (Teece, 2007) in the specific case of DDIC of marketing capability building. Wilden et al. (2015) emphasize the need to explain the mechanisms leading to the creation and management of marketing capabilities; we believe this investigation is a first attempt at closing this operational gap.

The third contribution is the discovery of two unexpected dimensions, (1) potential enablers, i.e., digital orientation and top management sponsorship, and (2) potential consequences, in three distinctive areas: customer outcomes, firm outcomes, and innovation types. More explicitly, the detection of customer outcomes distinguishes our DDIC of marketing examination from other studies because, to date, consequences for DMC connected to innovation have mainly been related to firm outputs (Johnson et al.,

2017; Sultana et al., 2022a, 2022b). Specifically, the link established between DDIC of marketing and customers' economic and functional value strengthening provided interesting insights into value research in the marketing discipline. As customer perceived value is key to a firm's long-term survival and growth (Slater & Narver, 1994; Woodruff, 1997), our results propose a novel approach to product-related value (Parasuraman & Grewal, 2000) and customer perceived value (Zeithaml, 1988). Indeed, DDIC of marketing use sheds light on how firms can develop offers that are perceived as being of superior utility, more efficient, or a meaningful product in the customer mind. Finally, by engaging customers as a recommended resource in the process and by fostering customer-centric innovation outputs, our investigation advances knowledge of value-in-use in customers' value-creating processes, as determined by the customer (Grönroos, 2008; Vargo & Lusch, 2004).

1.7.2. Managerial implications

Our study offers valuable insights for B2B managers interested in embarking on DDIC of marketing. We present a three-phase capability-building model with associated resources, capabilities, and learning mechanisms for each phase. This framework can serve as a guide for identifying development targets and optimizing the marketing function's contribution to DDI. Marketers can use it to create an investment plan for the gradual implementation of DDIC of marketing. We also recommend that practitioners assess human resources with diverse skills, including technical, analytical, and managerial abilities, to enable the discovery of unexpected insights, proactive and reactive utilization of insights for innovation, and the setting of innovation priorities. This suggests the need to recruit talents capable of handling both technological data and the wealth of human creativity.

The second implication is the necessity for ongoing learning mechanisms within DDIC of marketing development. This is essential because innovation and digitalization are ever evolving in this context. The rapid emergence of digital technologies like extended reality and innovative models such as open innovation necessitate continuous adaptation in the industrial product and service offerings. Practitioners must continually adapt to this dynamic digital innovation landscape by reorganizing, reconfiguring, or implementing resources, capabilities, and processes to update DDIC of marketing and provide ongoing value to customers. Over time, these adjustments will build an agile portfolio of competencies characterized by flexibility, speed, modularity, and learning. This unique combination will be challenging for competitors to replicate and will enable firms to maintain their competitive advantages.

The third implication involves the discovered potential enablers and consequences that can inform marketers' DDI strategies. For instance, we highlighted the importance of C-

level[16] sponsorship and boardroom support in successfully implementing data-driven practices in firms (Wedel & Kannan, 2016). In addition, if firms aim to achieve innovation-related objectives such as reducing time-to-market or enhancing functional value for customers, they can leverage DDIC of marketing as a valuable capability, as shown in our study.

Referencing Figure 6, we provide key takeaways for managers looking to implement DDIC of marketing. Throughout our interviews, we also gathered insights into potential obstacles to DDIC of marketing, as mentioned by respondents and outlined in the last column of Table 3-4..

[16] C-level, or C-suite, refers to the senior executives of a company whose titles begin with the letter "C," which stands for "Chief: Chief Executive Officer, Chief Financial Officer, Chief Operating Officer, Chief Information Officer, Chief Technology Officer, Chief Marketing Officer

Table 3-4. Key takeaways and potential obstacles for building DDIC of marketing for B2B marketing managers

	Key takeaways	Potential obstacles
Phase 1 – Ideation	• Establish connections with external parties	○ Access to B2B external information from partners and customers – Privacy data concern
	• Build an IT[a] and data infrastructure based on technology robustness	○ Limited budget ○ Digitalized maturity level of the sector
Phase 2 – Analysis	• Identify and find human skills for analyzing the data-driven knowledge ecosystem	○ Scarcity and/or high cost of analytical and marketing profiles
Phase 3 – Deployment	• Develop ambidexterity orientation	○ Difficulty in reducing long life cycle production process and responding to immediate customers' signals
	• Develop agility	○ Difficulty in developing start-up practices and mindset, especially for MNC[b]
Learning mechanism "Capture"	• Become customer data centric in grasping knowledge for innovation outputs	○ Learn how to develop mechanisms of cocreation, innovative collaboration, and open innovation
Learning mechanism "Articulate"	• Renew and adapt the marketing human skills, develop collective intelligence	○ Change the marketing department organigram, from a vertical to a horizontal organization, from silos to collaborative platforms
Learning mechanism "Codify"	• Permanently benchmark new technologies	○ Lack of time and internal expertise
Potential enablers	• Develop a digital culture	○ Prepare the department for change management, create training sessions
Potential consequences	• Foster the solution approach, identified opportune for both the goods and services sector	○ Become customer centric instead of product centric ○ Think about the customer as a whole system of pains and problems to relieve to capture the whole value chain benefits ○ Imitate the B2C approach and create customer experience

[a] IT: Information technology; [b] MNC: Multinational company

1.8. Limitations and future research

This research is not without limitations, and it offers some future avenues for research. First, due to our qualitative approach, we suggest conducting a quantitative survey with

a larger sample to validate our empirical findings. This quantitative study could analyze the relative importance of each resource and capability within the DDIC of marketing. That could potentially provide a resources protocol for marketers. We propose employing a fuzzy-set qualitative comparative analysis to explore various pathways to building DDIC of marketing.

Second, there is a tradition of the contingency approach influencing the development of marketing capabilities in B2B contexts (Morgan et al., 2019). Although recent research has offered a contingent perspective on DMC (Homburg & Wielgos, 2022), there remains a scarcity of papers examining contingency effects on DMC in the industrial context (Herhausen et al., 2020), particularly in the context of DDIC of marketing. Investigating these contingency effects could be a fruitful avenue for research in marketing and innovation.

Third, our study did not delve into the topic of data privacy for B2B firms, but some participants expressed concerns about data security and privacy. Recent research has highlighted the evolving nature of privacy issues in B2B marketing due to changing technologies (Rao Hill & Corral de Zubielqui, 2023) and suggested that conceptualizing privacy and information privacy management shape B2B trust, branding, and servitization. Investigating not only privacy but also extended considerations like ethical issues, especially in the context of DDI, is essential, given the growing importance of these issues, as Gartner's prediction underlined that "by 2025, 70% of enterprise CMOs [chief marketing officers] will consider accountability for ethical artificial intelligence in marketing as one of their top concerns" (Gartner, 2022).

Lastly, the concept of value is multidimensional and closely linked to the marketing literature (Lindgreen & Wynstra, 2005; Payne & Holt, 2001). Despite this, the connection between customer value and DDI has received limited attention. Our findings touch on elements of customer value derived from DDIC of marketing, and other studies have explored customer value linked to innovation (Ngo & O'Cass, 2012; Payne & Frow, 2014; Ulaga & Eggert, 2006). Given the measurability of DMC (Homburg & Wielgos, 2022), conducting a quantitative survey to assess the impact of specific resources within DDIC of marketing on specific aspects of customer value is recommended. Further empirical research could establish relational schemes to guide managers in their data-driven customer value propositions.

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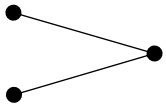
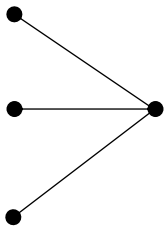
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1.10. Appendices

Appendix 1-1. Data structure codebook

1st order concepts	*2nd order themes*	*Aggregate dimensions*
• Engaging with customers • Linking with internal departments and subsidiaries • Linking with external partners • Industry digitalization maturity level	*Outside-in orientation*	**Ideation phase (1): Generate a knowledge ecosystem**
• Digitalized systems architectures • Technology robustness	*IT[a] and data infrastructure*	
• Real-time information need • Triangulation need for better customer understanding	*Classical and digital marketing intelligence linkage capabilities*	
• Marketing analytics systems • Analytical human skills	*Big data analytics capability*	**Analysis phase (2): Disseminate data-driven**
• Funnel system analogy • Data accessibility and visualization • Information quality	*Insights orchestration capability*	
• Test and learn teams • User case definition capability	*Capability to set up cocreation workshops*	
• Prioritize innovation topics • Assess global customers' interest	*Ambidexterity orientation capability*	**Deployment phase (3): Design an answer**
• Arbitrate decisions • Assess scalability	*Data-driven decision-making managerial skills*	
• Linking with external partners • Iterative flows through short deliverables	*Agility capability*	
• Customers' connection patterns • Permanent competition benchmark	*Capture*	**Learning mechanism (1)**
• Multiskilled intelligence capability • Data-driven project management capability	*Articulate*	**Learning mechanism (2)**
• Adapting and renewing digital tools • Reconfiguring department operational modes	*Codify*	**Learning mechanism (3)**

• Data-driven culture • Technology opportunism	*Digital orientation*		**Potential enablers**
• Achieving innovation objectives • Diffusing and supporting DDIC[b] vision	*Top management sponsorship*		
• Strengthening economic value • Strengthening functional value • Personalized offers	*Customer outcomes*		**Potential consequences**
• Better operational performance • Time-to-market reduction • Fine-tune segmentation	*Firm outcomes*		
• Servitization: data monetization offer and product-as-a-service • Solution approach	*Innovation types*		

[a] IT: Information technology; [b] DDIC: Data-driven innovation capability

Appendix 1-2. Supportive quotes from in-depth interviews regarding potential enablers and consequences of DDIC of marketing

Potential enablers	**Quotations**
Digital orientation: • Technology opportunism • Data-driven culture	See subsection 1.6.5.
Top management support: • Diffusing and supporting DDIC[a] vision • Achieving innovation objectives	"So, one of the key factors is really a willingness of someone to say, 'I'm at the service of.' So, the top priority is the customer and the listening, and that's how many products were born at S company. So, if you want, it's already historically, it's already in the mindset that actually, orchestrating the collection and listening already, and it's especially the reading and the translation behind the input, because, when you had a general manager who suddenly used this data and they, who was a creator, are immediately inspired by it in their innovation process." (17, France marketing director)
Potential Consequences	
Customers outcomes	
• Strengthening economic value	"It's the added value for the customer... the defense of the purchasing power... So, why the added value? It's because we were bringing him something, a solution that was initially priced at €0.50, and now that we're dropping below €0.20 on volume, on big volumes. So, that was a little bit the approach to say, well, here we are, we make you something that defends your purchasing power, that for you we understood your needs." (14, Head of product marketing)
• Strengthening functional value	See subsection 1.6.5.
• Personalized offers	"Today, the heavy trends that we can see in the market are notions of targeting, hyper-targeting, and campaign personalization, campaign contextualization. We were able to show that those 100,000 were the ones who had similarity criteria […] the ones closest to the customer database and the prospective database and the brand […] Behind it, thanks to our data, our database, […] we were able to create a mesh, and by saying, well, that's 100,000 structures there, they are distributed, with all these type of companies, all right, and behind that we've set up digital multichannel campaigns, so, a lot of mails, […] suitable advertising banners, that is, we were able to personalize each message, depending on the nearest company as one, a 1:1 relationship between the company and the prospect." (2, Commercial director)
Firm outcomes	
• Better operational performance	"The data, once used ultra well, can really do miracles […] In fact, I would say that the data would allow us to increase the company's turnover, without having to multiply resources. That's the main thing." (5, Marketing product manager)
• Time-to-market reduction	See subsection 1.6.5.
• Fine-tune segmentation	"From a purely tactical point of view […] we had a much better market visibility than we had before. We were finally able to, we even had the, the totality of the labs that were listed on our system. What kind of equipment they were using even when they weren't using ours. So, we had a visibility of the competition that was unequaled. A segmentation on volumes, on the uses of our machines and our products that was extremely fine. And that's why we didn't need to call on anyone else for this kind of thing, because we had a real bottom-up approach in terms of data, which was extremely, extremely fine, extremely granular." (13, Senior director international marketing)
Innovation types	

• Servitization: data monetization offer	See subsection 1.6.5.
• Servitization: product-as-a-service	"Regarding the sale of services, it is no longer a graceful gesture that we are making, it is really a business model that we are going to implement in its own right. […] and it also goes to the value proposition beyond the product. To see what we can add so that the customer experience is the most pleasant, the most efficient possible […] we are in a market of commodities, margins are pinched because we are in a market of commodities and another way of capturing value, well it is to expand our offer and to generate additional revenues with the sale of services. That's why we do more services." (8, Marketing director)
• Solution approach	"And in fact, that's where I've actually been exposed a lot to this notion of selling a solution. That's it. And so here, the first step in fact, concretely, was to actually move from selling products, we'll say separately, to selling products as part of a system. That is, you have several components on an FD product, for example. So, this is the first processing, and the second after actually, it was to add value to your products by involving partnerships, whether in terms of software or in terms of, we will say, peripheral solutions. So, in fact, collaboration with other partners, even sometimes with competitors, in fact, has also developed a lot." (13, Senior director product marketing)

[a] DDIC: Data-driven innovation capability

PART 3: CONFIRMATORY STUDY

1. **<u>ARTICLE 4</u> - Architecting value propositions for data-driven innovation: unveiling the role of data-driven innovation capability of marketing through a configurational approach**

1.1. Summary of Article 4

The main author is this article is Ludivine Ravat.
The co-authors are Pr. Olivier Furrer and Pr. Aurélie Hemonnet-Goujot.

Article 4 follows the connected research objective of confirming the consequences of using DDIC of marketing in architecting value propositions for DDI, by answering the following question:

> *What is the contributive role of DDIC of marketing in architecting value proposition for DDI?*

Findings revealed: (1) resources embedded in DDIC of marketing play a strategic role in fulfilling the practices of value proposition that drive DDI, and (2) identification of sets of configurations of marketing and firm resources, each contributing to achieving one of three identified DDI.

The box 4-1. below summarizes highlights and status for Article 4.

HIGHLIGHTS OF ARTICLE 4

- *The paper depicts value proposition practices for driving DDI*
- *Value proposition for driving DDI comprises three interrelated practices: value capture, value articulation, and value leverage, each with distinctive sub-practices.*
- *It unveils the significant role of the resources embedded in DDIC of marketing to fulfill value propositions for DDI.*
- *The study focuses on value proposition design for three identified DDI types, each resulting from a combination of marketing and firm resources embedded in its practices.*
- *The paper employs a configurational analysis to reveal two resource combinations for the DDI types (1) digitalized service innovation and (2) global integrated solutions, and one for the DDI type (1) data monetization.*
- *The configurations emphasize similarities and differences, underscoring the key role of marketing resources in each solution*
-

CURRENT STATUS OF ARTICLE 4

1. *Article presented at the international academic conference of* ***the 2024 Haring Symposium,*** *Kelley Business school, Indiana University, USA, April 12-13, 2024.*
2. *On-going research, to be submitted to the* ***Journal of the Academy of Marketing Science****, ranked 4*, AJG 2021, in September 2024.*

Box 4-1. Key takeaways from Article 4

1.2. Abstract

Data-driven innovation is increasingly vital for gaining a competitive advantage in business markets, underscoring the strategic role of firm competencies and data-driven innovation capability (DDIC) of marketing in crafting effective value propositions. However, the contribution of DDIC of marketing to value proposition design for data-driven innovation has been minimally explored. Based on an empirical complementary study, we intend to bridge this gap. First, we conducted a preliminary inductive analysis of data from 15 B2B international manufacturing companies engaged in data-driven innovation, leading us to determine three main value practices: (1) value capture, (2) value articulation, and (3) value leverage, each divided into three sets of inherent sub-practices for structuring value propositions for identified DDI types. Second, supported by a sample of 103 professionals from marketing, digital, IT, R&D, finance, and sales departments, we used Fuzzy set Qualitative Comparative Analysis (fsQCA) to depict the interactions of DDIC of marketing and firm resources within value proposition practices leading to specific DDI types. Our results highlight five configurations for three DDI types: (1) digitalized service innovation, (2) data monetization, and (3) global integrated solution, showing similarities and differences, and stressing the key role of DDIC of marketing resources in each solution. We conclude by discussing the theoretical and managerial implications of our findings and offering future research avenues.

Keywords

Value proposition; data-driven innovation; data-driven innovation capability of marketing; marketing strategy; Business-to-business firms; fsQCA

1.3. Introduction

Value propositions are deemed the firm's most crucial organizing principle (Webster, 2002, p.61), pivotal in the value creation process (Payne & Frow, 2005). A search in the Web of Science underscores its growing importance in business and management literature, with 83.4% of articles published since 1993 appearing in the last decade, totaling 738 articles. In today's dynamic business environment, focusing on value propositions is essential for innovating products or services, particularly by leveraging customer data to create new offerings and revenue streams in the digital era. This shift to a data-centric world necessitates companies to rapidly adapt their value propositions by assessing their innovation resources (Lindgreen & Wynstra, 2005), as modern digital technologies expand the potential scope of value creation.

Thanks to investments in big data and digital technologies, marketing enhances its understanding of customers and market trends, leading to the creation of new offerings (De Luca et al., 2021). Viewed as a strategic marketing tool, value propositions enable organizations to deliver superior value to targeted customers by leveraging digital and innovation-related resources to gain a competitive advantage (Day & Wensley, 1988; Porter, 1990; Slater, 1997). B2B companies have recognized the new potential of data for competitive innovation strategy, and it is unsurprising that data-driven innovation (DDI) has become a key pillar of 21st-century growth (OECD, 2015). DDI involves strategic use of data and analytics to develop or enhance products, services, and markets, focusing on value creation (OECD, 2015). Different types of DDI illustrate how traditional industries have entered the era of the “industrial internet”. For example, General Electric uses real-time data to provide B2B customers insights on optimizing fuel efficiency, monetizing this service and creating innovative data monetization opportunities (Subramaniam, 2022). Schneider Electric has developed new digitalized service innovations through its B2B platforms to enhance customers’ operational efficiency. Another example is Rolls-Royce's move towards a digital business model with global integrated solutions, aiming for agility and comprehensive value chain integration.

Organizational resources must mobilize to integrate market knowledge into value creation, a core function of the marketing department (Weerawardena, 2003). Using data for innovative value propositions through resource deployment is not new (Morgan, 2012), as marketing traditionally represents the customer's voice (Griffin et al., 2013). However, Big Data and advanced technologies have revolutionized this process. In DDI contexts, marketing departments leverage digital resources to create differentiated customer value sustainably (Bharadwaj et al., 2013). The digitalization surge enhances marketing's role in DDI strategies, posing new research challenges for industrial marketing scholars and managers across two dimensions.

First, recent research focuses on new marketing capabilities for innovation, linked to digitalization in business markets over the past 10 years. This area explores how firms acquire resources, skills, and capabilities to navigate digitalization (Kannan & Li, 2017; Lamberton & Stephen, 2016; Yadav & Pavlou, 2014). Studies now delve into digital marketing capabilities (De Luca et al., 2021; Herhausen et al., 2020; Mikalef et al., 2018) and emerging data-driven innovation capabilities (DDIC) (Alghamdi & Agag, 2024; Chaudhuri et al., 2024; Sultana et al., 2022a, 2022b). From a marketing perspective, DDIC of marketing comprises various resources configured to orchestrate DDI routines, facilitating value propositions (Ravat et al., 2024), thereby improving organizational performance and competitive advantage (Morgan, 2012), and enabling customers to perceive the created value (Eggert et al., 2018).

Second, digital technologies enable organizations to enhance capabilities through new offerings, aligning with innovation strategies, and fostering servitization trends within DDI. Technological advancements empower firms to engage customers, gather and analyze data, and enhance customer relationship capabilities in marketing, contributing to the service economy's growth (Rust & Huang, 2014). As services dominate the economy (Vargo & Lusch, 2004), research explores links between marketing capabilities, DDI, and servitization (Barrett et al., 2015; Kowalkowski et al., 2024; Martín-Peña et al., 2019). Studies investigate servitized DDI forms shaping digital competitive strategies, including digitalized services, data monetization, and global integrated solutions (Ardolino et al., 2018; Harrmann et al., 2022; Ritala et al., 2024; van der Borgh et al., 2023), yet integrating these developments fully into the value proposition remains a gap.

Recent work by Ravat et al. (Ravat et al., 2024) explores routines within DDIC of marketing, detailing resource deployment by marketing departments for servitized DDI and new value proposition creation. However, empirical testing linking DDIC resources, servitized DDI, and value proposition practices is lacking. Existing research connects value propositions with innovation (Lindič & Da Silva, 2011; Payne & Frow, 2014; Skålén et al., 2015), yet gaps persist in integrating this with digitalization. Definitions of value propositions in innovation lack contemporary clarity (Chandler & Lusch, 2015; Skålén et al., 2015), often focusing on competitive analysis (Sheehan & Bruni-Bossio, 2015), product traits (Chan Kim & Mauborgne, 2005), or exchange value theories (Grewal et al., 1998; Zeithaml, 1988), emphasizing benefits and problem-solving (Osterwalder et al., 2015).

Thus, in the B2B context, this servitization paradigm presents a new strategic focus for marketing departments in crafting value, particularly in the realm of DDI, fostering "4.0 Industrial Internet Marketing". However, the role of DDIC of marketing in shaping value propositions for DDI remains underexplored. This paper aims to dissect elements of value proposition design derived from organizational resources, specifically highlighting the integration of resources within DDIC of marketing to drive DDI. We thus propose the following research questions:

- What is the architecture of value propositions for DDI types, and how can we organize a common set of practices to design it?
- What DDIC of marketing and organization resources of these value propositions are relevant for realizing specific DDIs, and how do these elements combine to achieve their effect?

To investigate these questions, we adopt Service-Dominant (S-D) Logic as our theoretical framework. S-D logic is well-suited for examining how manufacturing firms participate in DDI, emphasizing the creation of value propositions by integrating firm resources to assess value-in-use within specific innovation contexts. This perspective enables us to illustrate the activities through which value propositions are shaped and how the distinctive objectives and contexts of actors integrating resources influence this shaping(Frow & Payne, 2011).
Methodologically, our empirical study is based on a preliminary analysis of data from 15 B2B international manufacturing companies engaged in DDI. We inductively identified three main value practices: value capture, value articulation, and value leverage, each divided into three sets of inherent sub-practices for structuring value propositions for different DDI types. Supported by a sample of 103 professionals from marketing, digital, IT, R&D, finance, and sales departments, we used Fuzzy set Qualitative Comparative Analysis (fsQCA) to depict the interactions of DDIC of marketing and firm resources within value proposition practices leading to specific DDI types.
The paper is structured as follows. The first section introduces DDI, value propositions, and DDIC of marketing within the S-D logic theoretical framework. The second section explores qualitative insights from interviews, identifying causal propositions to propose a conceptual framework. The third section details the application of fsQCA, describes the 103-respondent sample, presents the operationalization of study constructs, and outlines the possible combinations of marketing and firm resources necessary for various DDI solutions. The fourth section discusses theoretical and managerial implications, while the final section highlights limitations and suggests directions for future research.

This research enriches B2B strategic marketing literature by elaborating on the value proposition construct in the DDI context, focusing on the critical role of DDIC of marketing resources. From a managerial perspective, it guides companies on how to utilize their marketing resources to create specific DDI types through strategic and instrumental use of value propositions.

1.4. Literature review

From an S-D Logic perspective (Vargo & Lusch, 2004), there is a fragmented literature that connects the three dimensions of DDI, value proposition, and DDIC of marketing, from a B2B marketing viewpoint. We present extant findings from these three research streams to identify gaps in knowledge that motivate us to conduct our investigations.

Service-dominant logic perspective on data-driven innovation

DDI is a series of innovation processes utilizing advanced techniques and technologies like big data analytics, machine learning, AI, sensors, and IoT to extract valuable insights from data for innovative results (Sultana et al., 2022a). By treating data as a fundamental resource, DDI enables firms to innovate products and services that create new value. Strategic use of these technologies not only fosters groundbreaking developments but also sustains competitive advantage through ongoing enhancement of innovation capabilities. Table 4-1. summarizes recent definitions of DDI.

Table 4-1. Definitions of DDI from the academic literature

Authors/Year/Journal	Definition of DDI
Alghamdi & Agag, 2024 *Journal of Retailing and Consumer Services*	DDI refers to a collection of processes employing tools, such as "big data analytics", and methodologies, such as machine learning techniques and artificial intelligence, to generate fresh insights from existing datasets. Firms can maintain a competitive advantage via data-driven innovation, research, and development, as well as the creation of new product and service.
Babu et al., 2024 *Annals of Operations Research*	DDI refers to the innovation process that adopts techniques and technologies for processing and analyzing big data using data-based decision processes.
Eriksson & Heikkilä, 2023 *Industrial Marketing Management*	DDI refers to innovation that utilizes data as a core ingredient.
Hossain et al., 2024 *Annals of Operations Research*	DDI produces innovative outputs from data and is a primary source of competitive advantage for firms.
Rindfleisch et al., 2017 *Review of Marketing Research*	DDI helps firms to exploit their existing value and enhance their product innovation by gathering and analyzing data.
Sultana et al., 2022 *Technological Forecasting and Social Change*	DDI is series of innovation processes that apply techniques (such as big data analytics) and technologies (e.g., machine learning, deep learning, and artificial intelligence) to extract meaningful value from data to generate innovative results.

Firms strategically use DDI to develop innovations that capture value from data (Davenport & Kudyba, 2016). DDI facilitates service-oriented applications with strategic benefits from data analytics (Akter et al., 2021). This makes digitalization closely tied to servitization and innovation in B2B companies, fostering new valuable services (Adrodegari et al., 2017). This service orientation appears in various DDI types. For example, Peloton develops new digitalized service innovations by linking its customers with B2B third-party entities, collecting data on user interactions with its sports equipment and sharing it with partners like nutritionists and trainers to support innovative services and revenue streams. Similarly, Monsanto, in the agriculture sector, uses data analytics on climate and weather to boost farmer productivity, enhancing revenue and market presence by selling them through a DDI type designed as data

monetization. Additionally, Caterpillar has expanded its technology adoption across all its products to meet the growing demands of the digital age, offering a suite of connected products and services, and fostering the creation of a digitalized global integration solution, another type of DDI. This shift allows Caterpillar to optimize product use and tailor digital services, such as CAT Connect[17] , which offers customized subscription options.
Effective financial performance in DDI requires not only technological investments but also complementary servitization capabilities (Kohtamäki et al., 2020). Marketing capabilities are critical in this context for understanding customer needs, managing insights, and articulating value propositions (Akter et al., 2021; Eriksson & Heikkilä, 2023). From a S-D Logic perspective (Vargo & Lusch, 2004), marketing capabilities drive servitized DDI, especially DDIC of marketing, creating sustainable value by leveraging digital resources like IoT and big data analytics (Bharadwaj et al., 2013). Marketers play a key role in managing knowledge through firm-customer collaborations and shaping innovative value propositions (Lindgreen et al., 2012; Vargo & Lusch, 2004).

However, challenges exist in integrating DDI due to gaps in marketing capabilities (Rapaccini & Adrodegari, 2022). The evolving digital environment requires organizations to assess the role of DDIC in architecting value propositions to create servitized DDI. Research often overlooks the role of marketing capabilities in designing value propositions for specific DDI types (Alghamdi & Agag, 2024; Kumar et al., 2024; Sultana et al., 2022b). Authors such as Babu (2024) and Hossain et al. (2024) outline holistic approaches to DDI, considering organizational factors, but do not fully explore the role of marketing capabilities in value proposition design for specific DDI types.

Therefore, further research is needed to understand the role of DDIC of marketing in shaping value propositions across different types of DDI.

Service-dominant logic perspective on value proposition

Lanning and Michaels (1988) defined a value proposition as the benefits a company offers at a specific price to a defined customer group, considering costs. This concept emphasizes how firms aim to deliver superior value to customers (Webster, 2002). The notion of relationship value has evolved this concept by exploring what customers and suppliers find valuable in their interactions within specific product or service contexts. Payne and Frow (2014) argue that a value proposition represents an organization's promise of benefits that customers will receive throughout their experience with a product or service, encompassing both product benefits and the experiential value from their relationship with the organization.

[17] https://www.cat.com/en_GB/support/operations/cat-connect-solutions/energy-transportation.html

A superior value proposition denotes an offering that provides more value or better solves a problem compared to competitors (Payne & Frow, 2014), whether through products or services (Vargo & Lusch, 2008). Therefore, a value proposition serves as a strategic tool through which firms communicate how they help customers achieve significant tasks (M. W. Johnson et al., 2008). This strategic commitment involves deploying marketing resources, including relationship management capabilities (Ulaga & Eggert, 2005, 2006), to enhance the value derived from customer-supplier relationships within specific innovative market offerings (Lindgreen & Wynstra, 2005; Ngo & O'cass, 2013).

In the context of S-D logic (Vargo & Lusch, 2008), a value proposition hinges on the value generated from knowledge exchanges among actors and the customer's usage context. Thus, the value proposition for DDI equips customers with resources in value constellations, empowering them to enhance their own value creation (Michel et al., 2008; Rubalcaba et al., 2012). This necessitates integrating firm and marketing capabilities to architect value propositions, including those for DDIC of marketing.

Research explores co-creation concepts in B2B firms through integrated digital resources to enhance value creation under S-D Logic. In digital competitive strategy, adopting a servitization strategy requires marketing departments to develop essential digital capabilities supporting co-creation (Mostafa, 2021), either internally or through new partnerships (Parida et al., 2019). These capabilities include intelligence, connectivity, and analytics, crucial for facilitating interactive co-creation with customers (Lenka et al., 2017). Hasselblatt et al. (2018) elaborate on IoT-based innovation strategies for co-creation, identifying competencies such as digital business model development and IoT value delivery.

While these studies highlight digital capabilities' role in co-creation, they often overlook integrating findings into the theoretical framework of value proposition architecture specific to DDI, suggesting a need for further research.

Additional research has advanced understanding of resource integration for developing value propositions in servitization contexts. Skålén et al. (2015) identified practices that integrate resources into value propositions, categorized into provision, representational, and management practices. Lindič and Da Silva (2011) explored the intersection of value proposition and innovation, defining components like performance and ease of use. Payne and Frow (2014) analyzed value propositions in healthcare, emphasizing value-in-use and learning processes. Ulaga and Eggert (2006) highlighted relationship value, focusing on interaction quality and supplier expertise.

Despite these contributions, there's a gap in micro-level analysis within marketing departments, particularly in the context of DDI, indicating a need for further research. The servitization of innovation in DDI implies low formalization of processes, integrated with daily operations, suggesting a fertile area for investigation (Kelly & Storey, 2000). Firm

and marketing resources are foundational to the value proposition, integrating into servitized DDIs as resource integrators (Korkman et al., 2010). Hence, consistent with S-D logic, DDI emerges from the integration of these resources to formulate value propositions, thereby enabling value creation across diverse forms of servitized DDIs, necessitating an investigation into this relationship.

Service-dominant logic perspective on data-driven innovation capability of marketing

Capabilities, defined as intricate skill and knowledge bundles, enable firms to coordinate activities and utilize assets effectively (Day, 2011; Helfat et al., 2009). These capabilities, characterized by competencies difficult for competitors to replicate, are essential for understanding a firm's competitive advantage and performance (Barney, 1991; Slotegraaf et al., 2003; Vorhies et al., 2009). Analyzing firm and marketing capabilities is crucial in processing and communicating value propositions to customers. As firms increasingly invest in Big Data technologies and analytics to boost performance (Lambrecht & Tucker, 2015) and drive innovation (Sorescu, 2017), marketing departments play a pivotal role in leveraging digital capabilities to understand customer needs and identify new product and service opportunities (Chandy et al., 2017; Troilo et al., 2017).

Digital marketing capabilities have become a significant field of research attention, involving strategic use of digital technologies for interactive, targeted customer and partner engagement, creating new value (McIntyre & Virzi, 2019; Sridhar & Fang, 2019; Wedel & Kannan, 2016). Some studies highlight how these capabilities drive innovation: Cao et al. (2019) note that leveraging Big Data enhances marketing analytics, influencing decision-making and product development. Johnson et al. (2017) identify marketing exploration and exploitation as key drivers of Big Data integration, boosting new product revenues. Ashrafi & Zare Ravasan (2018) find a positive correlation between business analytics, IT infrastructure, and marketing's market orientation in achieving innovation. Investment in Big Data also benefits marketing by improving customer knowledge and fostering service innovations (De Luca et al., 2021). Mikalef et al. (2018) review components of Big Data analytics and their potential to drive business value through innovation.

Recent literature focuses on DDIC, linking it to DDI and detailing its components (Sultana et al., 2022a). Table 4-2. summarizes identified resources and capabilities comprising DDIC in the literature. Authors describe DDIC as encompassing managerial, technological, and personnel capabilities crucial for DDI success. They also identify market orientation, talent, and IT infrastructure as capabilities that enhance market performance and agility (Sultana et al., 2022a). Building on this foundation, Alghamdi & Agag (2024) propose a longitudinal analysis demonstrating how DDIC contributes to competitive advantage over time through marketing agility mediation. Chaudhuri et al. (2024) explore how Industry 4.0 technologies enhance organizations' data-driven cultures and DDIC. Eriksson &

Heikkilä (2023) focus on marketing capabilities, illustrating how these contribute to DDI when combined with technological capabilities.

A marketing-oriented perspective on DDIC, aligned with S-D Logic, portrays it as a vital capability fostering an 'outside-in' information ecosystem for disseminating data-driven insights crucial for DDI development, leveraging dynamic market-oriented resources (Ravat et al., 2024). This perspective highlights potential consequences of developing DDIC, like a new value-in-use for customers and possible DDI outcomes, though it does not empirically test the relationship between these three constructs.

Table 4-2. A resources and capabilities inventory for DDIC of marketing from the relevant literature

Authors/Year/Journal	Resources and capabilities of DDIC
Alghamdi & Agag, 2024 *Journal of Retailing and Consumer Services* And Sultana et al., 2022 *Technological Forecasting & Social Change*	• Market orientation capability (customer orientation, competitor orientation) • Infrastructure capability (data, technology) • Innovation talent capability (knowledge, training and development)
Chaudhuri et al., 2024 *Technological Forecasting & Social Change*	• Adoption of industry 4.0 applications: IoT, AI, Cyber Physical System (CPS), Block-chain technology (BCT) • Organizational data-driven culture
Eriksson & Heikkilä, 2023 *Industrial Marketing Management*	• Technological capabilities (ability to obtain the necessary data, ability to combine data from different sources, ability to analyze the data • Marketing capabilities (ability to innovate and deliver superior customer value, ability to capitalize on the customer as an asset, and ability to capitalize on the brand as an asset)
Ravat et al., 2024 *Industrial Marketing Management*	• DDIC ideation phase: outside-in orientation capability (engaging with customers, linking with partners), Information Technology (IT) and data infrastructure, digital marketing capabilities and classical marketing capabilities intelligence linkage capability • DDIC ideation analysis: Big Data analytics capability, insights orchestration capability, capability to set up cocreation workshops • DDIC deployment phase: ambidexterity orientation capability, data-driven decision-making managerial skills, agility capability

In conclusion, while often being investigated at the firm level and for servitization opportunities, the connection between DDI, value proposition and DDIC of marketing remains underexplored. We propose linking these three research fields through the S-D logic perspective, first, by exploring a set of practices and resources that form value propositions, and second, by confirming which organizational resources, particularly the ones embedded in DDIC of marketing, coalesce to produce DDI types.

We have illustrated our research gap in the figure below, which can be summarized accordingly:

There is a need to assess the contributive role of DDIC of marketing in architecting value propositions for DDI

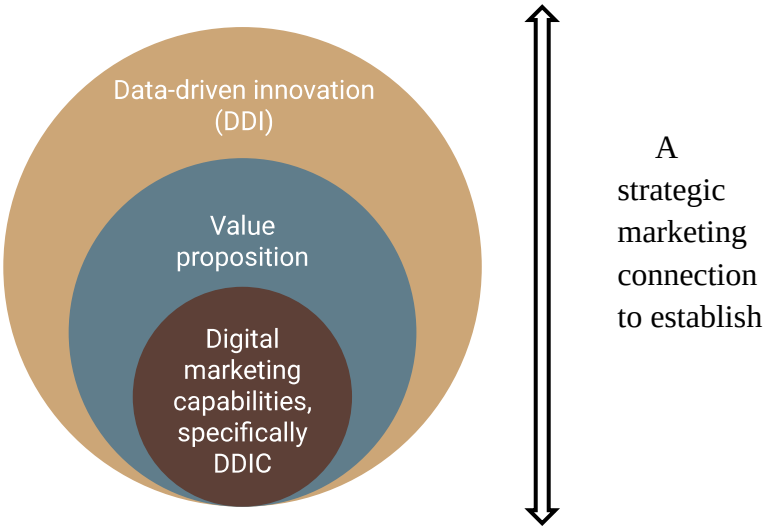


Figure 4-1. Visualization of the identified gap in B2B strategic marketing literature

The next section outlines findings from our qualitative study and introduces a set of practices for designing value propositions across DDI types. It also presents a conceptual framework illustrating the causal relationships among identified resources that combine together to achieve specific DDI types, forming the basis for our fsQCA configurational study.

1.5. Methodology

For this research, we employed two complementary methods. Initially, we conducted a preliminary qualitative study using an inductive approach. The aim was to identify the practices and resources involved in designing value propositions for different types of DDI. Subsequently, we carried out a confirmatory study utilizing a configurational approach through FsQCA (Ragin, 2008). This study tested the relationships among

various firm and marketing resources that collectively contribute to achieving different DDI types. The details of these studies are presented in the following subsections.

1.5.1. Study 1: A preliminary qualitative study to identify practices and resources for designing value propositions of DDI types.

Sample and data collection

Following Pratt's (2009) guidance, our research design for this qualitative study includes essential elements: theoretical foundation, methodology, sampling strategy, and unit of analysis. It details data extraction methods, including the interview guide, data sources, and coding procedures. Innovation, value, and capabilities are focal points in B2B strategic marketing explored through qualitative research (Lindgreen et al., 2021). Our study seeks to advance theory in the field, based on DDI, value proposition, and DDIC constructs within the S-D logic framework, using an inductive approach rooted in empirical evidence (Corley & Gioia, 2004; J. S. Johnson & Sohi, 2016).

Adopting theoretical sampling (Gephart Jr, 2004; Homburg et al., 2017), we targeted participants engaged in DDI for insights into value proposition architecture, focusing on DDIC of marketing. Purposive sampling covered 15 diverse B2B firms globally (Arsel, 2017), with snowball sampling refining the pool based on initial findings (Strauss & Corbin, 1998). Decision-makers across management levels provided deep insights into DDI implementation, ensuring theoretical saturation (Glaser & Strauss, 1967; Guest et al., 2006). For example, one respondent, highly experienced in DDI projects and renowned as a conference speaker, is frequently consulted for advice on leveraging DDI to enhance customer value propositions. Achieving theoretical saturation validated the robustness and diversity of our findings (Glaser & Strauss, 1967; Guest et al., 2006). **Appendix 1-1.** details the final sample, spanning diverse industries, bolstering the study's relevance and applicability.

Our interview guide focused on three key areas: (1) assessing the use of analytics, digital tools, and advanced technologies in DDI projects and participants' contributions; (2) delineating organizational and marketing competencies and practices enhancing value proposition in DDI initiatives; and (3) examining types of innovation resulting from DDI efforts. Rooted in theoretical considerations (Kvale & Brinkmann, 2009), specifically the S-D logic, the guide evolved throughout the study to maintain relevance and bolster internal validity.

Interviews proceeded in four stages (Grawitz, 2000). First, the introduction set the study context, allowing participants to share their backgrounds. Second, the focus shifted to

understanding DDI implementation in respondents' work. We gauged relevance through storytelling questions, such as describing products or services launched based on digitalized data. Third, the deepening phase explored value proposition aspects, including organizational challenges and success factors in DDI projects, emphasizing the marketing department's role. Discussions also delved into innovations from data-driven projects, with participants sharing examples and insights (Glaser & Strauss, 1967). Fourth, in the conclusion phase, we sought additional insights on practices and innovations. This structure facilitated a comprehensive exploration of value proposition practices driving DDI, from foundational concepts to detailed processes and outcomes, illuminated by participant narratives.

To ensure data validity, we consulted digital and B2B marketing experts to clarify terminology and ensure relevance and clarity from a managerial perspective. Bias reduction efforts involved randomizing themes and expert consultations, ensuring robust data collection and analysis to capture nuanced DDI practices and innovation impacts.

Data analysis

Over four months, we conducted 17 semi-structured video interviews, each lasting 43 to 96 minutes, resulting in 508 pages and 210,374 words of transcribed data. Transcription was done using word processing, and NVivo was employed for thematic analysis, following management and organizational studies practices (Dougherty & Bowman, 1995).

Using an inductive approach with open, axial, and selective coding, insights were derived from managers' experiences, identifying three key practices for developing value propositions to drive DDI. These practices were further broken down into sub-practices supported by various firm and marketing competencies and resources. This analytical process, guided by Spiggle (1994), involved categorizing qualitative data by labelling the components of value propositions organization’s resources, such as mastering systems and platform digitalization, codifying knowledge based on context, or materializing value proposition elements, among others.

The analysis abstracted these components into higher-order constructs: (1) value capture practice, (2) value articulation practice, and (3) value leverage practice. Each main practice was subdivided into distinct sub-practices, including, for instance, for (1), outside-in relationship building, for (2), coordinating actors' knowledge, and for (3), assessing scalability.

Through abstraction, commonalities in DDI typologies—adapted product or service, digitalized service innovation, data monetization, and global integrated solution—were identified. Through comparison, frequency ranking and dimensionalization were used to

discern commonalities across resources and practices, leading to the categorization of DDI types and the development of a model for DDI value propositions.

Our iterative analysis process involved refining initial insights with other researchers, focusing on distinguishing features and shared patterns during the refutation phase, until theoretical saturation was achieved (Charmaz, 2006). **Appendix 1-2.** outlines our codebook structure with a frequency-based ranking of occurrences.

To ensure trustworthiness, we sampled diverse organizations across sizes, sectors, and industries, enhancing broad applicability and minimizing bias (Lincoln & Guba, 1985). Researcher and data triangulation, combined with validation through the S-D logic framework and existing literature, assured internal consistency. Findings were further validated through peer discussions at the Industrial Marketing Management Summit, involving experts in value proposition and digitalization-linked servitization.

This meticulous approach is depicted in **Figure 4-2.**



Figure 4-2.
Research procedure for Study 1: An inductive approach for architecting value propositions for DDI and exploring the derived DDI types

Findings

We first outline our findings on the architecture of value propositions for DDI. Second, we detail the identified DDI types resulting from these propositions. Finally, we offer a conceptual framework that combines resources and competencies from DDIC of marketing and the firm to achieve DDI types, forming the basis for our fsQCA configurational study.

Value propositions for driving DDI: a set of practices and integrated resources

Our findings identify three main aggregate practices: (1) value capture, (2) value articulation, and (3) value leverage, each comprising sub-practices. Aggregate (1) includes mastering systems and platforms digitalization, outside-in relationship building, and identifying customers' jobs-to-be-done. Aggregate (2) involves coordinating actors' knowledge, codifying knowledge based on the context, and testing, iterating, and reinventing. Aggregate (3) focuses on materializing value proposition elements, assessing scalability, and personalized assembling of value proposition elements. These practices collectively form a cohesive system for developing value propositions to drive DDI. The resources contributing to these practices originate from both the firm and marketing levels. To emphasize the role of DDIC of marketing, relevant resources and competencies extracted from literature (see Table 4-2.) are depicted in dashed lines in **Figure 4-3**.

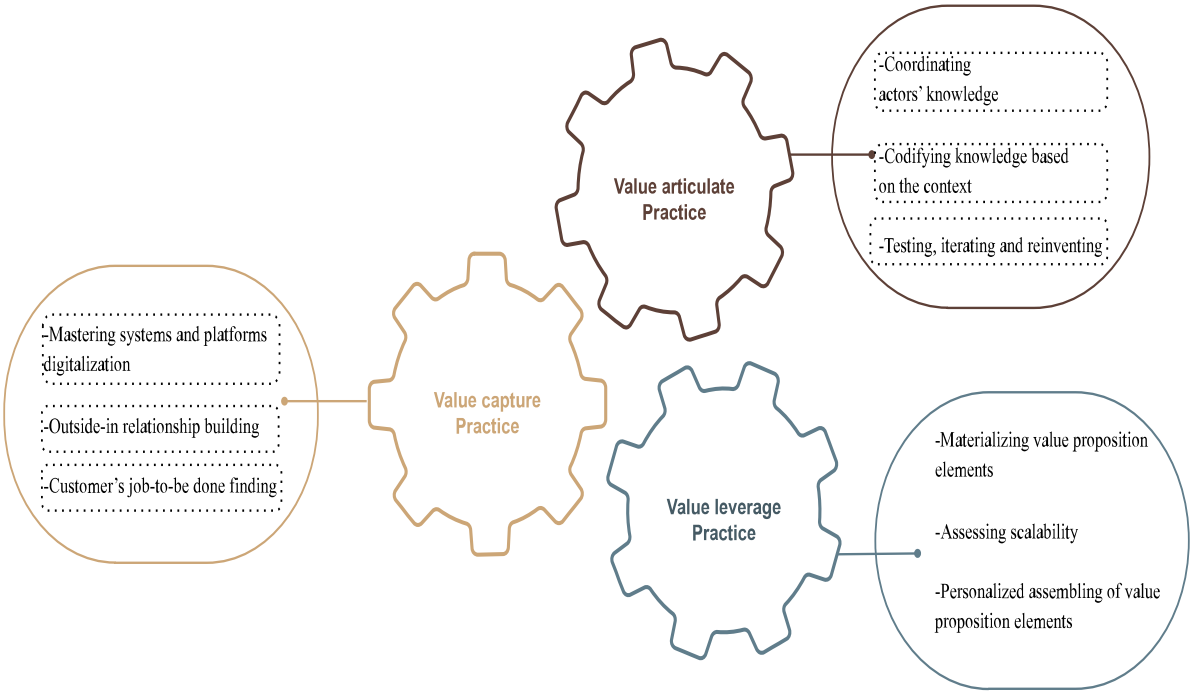


Figure 4-3. An architecture of value proposition for DDI

To craft DDI-linked value propositions, organizations employ interconnected practices requiring integrated resources and competencies to navigate the dynamic digital

paradigm (Hagberg et al., 2016). We illustrate these practices through an integrated gear system model (see Figure 4-3.), detailed below.

Value capture practice. This first practice identified by managers forms the foundation for capturing potential value for DDI. It includes three main sub-practices: mastering systems and platforms digitalization, outside-in relationship building, and customer's job-to-be-done finding. Key quotes from each sub-practice are included in **Appendix 1-3.**

Mastering systems and platforms digitalization involves developing an infrastructure with digital data and technology resources. Respondents highlighted the necessity of a formal, harmonized technological system to capture business environment information, especially for multinational companies aiming to globalize their innovation projects. This IT capability provides real-time access to information.

Outside-in relationship building requires active marketing department participation to bridge the market and the firm. Participants emphasized its crucial role in capturing value for DDI by listening to the market and maintaining permanent customer connections. This engagement helps propose DDI and manage a partners' ecosystem to capture additional value.

Customer's job-to-be-done finding was unanimously cited as essential for capturing value for DDI. This sub-practice focuses on identifying and addressing current and latent customer needs, reflecting the marketing department's role in developing customer-oriented resources:

> It's really quite different in terms of mechanics, we might say, where the idea is more about meeting a need rather than imposing a usage. We draw a lot from the inputs from the field, that is, from the customer, from our customer service and sales teams as well, who are, on a daily basis, close to our end users and with whom we often exchange to identify what the customers might need [...] Well, what would they like to see evolve? (6, E-marketing and communication director)

The other dimension of marketing resources highlights competencies in solving customer problems and capturing new value by providing additional or new benefits, as quoted below:

> You realize that you can generate more value when you really truly put yourself in the customer's shoes, in fact. There was one workshop that I really liked doing with my teams. It was what we called the value proposition, in fact. I used a value proposition canvas. There were different boxes, and in fact, when you were developing a product, the first thing you looked at was, it's about really putting yourself in the customer's skin, asking what the customer's problem is? What am I trying to solve for the customer? (13, Senior director product marketing)

In summary, our interviews revealed that implementing the value capture practice is essential for designing value propositions to drive DDI. This practice attracted significant attention from all respondents, regardless of their company's size, sector, industry, job function, or position. It serves as a pivotal element in architecting value propositions and

underscores the strategic role of the marketing department, with its resources in DDIC of marketing being crucial in building the value proposition.

Value articulate practice. This second practice is interrelated with the first value capture routine and can be summarized by the question: How do we communicate the captured value inside and outside the organization to drive DDI? This involves three sub-practices: coordinating actors' knowledge, codifying knowledge based on the context, and testing, iterating, and reinventing.

Coordinating actors' knowledge requires managerial skills to interpret data, understand analytics, and mobilize them when necessary. This sub-practice had the highest number of occurrences, as exemplified below:

> There are people who were responsible for coordination. In our sector, there are always coordination teams, market leaders who manage France, several markets, or in Europe, etc., and who coordinate, the link between the global team that creates the products and the markets. There's someone there for it and an entire team, but it goes for all topics. So, on all the topics that make up the life of the company [...] and who bring up the information."(17, France Marketing Director)

Second, *codifying knowledge based on the context* involves establishing processes to filter and absorb knowledge from customers, business partners, and internal staff. This converts knowledge into inputs for creating data-driven products and services tailored to business needs.

Testing, iterating, and reinventing is the final sub-practice, focusing on articulating value to customers. It received the most occurrences within this practice. Marketing agility, a key resource in DDIC, influences this sub-practice. It involves the department's ability to quickly offer various products or services, adapt to changing customer needs, or modify innovative routines to seize market opportunities. The DDI project team progresses iteratively to refine processes to achieve the DDI project.

In summary, the value articulation practice is crucial for disseminating extracted value in architecting a DDI value proposition. It integrates resources into mechanisms, processes, user cases, and iteration modes, serving as a vehicle for the value-in-use message, leading to the final value leverage practice.

Value leverage practice This is the final practice for architecting a value proposition for DDI. It examines which value proposition elements to leverage and how. Three sub-practices are identified: materializing value proposition elements, assessing scalability, and personalized assembling of value proposition elements.

Materializing value proposition elements involves translating and communicating the value proposition to customers. This process requires understanding customer needs and clearly conveying value elements so customers can realize the associated benefits. Respondents showed significant interest in this sub-practice, which involves two

dimensions: the physical representation of value elements and assessing how companies perceive the created value-in-use for customers.

Some participants noted issues with selling data. While customers saw the commercial potential, they struggled to envision its integration into their systems. Therefore, some companies created modeled interfaces to help clients materialize data affordances and understand the business value:

> The challenge we faced at the beginning of the data adventure at Helene company was the ability of people to materialize what it was because data remains very abstract and in the environment sector, people are used to having very concrete things. […] We had to create a data visualization interface so that people could see that it corresponded to something real, right. We had to make something that was a bit nice, even if it was utterly useless, we never sold it, but it was necessary to materialize this somewhat abstract data. It's weird, but well that's how it is, and we have to go through this because at the beginning people have a hard time grasping it. (2, commercial director)

Materializing value proposition elements means companies understand and communicate the value-in-use offered to customers. This can involve creating services that enhance customers' operational performance:

> Our mission is to try to work together to develop tools so that these partners can work with us easily and quickly. […] we develop tools in the sense of making their daily work easier. (5, Marketing product manager)

Assessing scalability is the second sub-practice in the value leverage practice. It involves ensuring that the value proposition offers a scalable and repeatable business model, making it easily understandable to both customers and the organization for industrial-scale operation.

Personalized assembling of value proposition elements is the final sub-practice, focusing on mass customization and unique customer experience. Using digitalized data for DDI allows firms to customize innovation outputs on a large scale, enabling mass customization without increasing costs, requiring high volumes, or taking too much time.

In summary, the value leverage practice, along with the value capture and value articulation practices, forms a cohesive system for architecting value propositions for DDI. Our qualitative analysis highlights the significance of DDIC of marketing and its resources in these practices, along with complementary firm resources and capabilities essential for value leverage. The analysis also identifies several types of DDI, which we describe in the following section.

DDI types derived from value proposition design

Our findings identify a typology of DDIs based on value proposition design, arguing that DDI results from combining firm and marketing resources within value proposition practices (S-D logic). Interviewees highlighted four servitized DDI types: (1) adapted product or service, (2) digitalized service innovation, (3) data monetization, and (4) global integrated solution. These types integrate distinct firm and marketing resources, providing specific value for customers. **Appendix 1-4.** presents examples for each DDI type, illustrated by firm and marketing resources, as well as the value-in-use it enables.

Adapted product or service. This type stems from a data-driven value proposition that is augmented by digitalized data. The product or service offered by the company is augmented, potentially creating a new and appealing value proposition for the customer. Companies offer enhanced value (economic, operational, functional) while operating within traditional competitive strategy frameworks (see environmental sector example in **Appendix 1-4.**). Despite these enhancements, the scope of products or services remains unchanged, and adaptation involves using existing or slightly improved resources to modify value propositions. Although frequently observed in our data, adaptations were excluded from our configurational study as it doesn't offer significant new insights into resource configurations for DDI.

Digitalized service innovation. This type of data-driven servitization is the result of shaped data-driving value proposition that is powered by data. This type of DDI actively depends on digitalized data. Digitalized service innovation, seen as service infusion, transition, or transformation (Kowalkowski & Ulaga, 2017; Rabetino et al., 2018), reflects companies shifting from stand-alone products to service-oriented strategies that better fit customer needs and drive business growth. Marketing resources are crucial in gathering market information and identifying opportunities, essential for developing new projects. To develop digitalized service innovation, B2B companies often interact with customers and engage in co-production practices, involving extended networks of buyers, sellers, and other parties. An example is a product-as-a-service offer to optimize the procurement system in the energy sector (see **Appendix 1-4.**).

Data monetization and global integrated solutions. These DDIs stem from data-centric value propositions transformed by digitalized data. Both types incorporate co-creation practices to develop new value propositions for customers. Co-creation involves collaboratively creating experiences and embedding tacit knowledge and skills from a broad spectrum of actors, extending beyond traditional industry boundaries. This approach transforms customer interactions into a comprehensive ecosystem of stakeholders.

Data monetization. In B2B markets, data monetization generates new revenue streams by incorporating data into firms' value propositions, often through new business models (Ritala et al., 2024). It involves using data to create economic benefits, such as cost savings

or additional revenues (Liozu & Ulaga, 2018). This DDI requires substantial investment in digital technologies, software-based sensors, data processing, and organizational firm and marketing capabilities to transform raw data into actionable insights, providing new value for customers. One interviewee described developing a value proposition to sell a data product to a global network of actors (see **Appendix 1-4.**).

Global integrated solution. This approach focuses on customized offerings, co-production, and long-term customer relationships (Grönroos, 1995; Normann, 2001; Vargo & Lusch, 2004), addressing unique business needs through digitalized data. It requires servitized DDI offerings that surpass traditional product boundaries, moving towards comprehensive integrated solutions. This shift redefines roles and activities for suppliers, customers, and partners within the value stream. Firms must enhance competencies by reallocating resources and acquiring new ones, focusing on system integration, operational services, and, where applicable, business consulting and financing. For example, a digitalized data value proposition in the semiconductor industry was proposed to meet the needs of an automotive client (see **Appendix 1-4.**).

In summary, this initial study lays the groundwork for a conceptual framework, forming the basis for our configurational analysis using fsQCA. The goal was to provide empirical material to identify causal conditions leading to various DDI types. We argue that value proposition practices in B2B firms involve dynamic interactions between DDIC of marketing and firm resources. These qualitative insights align with DDIC of marketing, defined as a dynamic capability interacting with complementary firm resources (Ravat et al., 2024). To create effective value propositions for DDI, B2B firms must consider the complex relationships among marketing and firm resources, allowing for multiple configurations. Based on these insights, we propose:

Proposition 1: Achieving the identified DDI types results from appropriate configurations of marketing and firm resources.

Proposition 2: The presence or absence of these resources can either promote or inhibit DDI types.

The figure below summarizes our configurational approach research model, which guides the confirmatory study using fsQCA analysis. This second study tests various pathways for combining firm and marketing resources to achieve specific DDI types, presented in the following section.

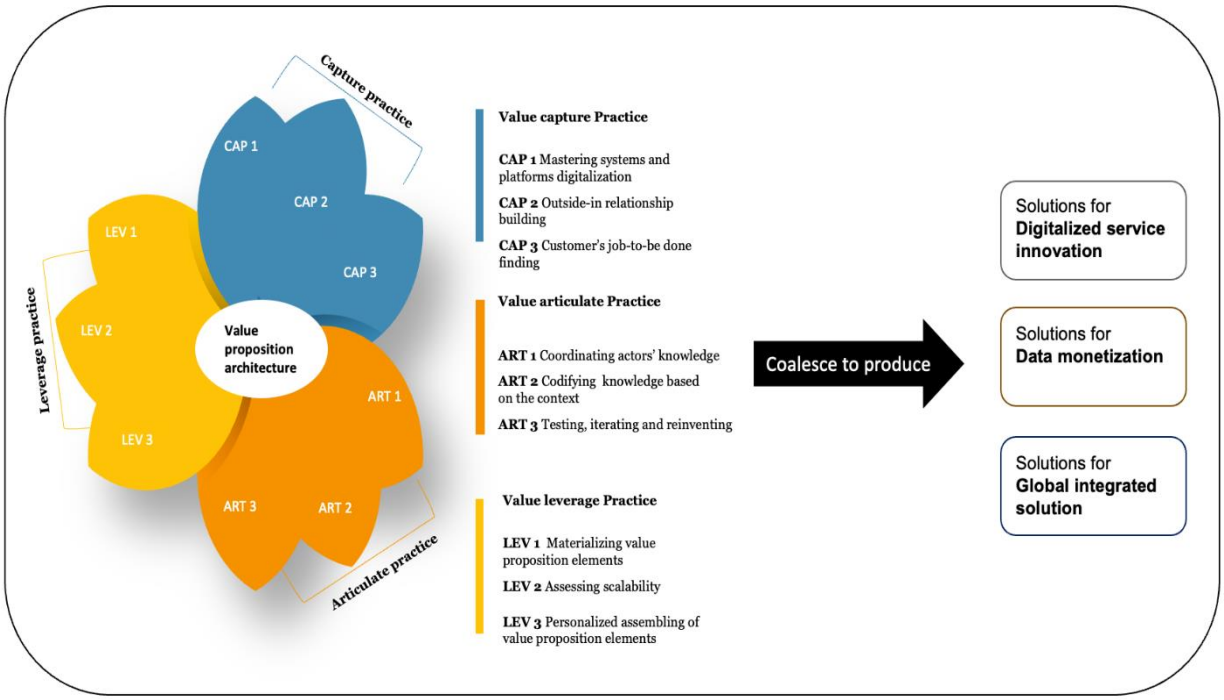


Figure 4-4. A configurational research model of marketing and firm resources to achieve different types of DDI.

1.5.2. Study 2: Configurational approach of DDIC of marketing and firm resources to drive DDI types

Research reveals a knowledge gap in how specific resource sets, particularly marketing ones, impact DDI outcomes, often assessed separately (Chatterjee et al., 2021; Eriksson & Heikkilä, 2023; Sultana et al., 2022). This study explores the interactions between various marketing and firm resources to achieve DDI types. We focus on three DDI types that significantly impact value proposition practices and resource configurations, extending beyond traditional B2B competitive landscapes: (1) digitalized service innovation, (2) data monetization, and (3) global integrated solutions. These types represent new strategic directions for B2B companies in the digital era, illustrating how digitalization can transform B2B strategies by transforming their resources arsenal.

The previous qualitative analysis underscores the need for a configurational analysis to understand the interplay between firm-level and marketing-specific resources in shaping DDI outcomes, as proposed in *Proposition 1*. We advocate an intricate web of resources and practices as necessary configurations to drive DDIs. Qualitative Comparative Analysis (QCA), rooted in Boolean algebra and fuzzy set theory, analyzes cases involving multiple feature combinations. QCA identifies configuration patterns, highlighting similarities and differences (Ragin, 1987, 2008; Rihoux & Ragin, 2009). QCA's value lies in analyzing

complex complementarities among factors, where outcomes result from various causal combinations, or "recipes" (Ragin, 2008).

FsQCA (fuzzy-set Qualitative Comparative Analysis), a QCA subset, uses continuous or interval scale variables, providing a more precise consistency assessment compared to crisp-set QCA, limited to binary analysis (Ragin, 2008). We applied fsQCA to identify asymmetrical causal conditions, acknowledging that multiple resource configurations can lead to similar DDI outcomes (equifinality) and that different combinations significantly influence outcomes (causal asymmetry), as suggested by *Proposition 2.* By employing fsQCA, we aim to reveal strategic configurations underpinning DDI initiatives, offering a granular understanding of how specific resources and practices foster innovation in the digital age.

Data collection

Survey instrument. To explore causal conditions leading to three types of servitized DDI, we created a survey for easy replication, effectively examining numerous factors simultaneously (Pinsonneault & Kraemer, 1993). Configurational analyses at the firm level often utilize survey data (Fiss, 2011). We thus design our study using a survey structured into five sections. The first section selects key informants by gathering basic information about them and their involvement in DDI. The next three sections delve into competencies related to capturing, articulating, and leveraging value for DDI. The final section seeks insights into the various types of DDI. The questionnaire comprised a total of 26 questions. The questionnaire includes 26 questions based on established literature scales, adapted for our DDI context, answered on a seven-point Likert scale from 1 (strongly disagree) to 7 (strongly agree), .a common practice for measuring abstract concepts in empirical research (Kumar et al., 1993). Marketing faculty reviewed the initial questionnaire, and a pre-test with industry professionals assessed face validity and appropriateness, leading to further adjustments. Details of the survey instrument are in **Appendix 1-5..**

Sample. The online survey began with a welcome message explaining the study's purpose and obtaining informed consent. To avoid biases and ensure a representative sample, strategies included assurances of anonymity and data use for research only. An attention check CAPTCHA prevented bot responses, and data integrity was ensured by excluding too-quick (less than 50% of the median time) or incomplete responses.

Participants were drawn from B2B companies of various sizes and sectors via Prolific[18], targeting individuals from junior to top management, including leaders in marketing, business strategy, R&D, and finance. Participants, offered a modest cash incentive, took an average of 9 minutes to complete the survey. Out of 100 individuals approached, 94 participated, with 65 responses considered usable after applying completion time and relevance criteria, excluding B2C sector participants. An additional round focused on marketing personnel added 34 responses, and a network of managerial contacts in France,

[18] https://www.prolific.com/

Switzerland, and Germany contributed 4 more, totaling 103 key informants. This diverse sample spans various industries and management levels, detailed in **Table 4-3** below.

Table 4-2. FsQCA research sample characteristics

Characteristics	**Sample (N = 103)**	**Proportion (%)**
Sector		
Goods	23	22,3%
Services	80	77,7%
Industry		
Agriculture Forestry Fishing and Hunting	1	1,0%
Arts Design and Communication	1	1,0%
Automotive Industry	3	2,9%
Computer and Electronics Manufacturing	2	1,9%
Construction	5	4,9%
Electrical and Electronic Appliances	3	2,9%
Finance and Insurance	20	19,4%
Information Services and Data Processing	1	1,0%
IT Digital services and Consulting	20	19,4%
Legal Services	1	1,0%
Manufacturing	11	10,7%
Marketing Services and Consulting	6	5,8%
Medical/healthcare	6	5,8%
Other (non communicated)	5	4,9%
Scientific or Technical Services	3	2,9%
Software and Internet Solutions	7	6,8%
Telecommunications	2	1,9%
Tourism and hospitality	1	1,0%
Transportation and Warehousing	2	1,9%
Energy	1	1,0%
Publishing	2	1,9%
Firm size		
10-49	6	5,8%
50-249	35	34,0%
250-999	20	19,4%
1000+	42	40,8%
Country		
Canada	1	1,0%
France	3	2,9%
Germany	7	6,8%
India	4	3,9%
Ireland	10	9,7%
Mexico	2	1,9%
Netherlands	6	5,8%
Poland	2	1,9%
Portugal	3	2,9%
South Africa	9	8,7%

Sweden	4	3,9%
Switzerland	3	2,9%
Turkey	1	1,0%
United Kingdom	15	14,6%
United States	24	23,3%
Undisclosed	9	8,7%
Function in organization		
IT/Data analysis/CX (customer experience)	24	23,3%
Engineering (e.g. software)	7	6,8%
Finance or Accounting	7	6,8%
Marketing / Product Management	50	48,5%
Project or Program Management	9	8,7%
Research & Development	4	3,9%
Sales / Business Development	2	1,9%
Industry role		
Consultant	6	5,8%
Junior Management	12	11,7%
Middle Management	63	61,2%
Upper Management	19	18,4%
Trained Professional	3	2,9%

Construct definition and measurement. Our practices for shaping the value proposition for DDI are based on integrated resources embedded in organizational capabilities, which form the basis for measuring the concepts.

Capture value practice requires competencies in system and platform digitalization, outside-in relationship building, and identifying the customer's job to be done. System digitalization assesses data and technology resources (Mikalef & Krogstie, 2020). Outside-in relationship building evaluates the marketing department's connections with customers and partners (Mu, 2015). Identifying customer job to-be-done measures marketing's customer orientation and market orientation to deliver superior customer value (Nakata et al., 2018; Jaworski & Kohli, 1993; Narver & Slater, 1990).

Value articulate practice requires competencies in actors' knowledge coordination, knowledge codification based on the context, and skills for testing, iterating, and reinventing for innovation. Knowledge coordination involves integrating internal and external knowledge for DDI (Mikalef & Krogstie, 2020). Contextual codification converts coordinated knowledge into actionable insights (Gold et al., 2001). Marketing agility, essential for testing and iterating, assesses organizational responsiveness (Zhou et al., 2019).

Value leverage practice relies on competencies in materializing value proposition elements, assessing scalability, and customizing value proposition components. Materializing value proposition elements involves delivering performance, pricing, relationship, and co-creation value (Ngo & O'Cass, 2009). Scalability is measured using

Zhao and Di Benedetto's (2013) scale for organizational scalability. Personalized assembling of value proposition elements measures the organization's capacity for customization, on a large industrial scale, i.e, customizing offers at high volumes (Zhang et al., 2015).
Our investigation focuses on three types of DDI shaped by value propositions: digitalized service innovation (e.g., product-as-service, add-on service), data monetization, and global integrated solution. We draw on De Luca et al. (2021) for service innovation measure, Parvinen et al. (2020) for data offering, and Worm et al. (2017) for global integrated solution, tailoring these to our data-driven context. **Appendix 1-5.** lists the measures used to develop our survey questions.

Construct validity. We used principal component analysis to pretest the measurement properties of our Likert scales. The results show good reliability and construct validity. Reliability was confirmed by Cronbach's Alpha values above 0.70, indicating adequate internal consistency. Convergent validity was established as the average variance extracted (AVE) for each construct exceeded 0.50 (Hair et al., 2010). According to the literature, these results are suitable for most research purposes (de Vaus, 2002; Hair et al., 2010).

Appendix 1-5. presents our descriptive statistics, including the multi-item scales, means, standard deviations, Cronbach's Alpha, and AVE.

Calibration and transformation of conditions

Calibration aligns fuzzy membership values with real-world context, enhancing fsQCA analysis validity and reliability. This step ensures that membership values accurately reflect the data and the researcher's understanding of the variables. We used three qualitative breakpoints: full membership (0.95), full non-membership (0.05), and the cross-over point (0.5). For seven-point Likert scales, thresholds were set at 6 (full membership), 4 (cross-over), and 2 (full non-membership) (Ordanini & Parasuraman, 2011; Pappas & Woodside, 2021).

Analysis of Necessary Conditions

Testing the necessity of each condition is crucial before constructing a truth table in fsQCA (Schneider & Wagemann, 2010). We examined whether any of the nine conditions of our value practices, or their negation, were necessary for achieving the three identified DDIs by checking if the condition was consistently present (or absent) when the outcome was present (or absent). As shown in Table 4-4., many conditions meet or exceed the consistency threshold of 0.90 (Ragin, 2008; Schneider & Wagemann, 2010), indicating these conditions can fully explain the outcomes, confirming Proposition 2. Thus, digitalized service innovation, data monetization, or global integrated solutions can theoretically be achieved with the presence or absence of all other conditions.

Table 4-3. Overview of necessary conditions.

	Outcomes of interest					
	Digitalized service innovation		Data monetization		Global integrated solution	
Conditions	Consistency	Coverage	Consistency	Coverage	Consistency	Coverage
Value capture resources						
CAP 1 Infrastructure capability (data and technology)	0.95	0.92	0.98	0.68	0.93	0.88
~ CAP 1 Infrastructure capability (data and technology)	0.14	0.78	0.14	0.56	0.17	0.90
CAP 2 Outside-in relationship building capability (customer engaging, partner linking)	0.91	0.95	0.96	0.70	0.91	0.92
~ CAP 2 Outside-in relationship building capability (customer engaging, partner linking)	0.18	0.74	0.19	0.55	0.20	0.79
CAP 3 Customer orientation capability	0.96	0.93	0.97	0.67	0.95	0.90
~ CAP 3 Customer orientation capability	0.13	0.71	0.15	0.60	0.14	0.75
Value articulate resources						
ART 1 Human managerial skills	0.90	0.94	0.96	0.71	0.90	0.91
~ ART 1 Human managerial skills	0.19	0.77	0.19	0.53	0.20	0.79
ART 2 Knowledge conversion capability	0.91	0.93	0.96	0.69	0.91	0.90
~ ART 2 Knowledge conversion capability	0.17	0.78	0.19	0.61	0.19	0.83
ART 3 Marketing agility	0.83	0.97	0.88	0.73	0.82	0.94
Value leverage resources						
LEV 1 Value offering elements materialization	0.96	0.94	0.97	0.67	0.95	0.90
~ LEV 1 Value offering elements materialization	0.13	0.72	0.14	0.58	0.14	0.77
LEV 2 Scalability capability	0.89	0.93	0.94	0.70	0.89	0.90
~ LEV 2 Scalability capability	0.20	0.79	0.19	0.56	0.21	0.82
LEV 3 mass customization capability	0.82	0.97	0.90	0.75	0.82	0.95
~ LEV 3 mass customization capability	0.28	0.78	0.27	0.52	0.30	0.81

Note: ~ represents the absence of a condition

Analysis of sufficient conditions

The first step involves constructing the truth tables and reducing the number of rows, and the second step involves analyzing the truth tables by interpretating the configurations for every DDI type outcome, modelized by the Quine-McCluskey algorithm.

Step 1 - Construction of truth table. We constructed a truth table listing all possible combinations of conditions and assigned empirical cases to these configurations to determine if they lead to the outcome (Fiss, 2011). By applying minimum frequency and consistency thresholds, we reduced the truth table to relevant and consistent configurations. When a necessary condition is identified, truth table rows without this condition are excluded from the minimization process (Schneider & Wagemann, 2012; Wagemann et al., 2016). Each truth table, featuring 2^k rows where k is the number of predictors, is detailed in **Appendix 1-6.**. We separated configurations fostering DDI types by specifying the consistency cutoff value as 0.80 and the number-of-cases threshold as 1 (Ragin, 2009). Consistency reflects how well cases adhere to set-theoretical relationships, akin to statistical significance in regression analysis (Park, 2017).

Step 2 - Analysis of the configurations for DDI outcomes. Following Ragin's (2009) recommendation, we employed standard fsQCA analysis to generate solutions for the three DDI types: (1) digitalized service innovation, (2) data monetization, and (3) global integrated solution. This approach offers a nuanced understanding of resource configurations needed to achieve these outcomes. The fsQCA produces three types of solutions: complex (no logical remainders), intermediate (some logical remainders), and parsimonious (all logical remainders). We opted for the intermediate solution, as it incorporates simplifying assumptions aligned with theoretical expectations (easy counterfactuals), reducing complexity without unreasonable assumptions.

These solutions combine conditions for value capture, value articulation, and value leverage into various causal recipes to explore their contributions to different DDI types. Using an algorithm based on Boolean algebra, we simplified truth table rows into straightforward combinations (Ragin, 2009). This strategy differentiates between core and peripheral causal conditions: core conditions are essential for the outcome, while peripheral conditions are less crucial (Fiss, 2011). Our findings are reported in **Table 4-5.**. We conducted analyses for configurations leading to (1) digitalized service innovation, (2) data monetization, (3) and global integrated solution. The presentation of the findings is as follows: black circles (●) indicate the presence of a condition, and blank spaces represent a "don't care" condition, where the causal factor may be present or absent. Larger circles denote core conditions, and smaller circles indicate peripheral conditions.

Table 4-4. Configurations for DDI types

Solutions (identified DDI types)					
	Digitalized service innovation		Data monetization	Global integrated solution	
Configuration	1a	1b	2	3a	3b
Value capture resources					
CAP 1 Infrastructure capability (data and technology)	•	•	•	•	•
CAP 2 Outside-in relationship building capability (customer engaging, partner linking)	•	•	•	•	•
CAP 3 Customer orientation capability	•	•	•	•	•
Value articulate resources					
ART 1 Human managerial skills	•	•	•	•	•
ART 2 Knowledge conversion capability	•	•	•	•	•
ART 3 Marketing agility	•		●	•	
Value leverage resources					
LEV 1 Value offering elements materialization capability	•	•	•	•	•
LEV 2 Scalability capability		•	•		•
LEV 3 Mass customization capability			●		
Consistency	0,99	0,98	0,83	0,97	0,97
Raw coverage	0,76	0,80	0,81	0,77	0,82
Unique coverage	0,02	0,06	0,81	0,02	0,07
Overall solution consistency	0,98		0.83	0,83	
Overall solution coverage	0,83		0.81	0,96	

The findings in **Table 4-5.** indicate that the solutions for each identified DDI type show high consistency and reliability. Using the Quine-McCluskey algorithm, we modeled three DDI types with high coverage, providing evidence of its relative empirical importance (Ragin, 2008).: 83% of cases with high digitalized service innovation corresponded to two combinations of conditions (1a, 1b); 81% of cases with high data monetization corresponded to one combination (2); and 83% of cases with high global integrated solutions corresponded to two combinations (3a, 3b). Each configuration also demonstrated a high degree of consistency.

As evident from the results, the five configurations underscore the significance of considering marketing resources, particularly those embedded in value capture practice. Additionally, two resources integrated into value articulate practice, namely human managerial skills (ART1) and knowledge conversion capability (ART2), and one organizational resource included in value leverage practice, namely value offering elements materialization capability (LEV1), are identified as necessary conditions in all five configurations. This was also confirmed by our previous necessary conditions analysis.

These findings highlight the critical role of the marketing department and its competencies embedded in value capture resources. They also confirm the necessity for managers to articulate data by filtering and codifying knowledge into actionable insights for innovation. Additionally, the findings emphasize the importance of value leverage resources associated with value proposition activities to help customers understand the value and experience offered by these DDI outcomes (LEV 1). We can qualify all these conditions as INUS conditions (Insufficient but Necessary part of an Unnecessary but Sufficient condition) (Ehrenstein, 2022). This means that while each condition alone is not sufficient to explain every DDI type, their combination is necessary to achieve a comprehensive model, thus confirming *Proposition 1*.

Some differences were revealed depending on the DDI achieved. In the context of *digitalized service innovation* outcomes, two configurations were identified. Apart from the previously mentioned marketing and firm resources, the configurations indicate that marketing agility (ART3) is a necessary condition in configuration 1a and a “don’t care” condition in configuration 1b. This indicates two levels of marketing agility for marketing department: advanced (1a) and unconcerned (1b). Moreover, both configurations (1a: 0.99, 1b: 0.98) show high consistency and raw coverage (1a: 0.76, 1b: 0.80). Mass customization capability (LEV3) is a “don’t care” condition in both, while scalability capability (LEV2) is necessary only in solution 1b.

Configurations for *data monetization* highlight the importance of considering every resource to engage in this DDI type, indicating that the complete set of variables is necessary to comprehensively explain data monetization. The algorithm proposed a single combination, exhibiting high coverage (81%) and reasonable consistency (83%).

Marketing agility (ART3) and mass customization capability (CLEV3) also play crucial roles and can be considered core conditions. Additionally, identical levels of raw and unique coverage (0.81) imply that this configuration solely explains the cases it covers, without overlap from other configurations. In conclusion, all conditions are essential for precise data monetization modeling, as they each contribute uniquely and necessarily, ensuring high coverage and consistency by capturing the phenomenon's complexity and preventing redundancy. The recent development of data monetization, compared to digitalized service innovation or global integrated solutions within B2B companies, may explain this result.

Lastly, the *global integrated solution* outcome presents two configurations identical to those for digitalized service innovation, showing a high overall consistency level (0.83), albeit to a lesser extent than digitalized service innovation, and high solution coverage (0.96), which is of greater importance than for digitalized service innovation. On the one hand, digitalized service innovation involves transitioning from stand-alone products to a strategy emphasizing services (e.g., product-as-service, add-on service). On the other hand, the global integrated solution requires servitized DDI offerings that surpass the traditional boundaries of the existing product base and the product-service continuum, moving towards comprehensive integrated solutions. Digitalized service innovations are then seen as part of the global integrated solution strategy development. To conclude, the marketing and firm resources that combine to achieve both global integrated solutions and digitalized service innovation are considered similar. Finally, the sample selection, which did not consider sector, industry, size, or country, may have limited nuanced findings.

Analysis of the absence of DDI outcomes

We used the fsQCA algorithm to identify which marketing and firm conditions lead to the absence of (1) digitalized service innovation (~1), (2) data monetization (~2), and (3) global integrated solutions (~3). Applying similar thresholds revealed different causal configurations for these absences (**Appendix 1-7.**). Each DDI outcome showed stable combinations between complex and intermediate solutions, with no simplification found, reflecting the full complexity of causal relationships. This stability suggests the conditions in the complex solutions are robust, even when simplified, indicating their importance for both researchers and practitioners. Researchers can develop robust theories, while practitioners can understand the essential conditions central to these DDI outcomes.
The intermediate solution for the absence of digitalized service innovation (~1) and global integrated solutions (~3) showed high consistency (0.85 and 0.81, respectively). However, the configurations for the absence of data monetization (~2) had a slightly lower consistency (0.78), indicating they are useful but moderately reliable and potentially improvable.

Appendix 1-7. demonstrates causal asymmetry, where configurations leading to the absence of a DDI outcome are not the mirror opposites of those leading to their presence. For example, configurations for the absence of digitalized service innovation (~1) and global integrated solutions (~3) differ from their presence configurations, showing unique solutions, one specific for the absence of digitalized service innovation and two specific for the absence of global integrated solution. This asymmetry is also evident in the INUS conditions that manifest in the absence of these outcomes. The INUS conditions reported in the presence of these outcomes are not their exact opposites across all configurations for their absence.

For the absence of (1) ~ digitalized service innovation and (3) ~ global integrated solution, we found similar INUS conditions, which reinforce the consideration of (1) digitalized service innovation as part of the (3) global integrated solution, as demonstrated earlier: CAP1, CAP2, CAP3, ART2, ART3, LEV1, LEV2, LEV3. For the absence of (2) ~ data monetization, the conditions are: CAP1, CAP2, CAP3, ART1, ART2, ART3, LEV1, LEV2, LEV3, which are also all necessary for the presence of this outcome. Lastly, no core conditions were revealed for the absence of (2) ~ data monetization.

Robustness check

The robustness check of the fsQCA was conducted with sensitivity tests. We calibrated the consistency level at 0.75 with a minimum case threshold of 2, and at 0.85 with a minimum case threshold of 2. The results showed a single solution for (1) digitalized service innovation and (3) global integrated solution, identical to those in Table 4 (solutions 1b and 3b, respectively). This indicates that a higher number of cases can reduce solution proposals. For (2) data monetization, results differed slightly: marketing agility (ART3) became a "don't care" condition at both consistency levels, while mass customization capability (LEV3) was a core condition at 0.75 and a sufficient condition at 0.85. Robustness is indicated by the solution consistency and coverage levels that remain the same regardless of the calibrated threshold for consistency, except for (2) data monetization where a difference is observed. The results are shown in **Tables 4-6.** and **4-7..**

Table 4-5. Intermediate solutions representation for configurations of DDI types, consistency level of 0.75 and frequency threshold of two cases.

	Solution coverage	Solution Consistency
(1) **digitalized service innovation**		
CAP1*CAP2*CAP3*ART1*ART2*LEV1*LEV2*	0.80	0.99
(2) **data monetization**		
CAP1*CAP2*CAP3*ART1*ART2*LEV1*LEV2*LEV3	0.84	0.84
(3) **global integrated solution**		
CAP1*CAP2*CAP3*ART1*ART2*LEV1*LEV2	0.82	0.97

Notes:

1."*" means presence of the condition.

2. CAP1: Infrastructure capability (data and technology); CAP2: Outside-in relationship building capability (customer engaging, partner linking); CAP3: Customer orientation capability. ART1: Human managerial skills; ART2: Knowledge conversion capability. ART3: Marketing agility; LEV1: Value offering elements materialization capability; LEV2: Scalability capability; LEV3: Mass customization capability

3. LEV3: Presence of a core condition

Table 4-6. Intermediate solutions representation for configurations of DDI types, consistency level of 0.85 and frequency threshold of two cases.

	Solution coverage	Solution Consistency
(1) **digitalized service innovation**		
CAP1*CAP2*CAP3*ART1*ART2*LEV1*LEV2*	0.80	0.99
(2) **data monetization**		
CAP1*CAP2*CAP3*ART1*ART2*LEV1*LEV2*LEV3	0.84	0.81
(3) **global integrated solution**		
CAP1*CAP2*CAP3*ART1*ART2*LEV1*LEV2	0.82	0.97

Notes:

1 "*" means presence of the condition.

2. CAP1: Infrastructure capability (data and technology); CAP2: Outside-in relationship building capability (customer engaging, partner linking); CAP3: Customer orientation capability. ART1: Human managerial skills; ART2: Knowledge conversion capability. ART3: Marketing agility; LEV1: Value offering elements materialization capability; LEV2: Scalability capability; LEV3: Mass customization capability

We performed another sensitivity test by recalibrating the threshold for full set membership to 6.5 and adjusting each variable accordingly. No significant changes were observed, except for minor variations in the number of cases within solutions and the consistency levels for necessary and sufficient conditions. The results for (3) global integrated solution remained the same as in Table 4, and only solution 1b was proposed for (1) digitalized service innovation. For (2) data monetization, the results were identical to Table 4, except that marketing agility (ART3) became a "don't care" condition, while mass customization capability (LEV3) remained a core condition. These outcomes confirm the consistency and robustness of our calibration method.

1.6. Discussion

Drawing on the S-D Logic view, this study investigates how to architect value propositions for DDI by decomposing them into sets of practices and sub-practices. We explored how resource bundles within these practices lead to different DDI types, focusing on the role of DDIC of marketing. Using an fsQCA approach, we examined causal resource configurations for each DDI type. Our analysis provides the following results:

- The architecture of value propositions for DDI comprises three interrelated practices: value capture, value articulation, and value leverage, each with distinctive sub-practices.
- Achieving these practices requires specific resources from both marketing and the organization. The resources of DDIC of marketing play a significant role in fulfilling value propositions for DDI.
- This architecture identifies different DDI types, each resulting from a combination of marketing and firm resources embedded in value practices.
- Configurational analysis revealed two resource combinations for digitalized service innovation and global integrated solution, and one for data monetization.
- The configurations highlight similarities and differences, underscoring the key role of marketing resources in each solution.
- All solutions rely on similar marketing resources for value capture, managerial skills for value articulation, and the firm's ability to materialize value offering elements for value leverage.
- Differences among configurations include the role of mass customization capability, only crucial for data monetization, and the varying importance of firm scalability capability across DDI types.

- Marketing agility's role varies, oscillating from essential to core condition in some configurations but negligible in others.

We now discuss the theoretical and managerial implications.

1.7. Theoretical implications

The findings of both studies add to the literature in several ways.

Value proposition research field

Using the S-D Logic (Vargo & Lusch, 2004) perspective, we confirmed that architecting value propositions for DDI involves an interrelated system of practices and sub-practices. This aligns with Skålén et al. (2015), who found that value propositions for service innovation consist of ten practices, created either separately or conjointly. Our study extends their findings by confirming that all DDI types are created collaboratively, illustrated by capabilities like outside-in relationship building, coordinating actors' knowledge or personalized assembling of value proposition elements. We argue that practice theory aids in understanding the collaborative innovation phenomena of DDI for shaping value propositions by focusing on micro-level collaborative sub-practices (Kohtamäki & Rajala, 2016).Moreover, we extended service innovation context to the broader scope of servitization, especially DDI., and tested our identified marketing and firm resources using fsQCA to configure pathways leading to specific DDIs.

Secondly, in a more holistic approach, we contribute to the contemporary literature on value propositions (Eggert et al., 2018; Payne et al., 2017) by linking market knowledge and innovation to the value proposition. Following the S-D Logic, Payne et al. (2017) emphasized evaluating the combination and relevance of key resources-integrating actors for creating effective value propositions, and which activities assist. We addressed this by detailing activities related to DDI, namely the practices of value, executed through the integration of resources integrated in DDIC of marketing, can form the corresponding value proposition. Following Korkman et al. (2010), we state that "practices are resource integrators," and that value proposition practices are marketing capabilities integrators (Moorman & Day, 2016). Additionally, literature underlined the need to reveal which underlying mechanisms can nurture the process of value proposition design (Storbacka & Nenonen, 2011) and we demonstrated that the value proposition for DDI is organized into a system of three intertwined aggregated practices, illustrated by gears.

Thirdly, this study significantly contributes to the concept of value propositions in DDI by identifying resource configuration patterns. It aligns with Ranta et al. (2020), emphasizing the importance of value proposition research due to its performance implications in

various contexts. Grimes-Rose et al. (2024) extended this by empirically testing which marketing and organizational resources enhance value proposition implementation. However, they noted that the identified resources might not encompass all explanatory factors, especially in DDI. DDI, as an emerging strategy, requires asymmetrical techniques based on complexity theory, such as fsQCA (Kumar et al., 2022). This study advances the field by proposing configurational patterns of value proposition architecture for DDI, aiming to better predict and explain real-world business and complex phenomena.

DDI research field

As research on DDI within B2B marketing is still emerging, our fsQCA study provides a theoretical foundation, capturing the complexity of causally relevant conditions and facilitating further investigation (Kraus et al., 2018).

First, based on the S-D logic, our findings also support the view that digitalized data enable developing global integrated solutions, intending to address customers' needs in a holistic value chain perspective. It echoes research on servitization that states, “the new focus in research today is not on the differences between goods and services but on differences in how we want to portray value creation with customers (and other stakeholders) where the customer's perspective is emphasized” (Edvardsson, 2005, p.118). Following up this approach, we enriched research on the integrated solutions concept from a service-centered perspective by decomposing specific elements of value propositions that lead to global integrated solutions.

Second, our study provides insights into the data monetization concept, detailing resources integrated into value proposition practices that lead to it. Our results align with research on data-driven value propositions for selling data-driven products and services (Ritala et al., 2024). These authors highlighted the role of digital assets in shaping value propositions and suggested methods like fsQCA to identify key conditions for monetizing data. We quantitatively measure data monetization by examining paths of resource combinations leading to it. To our knowledge, there is no quantitative approach on data monetization.

Third, from a broader perspective, we link DDI more closely to B2B strategic marketing theory. Typically associated with technical, technological, and operational capabilities, DDI is explored in fields like information systems, production, and innovation. By analyzing DDI from a marketing perspective, we highlight the marketing department's strategic influence, confirming that market-based capabilities and customer needs knowledge are essential complements to technological capabilities for achieving DDI.

DDIC of marketing research construct

From a marketing perspective, we confirmed the crucial role of DDIC resources in shaping value propositions for DDIs and established a causal relationship between DDIC of marketing, value proposition, and DDI. We offered a clearer definition of the value proposition's contributive role (Chandler & Lusch, 2015) in the specific context of DDI (Lindič & Da Silva, 2011).

First, resources for capturing value, combining technology and data assets with marketing capabilities, are crucial for the three DDI solutions. This aligns with research linking infrastructure and market-orientation capabilities to DDI (Eriksson & Heikkilä, 2023b; Sultana et al., 2022) and highlights the importance of marketing in understanding customer needs in a digitalized business ecosystem (Day, 2011; Merrilees et al., 2011).We enrich the literature by explaining their critical joint role in three types of DDI.

Second, marketers' skills in coordinating and converting knowledge were identified as essential for articulating value potential in all three DDI types. Efficient knowledge management for DDI purposes is crucial in the digital era, supported by research on managing digitalized customer knowledge across the innovation process (TrabuChi & Buganza, 2019).

Lastly, marketing agility appears as an essential condition, a "don't care" condition in different configurations. Moreover, for data-monetization solution, it was evaluated as a core condition. This underscores the need to better understand marketing agility's role in innovation. Zhou et al. (2019) define marketing agility as the ability to anticipate and respond quickly to opportunities to satisfy customer needs. However, agility can be domain-specific or task-specific and may sometimes not involve the marketing function, explaining our varied results.

1.8. Managerial implications

Our findings reveal that managers can develop value propositions for driving DDI using an interactive system of value practices. It is essential to consider the three main aggregates and their sub-practices, regardless of the DDI outcome type. This strategy involves integrating various resource strategies based on similar foundations for each DDI type. Key marketing resources include infrastructure capability, outside-in relationship capability, and customer orientation capability for value capture practice, and human managerial skills and knowledge conversion capability for value articulation practice. At the firm level, managers need to develop the ability to materialize value proposition elements to leverage value for DDI. Depending on budgets and business objectives, companies can experiment with multiple data-driven value propositions and

market several DDI outcomes simultaneously. This approach highlights the marketing department's potential in capturing insights to form value propositions for the three identified DDIs. For example, a single insight can serve multiple value propositions for DDI, which is untypical in traditional new product development processes. Marketing can use these arguments to justify investments in building its outside-in information ecosystem, involving specific recruitments, digital infrastructure modifications, and partnerships with data companies, IT firms, hosting services, or data procurement. Our study serves as a guideline for decision-makers to inventory existing resources and identify additional ones needed before deciding on a particular DDI outcome.

Secondly, a notable implication lies in the similarities found in building value propositions for both digitalized service innovation and global integrated solutions. This suggests that marketers developing both DDIs should consider achieving them conjointly, possibly starting with a digitalized service innovation as a test before establishing a blueprint for a global integrated solution. For example, Caterpillar initially equipped some engines with sensors for digitalized service innovation before expanding to a global integrated solution, accelerating the adoption of connected products across four categories: equipment management, productivity, safety, and emissions[19].

Shifting towards data monetization requires significant investment, as it involves all identified resources to shape its value proposition. Although this type of DDI offers additional revenue, it often requires substantial investment before profitability, needing large-scale and highly personalized sales. Our study shows that marketing resources are deeply involved in shaping the value proposition for data monetization. Marketing departments capture internal and external data to construct the value proposition and play a crucial role in articulating this value. For instance, companies like Carrefour assign a predominant role to marketing, collaborating with suppliers to draft specifications for selling data monetization offers, ensuring high partner retention. Data monetization presents an opportunity for marketing to strengthen its role by leveraging its expertise in implementing an outside-in ecosystem to demonstrate its capability in defining targeted value propositions for data monetization. Moreover, the firm's ability to mass customize this offer suggests that turning data into business benefits can be a scalable and innovative strategy for B2B companies. As these DDIs are still in their infancy in the B2B environment, convincing the C-suite, especially those focused on product lines, is necessary. This study may help marketers create value propositions for data monetization, supported by upper management and by cultivating an organizational data-driven culture.

Lastly, DDI necessitates a customer-centric approach to innovation. Marketers must collaborate with clients to ensure successful DDI realization. Our study details collaboration mechanisms for marketers, from basic collaboration to co-creation

[19] (Subramaniam, 2022)

practices, based on the desired DDI type. Interviewees indicated that this is challenging, especially for companies' managers with technical backgrounds focused on technical rather than market aspects. It is commonly accepted that the marketing department links firms and their markets, capturing customer needs and market trends. Marketing strategies delineate the value customers can expect from engaging with firms. Our findings demonstrate that the marketing department is crucial for helping managers become customer-centric in achieving DDI projects. We suggest that marketers develop training programs, best practices, or use cases to enhance customer orientation.

Table 4-8. captures the practical implications, key takeaways, and actionable suggestions for marketers.

Table 4-7. Managerial implications

Instrumental area	Key takeaways	Suggestions
Value proposition Architecture	• Managers can develop value propositions for DDI using an interactive system of value practices. Consider the three main aggregates and inherent sub-practices for all DDI types. • Integrate resource strategies based on similar marketing resources for value capture and articulation, and leverage value by materializing value proposition elements at the firm level for all DDI types.	• Experiment with multiple data-driven value propositions and market several DDI outcomes simultaneously. • Invest on a robust outside-in information ecosystem with specific recruitments, digital infrastructure modifications, and partnerships with relevant companies.
Resources inventory	• Managers need to inventory current resources and determine additional needs before deciding on a particular DDI outcome.	• Use the study as a guideline for resources inventory and acquisition.
Value proposition similarities	• Similarities in building value propositions for digitalized service innovation and global integrated solutions suggest potential for conjoint development.	• Start with a digitalized service innovation offering as a first DDI test before establishing a blueprint for a global integrated solution.
Data monetization investment	• Data monetization requires significant investment as all identified resources are involved. • Marketing resources play a key role in capturing and articulating value, and mass customization capability is crucial to leverage the value proposition for data monetization.	• Leverage the marketing expertise from the outside-in ecosystem to demonstrate to board members the marketing capability to define targeted and appropriate value propositions. Convince upper management and cultivate an organizational data-driven culture.
Customer-centric innovation	• DDI requires a customer-centric approach, marketers must collaborate with clients to realize each type of DDI and marketing is key in capturing customer needs and market trends and delineating value contributions for customers. • This can be challenging for managers with technical backgrounds.	• Develop training programs, best practices, or use cases to embrace customer orientation. • Ensure active collaboration between marketing and clients with constant market learning.

1.9. Limitations and future research

While this study sheds light on the relationships between resources that fulfill practices for architecting value propositions for different types of DDI, it has some limitations. First, our sample did not consider size, sector, industry, or country. Establishing settings with firms in the same area or sector could provide more contrasted results. For more robust external validity, comparing our results across various contexts could confirm their generalizability and reveal whether our identified causal configurations remain consistent across different settings or populations.

Second, our conditions were selected based on our inductive analysis, which informed our questionnaire and may have introduced interpretative bias, potentially obscuring some variables. Additionally, our samples included a significant proportion of marketing managers to emphasize the role of DDIC in shaping value propositions for DDI. Expanding the sample to include more diverse respondents could have revealed additional conditions from across the organization, potentially accentuating distinctions between the three DDI types.

Third, adopting a contingency approach may further our understanding of how to structure value propositions to drive various DDI types, such as data-driven culture, level of digitalization, or upper management support. These factors are often analyzed as moderators or mediators in studies on digitalization and innovation.

Fourth, the stability of causal configurations across different solution types indicates that we captured fundamental aspects of the causal process, laying the groundwork for robust theoretical frameworks. We found identical causal combinations between digitalized service innovation and global integrated solution. To reinforce our findings, we suggest using structural equation modeling (SEM) on a larger sample. This validation can confirm the consistency of these resource-based causal inferences. Additionally, longitudinal research could illuminate the temporal dynamics of causal resources, capabilities, and DDI outcomes, providing a nuanced understanding of their interplay over time.

Fifth, the scarcity of quantitative research on data monetization contrasts with its recognition as a promising outcome of using digital data and tools. Given the nascent stage of data monetization research, there is a critical need for further study on how companies leverage data sales (Parvinen et al., 2020). Addressing both managerial and academic gaps, exploring data monetization presents a strategic opportunity for B2B companies to sustain competitiveness. We recommend detailed case studies and applying structural equation modeling via PLS analysis to delve deeper into this area.

In conclusion, this article seeks to explore how to architect value propositions for driving different DDI types by unveiling the power of DDIC of marketing. We encourage both academics and practitioners to build on these findings to contribute new insights on this topic.

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1.11. Appendices

Appendix 1-1. Qualitative research sample characteristics

N°/ Job title	Sector	Industry	Type of company /Country	Value proposition/focus of the study
1. Senior director, international marketing	Goods	Medical equipment manufac-turing	MNC[a] USA	Improving the operational performance of medical instruments users by making changes to the software that controls these instruments
2. Commercial director	Services	Marketing services and consulting	SME/SMI [b] France[g]	Enhancing the functionality of a marketing services platform for B2B customers based on their digital maturity level and personalized needs
3. CEO	Services	Training	VSB[c] France	Offering customized training programs to customers through enhanced segmentation and targeting
4. Data analytics director	Goods	Tourism	SME/SMI France	Creating data analytics reports available to the company and sellable to its partners to improve marketing operational efficiency and increase business value
5. Marketing product manager	Goods	Tourism	MNC France	Developing an enhanced product with improved features to boost customer operational efficiency and increase loyalty
6. E-marketing and communicatio n director	Services	Marketing services and consulting	SME/SMI France[g]	Enhancing the functionality of a marketing services platform for B2B customers based on their digital maturity level and personalized needs
7. E-commerce director	Goods	Cosmetics	MNC France	Making offers available, visible, and rapidly accessible to a wide range of retailers by optimizing the logistics system.
8. Marketing director	Goods	Energy	MNC France	Optimizing the procurement system in the energy sector to retain customers and acquire new ones
9. Chief planning officer	Goods	Automotive	MNC Japan	Developing added value-in-use by providing additional services such as maintenance, insurance, and financing
10. Marketing, data, and CRM[d] expert	Services	Marketing services and consulting	VSB France	Offering consulting services to companies looking to enhance their business value through data monetization offerings
11. Head of data	Services	IT [f], digital services, and consulting	MNC France	Creating a data product that can be sold to a network of worldwide partners to reduce customer acquisition costs and enhance targeted segmentation.
12. SME/SMI EMEA[e] vice president	Services	Sofware and Internet solutions	MNC France	Offering customized internet solutions through digitalized, finely-tuned market segmentation to gain market share
13. Senior director	Goods	Semi-conductors	MNC Germany[h]	

product marketing				Proposing a comprehensive integrated solution offering to meet the needs of a specific client and capture the entire value chain.
14. Head of product marketing	Goods	Semi-conductors	MNC Germany[h]	Proposing a comprehensive integrated solution offering that can be customized to meet specific needs
15. Marketing and Commercial director	Goods	Environment	SME/SMI France	Resolving a customer problem by proposing a service adapted to a specific need
16.Vice president customer experience and CRM	Goods	Electrical and electronic appliances manufacturing	MNC France	Developing B2B portal systems and platforms to simplify the daily operations of both customers and the company, thereby increasing loyalty
17. France marketing director	Goods	Cosmetics	MNC France	Establishing a direct-to-consumer system to enhance customer experience and loyalty

[a] MNC: Multinational company; [b] SME/SMI: Small and medium enterprise / small and medium industry; [c] VSB: Very small business; [d] CRM: Customer relationship management; [e] EMEA: Europe, Middle East, Asia; [f] IT: Information technology; [g] France: respondents from the same company; [h] Germany: respondents from the same company

Appendix 1-2. Data structure codebook and ocurrence frequency

1st order concepts	*2nd order themes*	*Occurrence frequency*	*Aggregate dimensions*
• Scanning and tracking technologies • Standardization, ubiquity and globalization of the information system • Digital information real time access capability	*Mastering systems and platforms digitalization*	*60*	**(1) Value capture practice**
• Pluri-resources information system Creation and management of an ecosystem of partners	*Outside-in relationship building*	*51*	
• Customer-centricity • Customers' problem solving • Identifying current and latent needs	*Customer's job-to-be done finding*	*83*	
Total		***194***	
• Human skills to mobilize knowledge • Interfunctional knowledge resources coordination • Relational skills - Community first	*Coordinating actors' knowledge*	*97*	**(2) Value articulate practice**
• Organizational learning resources • Implementation of best practices and user cases	*Codifying knowledge based on the context*	*55*	
• Entrepreneurial practices • Marketing agility	*Testing, iterating and reinventing*	*91*	
Total		***243***	
• Customers' value-in-use assessment • Upgrading customers' offerings	*Materializing value proposition elements*	*102*	**(3) Value leverage practice**
• Globalization of offerings launches • Digital repeat business	*Assessing scalability*	*38*	
• Customization • Unique customers' experience	*Personalized assembling of value proposition elements*	*45*	
Total		***185***	

Appendix 1-3. Supportive quotes from in-depth interviews regarding sub-practices of value propositions for DDI.

Value capture practice	Quotations
Mastering systems and platforms digitalization	"Finally, the essential resources, in fact, in these areas, concerning data, it's true that the infrastructure, the data lake, the software solution that will allow us to host the data from business systems, model it, and restore it. Well, obviously, we can't do without it; we have to have one." (4, Data analytics director)
• Standardization, ubiquity and globalization of the information system	"The globalization of CRM […] was the starting point actually of many things because it's from the moment you have a real CRM that is global, then, then you have data." (1, Senior director, international marketing)
• Digital information real time aCess capability	"A team had redesigned, rethought the architecture of our websites. This meant that we were all together and now we share everything, so on one hand, it's fantastic because it means that as soon as the global team develops a feature, we can adopt it much faster, in real-time. So, that's great." (7, E-commerce director)
Outside-in relationship building	"So, historically, it's really listening, in this case, with whatever means available. […] marketing has become a kind of conductor of all this, and its function is to sense the weak signals regarding things that start to emerge and the transformation of this data into very concrete input to get back to very tangible things. […] the difference with a company like Sophie, is that from the beginning, […] they had elements with a direct-to-consumer approach. So, it's a culture that has always existed, and there was this intention from the start to be in direct contact with customers. […] So, the strength of Sophie from the start, is having invented direct to consumer." (17, France Marketing Director)
• Creation and management of an ecosystem of partners	"It was about adding value to your products by involving partnerships, whether in terms of Software, or in terms of what we might call peripheral solutions. So, the collaboration with other partners, even sometimes with competitors, in fact also developed a lot. […] And that's why we did this aspect of widening the partnerships and so on was important, and so in my last role as marketing director, I had reorganized the teams, to give them not only a product hat but also an application hat […] the product specifications that you need to develop so that it matches with the specifications of the product from your Business Unit next to it, so that this interface between the two products actually brings real value, whether in terms of costs, in terms of functionality for the end customer." (13, Senior director product marketing)
Value articulate practice	
Codifying knowledge based on the context	"At each point of the journey, we are able to identify clusters of user cases.[…] It means that, the core model is process journey data model. […]this core model, it must be well modeled. Even if it means creating variants, but which are managed, and so if it's not very clean and core model, including data model, the object model, the API model not very well done, you fail. […] everyone will work with a documented, unified methodology, so you understand […] We documented, we trained everyone. When I say 2,000 people, everyone was trained on this, and this method, we will also evolve it every quarter. It's the REX (Return on Experience)."(16, Vice president customer experience and CRM)
Testing, iterating and reinventing	
• Marketing agility	"Creating an analytical product to sell to a supplier has nothing to do with receiving and selling Beta products. It's a completely different profession, truly, so the teams to be established must have competence in everything, in product management or in the quality of data we had, which was not a requirement before, it changes, quite abruptly. And then, when we want to scale up, […] when I have 250 suppliers in 8 countries with IT systems that are different from country to country […] I am reinventing a profession, creating in a few months and years, a different profession that has nothing to do with it […] it's not because I've managed a small country like Sweden and Portugal that I will know how to scale up for a country like France. So, I discover problems as I address my topics and scaling up and productizing all this is a real challenge both functionally and technologically." (11, Head of data)
Value leverage practice	
Assessing scalability	"Essentially, we do not develop a specific platform for each customer. It's more in an industrial mode or in the way we will design our platform where, essentially, we already adapt based on the typology of the user who will access the platform." (6, E-marketing and communication director)

Personalized assembly of value proposition elements	"So, you need different customizations, we can do that for you. Until now, every time you came to us asking for a customization that could go, it would take 2-3 years. We couldn't do it, the volumes weren't high enough, but now you can have it done, 6 months later, depending on the schedules. Generally, that was it. And to do things specifically for them and make them feel important […] And then there are some customers who may have a need that others don't, so since it's the same chip, and there's just one last step that differentiates them, we can adapt for the customer afterwards. That is, if they needed a customization, we would do it because it was already included." (14, Head of product marketing)

Appendix 1-4. A description and illustration of DDI types according to a service-dominant logic perspectives including resources integration (firm and marketing resources) and value-in-use assessment

Adapted product or service	**Quotations**
Type (exemplar)	*Adapted service for an improved performance in the environment sector.* "We started to get involved in integrating remote sensing data, even for space, to initially solve a problem for a client. But they weren't the only ones concerned with that parameter. And we talked to R company, a long-standing client who told us they were also interested. Alright. Let's compare, since you have the pyranometers at your place. What the satellite provides compared to your ground data. And then we realized that the satellite data on this parameter was incredibly effective. They removed all the pyranometers they had and switched to our satellite radiation data. And then, when we have two companies, S company and R company, using it, we go to others and say, well, this is validated by S company and R company, which everyone knows in the market, […] it means it's good, so we can go ahead, so there is the whole part of reassurance behind it. So, actually. Listen to the market's problem, […] and we unravel the ball of yarn." (15, Marketing and Commercial director)
Type of required firm resources	*Mass customization capability to fulfill the sub-practice of personalized assembly of value proposition elements.* "We have a particular legitimacy on this topic. Will it interest several players in the supply chain or in a sector of activity? And if both were green at that time, we would go for the research project, it lasted as long as it needed to. It allowed me to stay ahead on certain topics […] Because we were approached one day by people on that topic, we told them, listen, OK, we're willing to go along with you, it lasts 3 years, but during those 3 years, we learned a lot about this subject, and after that was settled, it became a foothold like any other, we moved on to another expertise where we could mix sensor data, model data, specialized data. My experience at WZ Company left a mark on me, where what we said, which is important in the automobile, was to manage to specialize the product as finely as possible in the production chain. […]That is, we have a basic foundation, and the idea is what is the extra pinch of salt we can add to specifically address a problem without it really costing us much. And we actually do something specific, but with a lot of standards. ...We took the opposite approach of Gamma company by doing something specific with spatialized data" (15, Marketing and Commercial director)
Type of required marketing resources	*Customer orientation to fulfill the practice customer's job-to-be done finding.* "So actually, it starts with listening to the client, first of all. That is, he says, I'm struggling with this particular issue, lacking information, which I desperately need, but I can't find it […] I know perfectly well the entire ecosystem, from those who offer stations to those who provide remote sensing data, including satellites. […] I'm going to mix all of that. Knowing full well what the costs of the different solutions available on the market are, but to offer what meets an expectation at the fairest price" (15, Marketing and Commercial director)
Value-in-use	*A performance value-in-use context by offering augmented services.* "When we have a client named Steeve, […] and we are able to instantly provide data for 3000 municipalities to feed a disease model, something nobody else is capable of doing, it becomes much easier to sign contracts, it becomes much easier to negotiate a price because for them, it's immediately valuable […] What interests us about this client, what matters, is what he wants to do with the data, how it serves him on a daily basis […]. A new way to value data, so our company has shifted from being very techno-measurement-focused to being fully data-focused, regardless of the vectors, to meet a usage need at the best cost." (15, Marketing and Commercial director)
Digitalized service innovation	**Quotations**
Type (exemplar)	*A product-as-a service to optimize procurement system in the energy sector.* "We are precisely working on the digitalization of this entire journey... let's call it an evolution of opportunity through technology because we clearly see that the segment we are working on is evolving... Regarding the sale of services, it is no longer a graceful gesture that we are making, it is really a business model that we are going to implement in its own right. […] and it also goes to the value proposition beyond the product. To see what we can add so that the customer experience is the most pleasant, the most efficient possible […] we are in a market of commodities, margins are pinched because we are in a market of commodities and another way of capturing value, well it is to expand our offer and to generate additional revenues with the sale of services. That's why we do more services." (8, Marketing director)

Type of required firm resources	*Materializing of value proposition elements to fulfill the practice value leverage.* "We are solicited for the customer journey precisely for a business marketing part, that is, what is the journey, what are the personas, what are the uses, what are the practices. So, we are tasked with bridging the gap between the client, the user, and the developer in order to create what we call user cases, or user stories. We have a studio that precisely translates our needs into mockups, and once these mockups are well-developed, they are transformed into user stories to be developed by the service providers. […] to secure the development budget, you still need to put together a pretty solid file, […] when we finish listing […] we manage priorities" (8, Marketing director)
Type of required marketing resources	*Marketing agility to fulfill the sub practice testing, iterating and reinventing.* "I believe that today, with everything being so fluid and evolving, to establish and fix mastery would be very risky. It's better to remain an observer, even if it means fluttering a bit more around different suppliers, different solutions […] Things move very fast. Solutions that we considered permanent six months ago, we see that they evolve, and so it's a form of agile methodology, right? That's why we created this agile mode, to be able to say that we often change direction […] In our sector, there's so much evolution that what was true six months ago at the start of a project evolves. It has reoriented […] if you're not agile, and you've implemented an extremely heavy and rigid system, you struggle to correct course. […] And then probably lighter commitments, so, shorter partnerships, things that allow us to, well, essentially, we're not signing 10-year contracts currently on these developments." (8, Marketing director)
Value-in-use	*An add-on value-in-use context by delivering additional services to keep customers and conquer new ones.* "when we talk about energy transition for our sector, it involves measuring the carbon footprint, and this carbon footprint is also measured using digital tools, and increasingly our clients are asking us, "Well, how are you going to help me?" […]I told you about the client with whom we started a project a year and a half ago and which is going to be delivered in March. […] We clearly imagined a new offer around data that can then be deployed, of course, within other clients, so they will give us the opportunity to develop it elsewhere. But this was clearly the starting point, this new era related to data that allows us to consider new proposals for services." " (8, Marketing director)
Data monetization	**Quotations**
Type (exemplar)	*Selling a data product to a network of worldwide actors.* "They sought to industrialize; they realized they had a very significant data heritage and that they could do many other things. So, this led to the creation of a very important roadmap and data roadmap […] The company itself thought, I'm sitting on a treasure trove of data, I need to do much more with it and, since I have these data on my platform to serve my suppliers. Since the platform is mine, […] I might as well use it to do things right." (11, Head of data)
Type of required firm resources	*Robust data resources to fulfill the sub practice mastering systems and platforms digitalization.** "So, I have, I have a necessity, an obligation to formalize the quality of my data that I didn't have before ca notion of clarity, a data quality of product repository that I maybe didn't have before." (11, Head of data)
Type of required marketing resources	*Customer engaging to fulfill the sub practice outside-in relationship building.* "The particularity lies in the type of data we make available, that we want to release somewhere. It's a trade, you know. I have detailed information, me, the retailer, the seller, I will send back information to my suppliers, but I will be revealing a part of my business somewhere. A part of the subject on which I make my margin, and so what do I give, what level of aggregation. What level of detail, what level of value, am I able to monetize to both sell and generate additional revenue or a bit less of back margin, and at the same time ensure that the information Zeta company gives me makes me important and indispensable and ensures that I maintain my exclusivity on the sales channel." (11, Head of data)

Value-in-use	*A data-sharing context value-in-use between involved actors to reduce customer acquisition costs and increase fine-tuned segmentation.* "If I take the customer list from Alpha Company and the customer list from Beta Company, how do I determine if they are the same customers or if the two brands can assist each other? Rather than being disrupted by Amazon once again, we're going to set up a data clean room. What's a data clean room? It's where I anonymize my customer data on both sides, and I have a secure space that allows me to query directly, after having anonymized the data, to find out whether I have common customers or not. And if the customers are not common, to the extent possible, do they have the same characteristics? Same purchasing power, same lifestyle, and do they shop at the same places, are they potentially the same type of people? So, to do this, it's quite complex and expensive because you have to send the anonymized data for studies to industries, to third parties, to consulting firms, data analysis firms, etc. And you're never sure of the results. Today, we know how to set up data showrooms so that Alpha Company can query in a completely confidential manner without knowing the clients of Beta Company and vice versa. And so that the two marketing directors, having had the data analyst teams from Alpha Company and Beta Company go through the process, can say OK […] the data shows that we have things to do together. We have so many common clients that we know how to address, […] and we have so many non-common clients that we can monetize, so to speak." (11, Head of data)

Global integrated solution	**Quotations**
Type (exemplar)	*A global integrated solution offering in the semi-conductor industry to capture the entire value chain to answer needs of an automotive client.* "And in fact, that's where I've actually been exposed a lot to this notion of selling a solution. That's it. And so here, the first step in fact, concretely, was to actually move from selling products, we'll say separately, to selling products as part of a system. That is, you have several components on an FD product, for example. So, this is the first processing, and the second after actually, it was to add value to your products by involving partnerships, whether in terms of software or in terms of, we will say, peripheral solutions. So, in fact, collaboration with other partners, even sometimes with competitors, in fact, has also developed a lot." (13, Senior director product marketing)
Type of required firm resources	*Scalability to fulfill the practice value leverage.* "We have actually multiplied […] The building blocks remain the same, but it is here that the multiplying effect is really interesting. You have a pool of partners that is very large, much more flexible, and also adaptable. The partners we had in China were different from those we had in France, Germany, the United States, or elsewhere, and we only dealt with large clients. Now, with this approach that includes multiple layers of services and more, and not necessarily doing everything ourselves, […] we realize that with the building blocks we have today, we are capable of meeting the needs of smaller clients or fragmented clients, and so on. Thus, we have a multiplied offer while optimizing our resources. By reusing as many partners and this system database as possible, the advantage of having developed this IT tool for consolidation and online field knowledge has allowed us to break down barriers […]. For example, the guy in Japan can say, "Here's what was developed in the United States; it's already 95% what my client wants, so I don't have to reinvent the wheel." (13, Senior director product marketing)
Type of required marketing resources	*Partner linking to fulfill the sub practice outside-in relationship building.* "It's about leveraging partners, actually, because the first step […] what you want is […] value to the customer. And in fact, we realized that Y company was doing what we call hardware, that is, components. So, the step was to put them together, to make a board, to create a system." (13, Senior director product marketing)
Value-in-use	*A value-in-use context based on increased efficiency by offering time savings and an integrated solution to customers.* "We realized that by using external partners who develop application software with our products, etc., you're actually going to generate even more value for the customer, and you will also reduce what we call the validation time with the customer. That is, you're making their role easier if you give a graphics card to someone making a computer and say, "Here's the card, here are the specs, it's great and all," but they will have to hire, for example, a software team to put their code on it, and that's going to take time. Whereas if you use partners, I'm talking about design houses for example, or others who will actually develop application services, for example, on that card, you're actually delivering to the customer almost a turnkey solution, let's say a turnkey design reference, that they can integrate into their overall system." (13, Senior director product marketing)

* In this reported case, the resources embedded in the sub-practice of "mastering systems and platforms digitalization" are analyzed not at the marketing department level, but at the firm level, which is generally the case for most companies undertaking DDI projects.

Appendix 1-5. Survey instrument: scales items and descriptive statistics of measures

Scales items	Means	S.D.	Cronbach's alpha	AVE
The competencies of my organization to capture value for data-driven innovation				
CAP1. Sub-practice: Mastering systems and platforms digitalization				
Measure: infrastructure capability (data and technology) - Mikalef, P., Krogstie, J., 2020 (Adaptation)	5,54	1,33	0,88	0,75
To develop innovative projects based on the use of digitalized data (i.e., data-driven innovation), our organization:				
Data				
has access to very large, various or fast-moving data	5,72	1,22		
can integrate data from multiple sources	5,66	1,42		
can integrate external data with internal data	5,47	1,55		
Technology				
has explored or adopted cloud-based services for processing data and performing analytics	5,90	1,02		
has explored or adopted Artificial Intelligence (AI) solutions and/or Extended Reality (XR) technologies	5,24	1,36		
has explored or adopted cutting-edge technologies to share data and information within the organization	5,25	1,38		
CAP2. Sub-practice: Outside-in relationship building				
Measure: marketing capability from an outside-in perspective (customer engaging, partner linking) – Mu, 2015 (Adaptation)	5,30	1,45	0,93	0,82
To develop innovative projects based on the use of digitalized data (i.e., data-driven innovation), our marketing department:				
Customer engaging				
invests resources necessary to closely connect with customers	5,29	1,47		
genuinely cares to customers' circumstances (i.e., contexts)	5,64	1,35		
takes customers' viewpoint to consider how to design and improve innovation	5,50	1,57		
is able to immerse in customer reality	5,16	1,55		
Partner linking				
has a network in place that can help us find right partners (e.g., suppliers, manufacturers) with which to work	5,25	1,41		
can dynamically fine-tune and adjust our relationships with partners (e.g., suppliers, manufacturers) over time	5,18	1,40		
can effectively mobilize partners resources (e.g., suppliers, manufacturers) to create value for customers	5,08	1,39		
CAP3. Sub-practice: Customer's job-to-be done finding				

Measure : customer orientation – Nakata et al. 2018 (Adaptation)	5,56	1,33	0,86	0,79
To develop innovative projects based on the use of digitalized data (i.e., data-driven innovation), our marketing department:				
comprehends customers' needs and wants	5,61	1,21		
shapes business strategies in order to create superior customer value	5,56	1,33		
constantly monitors our level of commitment and orientation towards serving customers' needs	5,50	1,45		
The competencies of my organization to articulate value for data-driven innovation				
ART1. Sub-practice: Coordinating actors' knowledge				
Measure: human managerial skills – Mikalef, P., Krogstie, J., 2020 (Adaptation)	5,33	1,37	0,91	0,85
To orchestrate innovative projects based on the use of digitalized data (i.e., data-driven innovation), our organization is able to:				
understand the business need of other functional managers, suppliers, and customers to determine opportunities that big data might bring to our business	5,20	1,38		
coordinate data-related activities in ways that support other functional managers, suppliers, and customers managers, suppliers, and customers	5,17	1,43		
understand and evaluate the output extracted from big data	5,61	1,31		
ART2. Sub-practice: Codifying knowledge based on the context				
Measure: knowledge conversion – Gold et al., 2001 (Adaptation)	5,38	1,35	0,84	0,61
To orchestrate innovative projects based on the use of digitalized data (i.e., data-driven innovation), our organization has processes for:				
converting knowledge into the design of new products or services	5,47	1,27		
filtering knowledge	5,53	1,26		
integrating knowledge from the firm's individuals	5,22	1,40		
integrating knowledge from business partners	5,28	1,42		
sharing knowledge throughout the organization	5,38	1,41		
ART3. Sub-practice: Testing, iterating and reinventing				
Measure : Marketing agility – Zhou et al., 2019 (Adaptation)	4,86	1,48	0,88	0,61
To test the implementation of innovative projects based on the use of digitalized data (i.e., data-driven innovation), our marketing department has the opportunity to:				
offer different products through minor modifications to existing ones	5,16	1,31		
adjust what we offer to match market needs	5,49	1,22		
compress time from product concept to marketing to respond quickly to the changes in customer needs	4,54	1,58		

quickly change our product mix in response to changing market opportunities	4,58	1,68		
be fast at changing activities that do not lead to the desired effects	4,53	1,60		
The competencies of my organization to leverage value for data-driven innovation				
LEV1. Sub-practice: Materializing value proposition elements				
Proposed measure: Value offering – Ngo et O'Cass 2009 (Adaptation)	5,53	1,30	0,94	0,81
Performance value				
When our organization develops innovative projects based on the use of digitalized data (i.e., data-driven innovation), it is capable of delivering				
quality products and/or services	5,87	1,00		
products and/or services that are exactly what customers want	5,59	1,22		
products and/or services with innovative performance features	5,43	1,46		
Pricing value				
When our organization develops innovative projects based on the use of digitalized data (i.e., data-driven innovation), it is capable of proposing:				
pricing policies that are consistent and aCurate	5,24	1,47		
pricing policies that are more beneficial for customers than our competitors	5,17	1,36		
pricing products aCording to how valuable customers perceive them to be	5,23	1,40		
Relationship building value				
When our organization develops innovative projects based on the use of digitalized data (i.e., data-driven innovation), we can:				
ensure rapid response standards to deal with any customer enquiry	5,43	1,24		
have continuing relationships with customers	5,82	1,26		
deliver add-on values (e.g., special offers, status recognition, customization) to keep customers	5,40	1,54		
Co-creation-value				
When our organization develops innovative projects based on the use of digitalized data (i.e., data-driven innovation), we can:				
interact with customers to serve them better	5,80	1,25		
work together with customers to produce offerings that mobilize them	5,46	1,32		
interact with customers to design offerings that meet their needs	5,67	1,22		
provide customers with supporting systems (e.g., assistance, best practices, user cases) to help them get more value	5,73	1,22		
LEV2. Sub-practice: Assessing scalability				
Measure: scalability – Y.L. Zhao, Di Benedetto 2013 (Adaptation)	5,28	1,49	0,88	0,81

When our organization develops innovative projects based on the use of digitalized data (i.e., data-driven innovation):				
our opportunities for exploring economies of scale are great	5,34	1,45		
we can easily achieve economies of scale by centralizing certain critical (e.g., equipment-intensive) activities	5,19	1,44		
we can easily achieve economies of scale by developing offerings that are more systematically technology-based than people-based	5,29	1,58		
LEV3. Sub-practice: Personalized assembling of value proposition elements				
Measure: mass customization capability – Zhang, M., Zhao, X., Lyles, M. A., & Guo, H. 2015 (Adaptation)	4,83	1,63	0,87	0,72
When our organization develops innovative projects based on the use of digitalized data (i.e., data-driven innovation), we can:				
easily add significant product variety without increasing costs	4,57	1,68		
customize products while maintaining high volume	4,95	1,57		
add product variety without sacrificing quality	4,93	1,65		
adjust our product design aCording to customer demand without significantly increasing costs	4,86	1,62		
Data-driven innovation types				
SERV1. Digitalized service innovation				
Measure: service innovation - De Luca at al. 2019 (Adaptation)	5,39	1,34	0,87	0,73
Based on the use of digitalized data (i.e., data-driven innovation), our organization is able to develop innovative projects by:				
creating new service offerings	5,29	1,40		
recombining elements of existing services in new configurations	5,58	1,22		
creatively changing the number and quality of the customer touchpoints to match the customer context	5,33	1,18		
creating a new customer experience	5,35	1,57		
DATAM1.Data monetization				
Measure: data sellable offerings types - Parvinen, P. 2020	4,29	1,83	0,93	0,80
Based on the use of digitalized data (i.e., data-driven innovation), our organization is able to develop innovative projects by:				
selling data to at least one of the following stakeholders: current customers, suppliers and partners, data brokers, or data integrators	4,00	1,95		
selling data analyses on the business environment to at least one of the following stakeholders: current customers, suppliers and partners, or market research agencies	4,18	1,87		
selling a data-based service that provides current customers relevant signals on the business environment	4,36	1,78		
selling a data-based service that provides current suppliers and partners relevant signals on the business environment	4,44	1,76		
selling a data-based service that provides new customers relevant signals on the business environment	4,47	1,78		

SOLO1.Global integrated solution				
Measure: solution offering - Worm et al., 2017 (Adaptation)	5,28	1,40	0,86	0,59
Based on the use of digitalized data (i.e., data-driven innovation), our organization is able to develop innovative projects by proposing offerings that:				
integrate products and services into customers' environment	5,40	1,44		
require customer involvement in development and/or implementation	5,17	1,51		
involve taking over the customer's activities / process	4,81	1,61		
promise an outcome specified by customer-specific metrics	5,38	1,20		
include implementation of the solution (over time)	5,37	1,31		
include post-deployment support	5,56	1,30		

Appendix 1-6. Truth tables for digitalized service innovation, data monetizaton and global integrated solution.

F1.Truth table for digitalized service innovation

CAP1	CAP2	CAP3	ART1	ART2	ART3	LEV1	LEV2	LEV3	Number	DSO	raw consist.	PRI consist.
1	1	1	1	1	0	1	1	1	5	1	1,00	1,00
1	1	1	0	0	0	0	1	1	1	1	1,00	1,00
1	1	1	0	1	0	1	1	1	1	1	1,00	1,00
0	1	1	0	1	1	1	1	1	1	1	1,00	1,00
1	1	1	1	1	1	1	1	1	60	1	1,00	1,00
1	1	1	1	1	1	1	1	0	4	1	0,99	0,99
1	1	1	1	1	0	1	1	0	2	1	0,99	0,98
1	1	1	1	1	1	1	0	1	1	1	0,99	0,97
1	1	1	1	1	1	1	0	0	1	1	0,99	0,97
0	1	1	0	1	0	1	0	0	1	1	0,98	0,90
1	0	0	0	1	0	0	0	0	1	1	0,87	0,50
0	0	1	0	0	1	0	1	0	1	1	0,86	0,33
0	0	0	0	0	0	0	0	0	2	0	0,76	0,24

Notes:
CAP1: Infrastructure capability (data and technology); CAP2: Outside-in relationship building capability (customer engaging, partner linking); CAP3: Customer orientation capability. ART1: Human managerial skills; ART2: Knowledge conversion capability. ART3: Marketing agility; LEV1: Value offering elements materialization capability; LEV2: Scalability capability; LEV3: Mass customization capability; DSO: Digitalized service innovation; consist.: Consistency

F2. Truth table for data monetization

CAP1	CAP2	CAP3	ART1	ART2	ART3	LEV1	LEV2	LEV3	Number	DATAM	raw consist.	PRI consist.
1	1	1	0	1	0	1	1	1	1	1	0,85	0,36
1	1	1	1	1	1	1	1	1	60	1	0,83	0,77
1	1	1	0	0	0	0	1	1	1	1	0,82	0,18
0	1	1	0	1	1	1	1	1	1	1	0,82	0,17
1	0	0	0	1	0	0	0	0	1	1	0,82	0,02
0	1	1	0	1	0	1	0	0	1	1	0,80	0,08
1	1	1	1	1	1	1	0	1	1	0	0,79	0,33
1	1	1	1	1	0	1	1	1	5	0	0,79	0,50
0	0	1	0	0	1	0	1	0	1	0	0,77	0,07
1	1	1	1	1	1	1	0	0	1	0	0,77	0,30
1	1	1	1	1	0	1	1	0	2	0	0,74	0,35
1	1	1	1	1	1	1	1	0	4	0	0,69	0,38
0	0	0	0	0	0	0	0	0	2	0	0,65	0,00

Notes:
CAP1: Infrastructure capability (data and technology); CAP2: Outside-in relationship building capability (customer engaging, partner linking); CAP3: Customer orientation capability. ART1: Human managerial skills; ART2: Knowledge conversion capability. ART3: Marketing agility; LEV1: Value offering elements materialization capability; LEV2: Scalability capability; LEV3: Mass customization capability; DATAM: Data Monetization; consist.: Consistency

F3. Truth table for global integrated solution

CAP1	CAP2	CAP3	ART1	ART2	ART3	LEV1	LEV2	LEV3	Number	GISOL	raw consist.	PRI consist.
1	1	1	1	1	0	1	1	1	5	1	0,99	0,99
0	1	1	0	1	1	1	1	1	1	1	0,99	0,96
1	1	1	1	1	1	1	1	0	4	1	0,99	0,98
1	1	1	0	1	0	1	1	1	1	1	0,99	0,95
1	1	1	1	1	1	1	1	1	60	1	0,98	0,98
1	1	1	1	1	0	1	1	0	2	1	0,98	0,93
0	0	0	0	0	0	0	0	0	2	1	0,97	0,92
1	1	1	1	1	1	1	0	0	1	1	0,97	0,87
0	1	1	0	1	0	1	0	0	1	1	0,95	0,74
0	0	1	0	0	1	0	1	0	1	1	0,95	0,77
1	1	1	1	1	1	1	0	1	1	1	0,94	0,83
1	1	1	0	0	0	0	1	1	1	1	0,90	0,57
1	0	0	0	1	0	0	0	0	1	1	0,88	0,51

Notes:

CAP1: Infrastructure capability (data and technology); CAP2: Outside-in relationship building capability (customer engaging, partner linking); CAP3: Customer orientation capability. ART1: Human managerial skills; ART2: Knowledge conversion capability. ART3: Marketing agility; LEV1: Value offering elements materialization capability; LEV2: Scalability capability; LEV3: Mass customization capability; GISOL: Global Integrated Solution; consist.: Consistency

Appendix 1-7. Intermediate solutions representation for configurations of the three identified DDI types.

	Raw coverage	Unique coverage	Consistency
Intermediate solutions for (1) ~ **digitalized service innovation**			
~CAP1*~CAP2*~CAP3*~ART1*~ART2*~ART3*~LEV1*~LEV2*~LEV3	0.37	0.09	0.92
CAP1*~CAP2*~CAP3*~ART1*ART2*~ART3*~LEV1*~LEV2*~LEV3	0.32	0.05	0.87
~CAP1*~CAP2*CAP3*~ART1*~ART2*ART3*~LEV1*LEV2*~LEV3	0.32	0.03	0.93
~CAP1*CAP2*CAP3*~ART1*ART2*ART3*LEV1*LEV2*LEV3	0.34	0.07	0.83
Solution coverage	0.56		
Solution consistency	0.85		
Intermediate solutions for (2) ~ **data monetization**			
CAP1*CAP2*CAP3*ART1*ART2*ART3*LEV1*~LEV2	0.27	0.05	0.88
CAP1*CAP2*CAP3*ART1*ART2*LEV1*LEV2*~LEV3	0.35	0.12	0.79
~CAP1*~CAP2*~CAP3*~ART1*~ART2*~ART3*~LEV1*~LEV2*~LEV3	0.17	0.04	0.99
CAP1*~CAP2*~CAP3*~ART1*ART2*~ART3*~LEV1*~LEV2*~LEV3	0.15	0.01	0.99
~CAP1*~CAP2*CAP3*~ART1*~ART2*ART3*~LEV1*LEV2*~LEV3	0.14	0.01	0.98
~CAP1*CAP2*CAP3*~ART1*ART2*~ART3*LEV1*~LEV2*~LEV3	0.17	0.01	0.98
CAP1*CAP2*CAP3*~ART1*~ART2*~ART3*~LEV1*LEV2*LEV3	0.16	0.01	0.96
CAP1*CAP2*CAP3*~ART1*ART2*~ART3*LEV1*LEV2*LEV3	0.20	0.008	0.92
~CAP1*CAP2*CAP3*~ART1*ART2*ART3*LEV1*LEV2*LEV3	0.17	0.008	0.96
Solution coverage	0.54		
Solution consistency	0.81		
Intermediate solutions for (3) ~ **global integrated solution**			
CAP1*~CAP2*~CAP3*~ART1*ART2*~ART3*~LEV1*~LEV2*~LEV3	0.28	0.03	0.87
~CAP1*~CAP2*CAP3*~ART1*~ART2*ART3*~LEV1*LEV2*~LEV3	0.25	0.006	0.83
~CAP1*CAP2*CAP3*~ART1*ART2*~ART3*LEV1*~LEV2*~LEV3	0.31	0.034	0.86
CAP1*CAP2*CAP3*~ART1*~ART2*~ART3*~LEV1*LEV2*LEV3	0.31	0.034	0.87
~CAP1*CAP2*CAP3*~ART1*ART2*ART3*LEV1*LEV2*LEV3	0.30	0.024	0.82
Solution coverage	0.45		
Solution consistency	0.78		

Notes:
1."~" means absence and "*" means presence of the condition.
2. CAP1: Infrastructure capability (data and technology); CAP2: Outside-in relationship building capability (customer engaging, partner linking); CAP3: Customer orientation capability. ART1: Human managerial skills; ART2: Knowledge conversion capability. ART3: Marketing agility; LEV1: Value offering elements materialization capability; LEV2: Scalability capability; LEV3: Mass customization capability

GENERAL CONCLUSION

1. Research findings

The research object of this doctoral work is the DDIC of marketing. We aimed to position it according to:

- A context, that of DDI within B2B firms
- A concept, that of MIC
- A consequence, its contributive role in the value proposition

This research seeks to elucidate the concept of DDIC of marketing in B2B markets. In order to achieve this, four research objectives were established. The first objective was to gain an understanding of what marketing innovation capabilities are. The second objective was to conceptualize DDIC of marketing. The third objective was to explore the components and underlying processes of DDIC of marketing. Finally, the last objective was to confirm the consequences of using DDIC of marketing in architecting value propositions for DDI. Each research objective was addressed through a dedicated research article, the findings of which are presented in Figure 5-1 below. In addition, we provide an overview of our research problem and its four objectives, along with the research questions that guided our investigation.

We then detail each of these findings in Section 1, which presents the results from our conceptual approach, exploratory approach, and confirmatory approach.

Furthermore, our general conclusion is organized as follows: Section 2 provides a discussion of our research findings. Section 3 presents contributions and implications. Section 4 outlines limitations and future research. Finally, Section 5 delineates our researchers' positioning on what we believe will drive the future of B2B marketing, digitalization, and DDI.

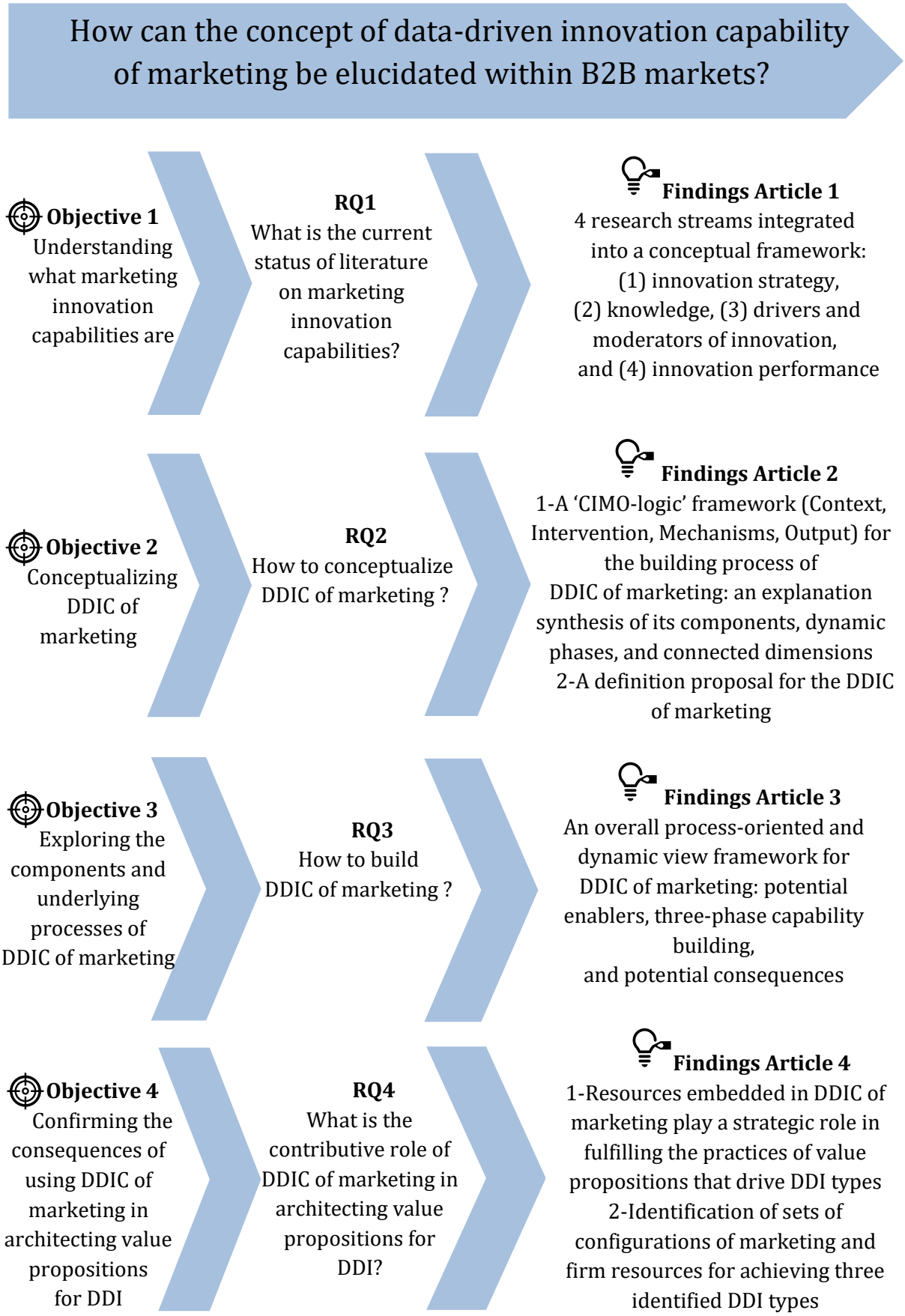


Figure 5-1. Research problem, objectives, questions and findings

1.1. Research findings from the conceptual approach

Article 1 and **Article 2** pursue conceptualization objectives.

Firstly, **Article 1** conducts a review on MIC using a bibliographic coupling analysis. This article is conceptual by nature and analyzes a substantial corpus of 262 peer-reviewed articles. To reduce interpretative bias, the quantitative method of bibliographic coupling was used. This technique connects documents based on their shared references, offering a systematic, transparent, and reproducible review process, thereby enhancing rigor (Tranfield et al., 2003; Zupic & Čater, 2015). It includes newer publications possibly not yet cited and research from emerging fields and smaller subfields, thus it is less biased towards historical data, providing more accurate results than the co-citation analysis technique (Boyack & Klavans, 2010; Zupic & Čater, 2015). The article employs VOSviewer software (Van Eck & Waltman, 2010), which facilitates network creation by analyzing document similarities, leading to classification into homogeneous clusters and visual representation (Boyack and Klavans, 2010). Employing bibliographic coupling aligns with the review's goal of delineating the current state of the MIC field, categorizing its thematic areas, and evaluating their potential future research impact.

The findings are presented in an integrative framework that synthesizes the extensive MIC knowledge extracted from marketing journals. I explored four primary MIC research streams: First, the cluster "MIC and innovation strategy" examines how innovation strategy relates to MIC by addressing two sub-dimensions: (1) market orientation and (2) innovation-based strategy. Second, the cluster "MIC and knowledge" explores various aspects of knowledge pertinent to MIC, reviewing four dimensions: (1) knowledge activity management, (2) knowledge operant resources, (3) complementarity of knowledge assets, and (4) strategic orientation of marketing knowledge. Third, the cluster "MIC and drivers and mediators of innovation" analyzes how MIC influences firm performance through its drivers and mediators. Lastly, the cluster "MIC and innovation performance" investigates MIC's contribution to innovation performance and the resulting outputs, proposing four angles of analysis: (1) the 'MIC type–innovation type' interface, (2) co-creation innovation activities, (3) data-driven competencies, and (4) value as an innovation performance output.

It is essential to note that this last cluster links MIC to two other dimensions of our research: the context of DDI through data-driven competencies, and the impact on value propositions through value as an innovation performance output. This cluster also represents the most significant cluster in terms of the number of publications and *h*-index. This underscores the importance of exploring these three research dimensions, i.e. MIC, DDI, and value proposition within a unified analytical framework.

Secondly, **Article 2** is specifically dedicated to delineating the concept of DDIC from a B2B marketing perspective, aiming to close a gap in a topic that has been gaining momentum since 2015, and establishing a foundational base for marketing scholars. It also serves as a guideline for practitioners seeking to implement DDI but facing challenges due to misalignment within their marketing organizational departments.

To address this, we adopted a critical realism approach (Rousseau et al., 2008) to conceptualize the DDIC of marketing in response to the new DDI reality. This approach facilitates the exploration of clear and specific questions regarding practical problems (Pawson, 2002), such as how to conceptualize the DDIC of marketing to drive firm DDI activities. Specifically, based on 48 relevant scientific papers published between 2015 and 2022, we incorporated evidence from various methods and then organized and interpreted it through explanation synthesis (Rousseau et al., 2008). Explanation synthesis begins by articulating likely underlying mechanisms and then examines the available evidence to determine their applicability (Rousseau et al., 2008). We align with these precepts as we aim to build knowledge about the DDIC of marketing by investigating its construction, components, underlying processes, and related dimensions. We also suggest a pragmatic way to interpret the phenomenon, thus increasing its applicability for marketers (Rojon et al., 2021).

This pragmatic perspective, which bridges the gap between theory and practice, is reflected in the framework we chose for presenting our analytical results. The 'CIMO-logic' framework (Denyer et al., 2008) helps understand how interventions work in specific contexts to address problems and find solutions. Specifically, it demonstrates how, in the context of BD technologies (C), interventions (I)—i.e., the DDIC of marketing building process—can be implemented to activate companies' intangible resource mechanisms (M) to create customer-centric innovation outcomes (O). Denyer et al. (2008) emphasize interventions (I) as a central hub of the explanation analysis, interconnected with the other three dimensions (C, M, and O), which align with our main objective to scrutinize and describe the construction process of DDIC of marketing (I).

Thus, grounded in recognized management theories such as MO, RBT, and DC, the systematic literature review revealed a three-phase process for constructing the DDIC of marketing: (1) building, (2) articulating, and (3) leveraging. These phases identify resources and capabilities to deploy three distinctive routines for data-driven activities: (1) generating an 'outside-in' information ecosystem, (2) disseminating data-driven insights, and (3) developing the data-driven innovation offer.

The framework also integrates the dimensions of the contextual role of BD and the consequences for DDI, such as value and value proposition, establishing a confirmed connection of DDIC of marketing with the other two Cs of our research framework positioning: *Context* and *Consequence* (see Section 2, positioning of the dissertation). It

provides a first approach to synthesizing knowledge on DDIC from the marketing department's perspective, addressing a literature gap. Additionally, by depicting its composition according to a process orientation, it advances a step-by-step method of construction, addressing another literature gap.

Finally, supported by an interdisciplinary systematic literature review, we propose the following definition for the DDIC of marketing:

> *The DDIC of marketing is a dynamic, market-oriented and processual capability related to the development of new offerings, forming part of digital marketing capabilities, that generates an 'outside-in' information ecosystem, disseminates the extracted data-driven insights and develops DDI offers, either proactively or reactively, by orchestrating tangible, intangible and human resources.*

These two conceptual findings, i.e., MIC and DDIC of marketing, derived from rigorous literature review methods, have helped us orchestrate and structure knowledge on marketing capabilities applied to innovation, which are crucial for achieving a firm's sustained competitive advantage. On one hand, we presented a series of initial results on the broad scope that encompasses MIC, reviewing a substantial number of peer-reviewed articles on the subject since 1975 to establish a foundational theoretical understanding of what MIC entails. On the other hand, we fine-tuned one of its specific capabilities, the DDIC of marketing, which is garnering increasing academic and managerial interest as it becomes a key component in the arsenal of digital competitive strategy.

As a result, it is worth noting that both capabilities exhibit key similarities and differences in their conceptualization, components, and connections to DDI and value proposition, as illustrated in the figure below.

Key similarities between MIC and DDIC of marketing:

Market-oriented
Knowledge-based and customer relationship management resources
Composed of tangible, intangible, and human resources
Resources' complementarity and heterogeneity
Specialized in innovation activities
Assist in architecting value propositions for innovation
Contributor to firm performance
Source of competitive advantage

MIC key differences:	**DDIC of marketing key differences:**
• Traditional industry competitive strategy	• Digital competitive strategy
• Products and/or services innovation	• DDI
• From product to customer perspective - Marketing to customers	• A co-creation perspective - Marketing with customers
• NPD process; episodic	• Practice-based process; interactive
• Innovation is improved by data	• Innovation depends on and can be habilitated by data
• Based on classical marketing capabilities	• Based on classical and digital marketing capabilities
• Inside-out approach: value chain resources	• Outside-in: ecosystem resources
• Capability building based on accumulative learning experience	• Capability building based on dynamic learning mechanisms
• Value proposition based on resources integration between providers and sellers	• Value proposition based on resources integration and sharing between ecosystem actors
• Value proposition perspective: from market offering to promise of value	• Value proposition perspective: proposal of value

Figure 5-2. Key similarities and differences between MIC and DDIC of marketing

The following subsection summarizes the findings from the exploratory study conducted in Article 3.

1.2. Research findings from the exploratory approach

Article 3 follows an exploratory objective. One limitation of the systematic literature review on the DDIC of marketing is its theoretical nature. While our goal was to map the extensive multidisciplinary literature on DDIC of marketing, our analysis did not empirically test any propositions. Therefore, we conducted an investigation to unravel the construction process of DDIC within B2B firms. We conducted a qualitative study to provide empirical evidence for the knowledge we structured on the DDIC of marketing during our conceptual study. This study aimed to advance the construct by uncovering unexpected dimensions and articulating its components and underlying processes in detail.

Specifically, we conducted 17 semi-structured interviews with experienced managers from international companies, regardless of their size, type of offer, or sector, to avoid any discriminatory nature and enhance the transferability and generalizability of our results. Our objectives were to: (1) evaluate the inventory of capabilities and resources related to the DDIC of marketing, (2) assess the predesigned process-oriented model, and (3) adjust, complete, and refine our framework. For this purpose, we employed a "systematic combining" approach grounded in abductive logic (Dubois & Gadde, 2002), which involves continuously matching theory with reality to elaborate, extend, and refine theories.

The first series of findings relates to the composition of the DDIC of marketing. From the RBT perspective, we identified key resources and capabilities and established their relationships within a capability model composed of three phases: (1) ideation, (2) analysis, and (3) deployment. We then verified the RBT assumptions previously used to detail the components of DDIC of marketing in our systematic literature review study.

The second series of findings involves building a capability model for DDIC of marketing using the dynamic, process-oriented approach of Zollo and Winter (Zollo & Winter, 2002). We found that each of the three identified phases is operationalized by three successive routines: (1) generating a knowledge ecosystem, (2) disseminating data-driven insights, and (3) designing a response. Each routine is facilitated by distinct learning mechanisms: (1) capture, (2) articulate, and (3) codify.

The third series of findings includes the discovery of two unexpected dimensions reflecting the process-oriented perspective of DDIC of marketing: (1) potential enablers

such as digital orientation and top management sponsorship, which facilitate the three-phase capability building, and (2) potential consequences in three distinctive areas: customer outcomes, firm outcomes, and innovation types, which intervene after the deployment of DDIC.

Through this capability model, we confirm a capability that is processual, dynamic, and market-oriented, as previously reviewed in the literature and illustrated by our empirical findings. The pragmatic approach to building this model allowed us to add complementary dimensions by specifically operationalizing routines that were adjusted, reconfigured, or renewed through the integration of learning mechanisms.

The final result is the presentation of an overall process-oriented framework for DDIC of marketing that summarizes our findings and analysis. This framework includes potential enablers, a three-phase capability building, and potential consequences, offering a detailed articulation of such a capability so managers can concretely implement it to sustain their DDI efforts.

Lastly, this framework empirically connects DDIC of marketing to the two C dimensions of our research positioning—DDI *Context*, specifically innovation types, and the value proposition *Consequence* i.e., the value dimension embedded in customer outcomes—as both potential outcomes of DDIC use. Therefore, this exploratory approach allows us to confirm an established relationship between our research object, the DDIC of marketing, our research context, DDI, and our research consequence, value proposition.

We now present the main findings from Article 4, guided by a confirmatory approach.

1.3. Research findings from the confirmatory approach

Article 4 pursues a confirmatory objective. Utilizing a configurational approach, our goal was to confirm the consequences of using DDIC of marketing in architecting value propositions for DDI.

Two subsidiary research questions were posed. The first seeks to understand the architecture of value propositions for driving DDI, organizing a common set of practices for their design. The second question explores which marketing and organizational resources of value propositions practices are relevant for realizing specific DDIs and how these elements combine to achieve their effects, specifically revealing the role of resources embedded in DDIC of marketing.

This article serves as the integrative element of all previous articles and aims to confirm our research positioning framework by validating the underlying links between our research object, the DDIC of marketing, our research context, DDI, and the consequences of using DDIC of marketing in formulating value propositions for DDI.

Initially, a preliminary study provided insights into the architecture of value propositions for driving DDI by breaking it down into a set of practices and sub-practices. Specifically, we disclosed that:

- The architecture of value propositions for DDI is structured around a system of three interrelated practices: (1) value capture, (2) value articulation, and (3) value leverage. Each of these main practices is further divided into distinct sub-practices, which include the following: for value capture, mastering systems and platforms for digitalization, building outside-in relationships, and identifying the customer's job-to-be-done; for value articulation, coordinating actors' knowledge, codifying knowledge based on context, and engaging in testing, iterating, and reinventing; for value leverage, materializing value proposition elements, assessing scalability, and personalizing the assembly of value proposition elements.
- To successfully implement these value proposition practices for DDI, firms require specific resources from both the DDIC of marketing and the broader organization.
- Furthermore, the structured approach to these value proposition elements for driving DDI facilitates three types of servitized DDI: (1) digitalized service innovation, (2) data monetization, and (3) global integrated solution.

After identifying these practices, we addressed our second sub-question by exploring how the bundles of resources embedded within these practices could lead to different types of DDI, focusing on the specific role that the DDIC of marketing can play in achieving this typology of innovation. The FsQCA method was deemed appropriate to examine the causal configuration of resources for the three identified types of DDI. Our analysis yielded the following results:

- The resources of DDIC of marketing and the firm coalesce to provide configurations for each of the three identified DDI type.
- Configurational analysis revealed two resource combinations for digitalized service innovation and global integrated solution, and one for data monetization.
- The configurations highlight similarities and differences, underscoring the key role of resources of DDIC of marketing in each solution.
- All solutions rely on similar marketing resources for value capture, managerial skills for value articulation, and the firm's ability to materialize value offering elements for value leverage.

- Differences among configurations include the role of mass customization capability, only crucial for data monetization, and the varying importance of firm scalability capability across DDI types.
- Marketing agility's role varies, oscillating from essential to core condition in some configurations but negligible in others.

This nuanced understanding not only provides insights into the necessary and core conditions of resource deployment but also delineates the strategic emphasis on specific capabilities and resources within varying contexts of DDI.

To conclude, our findings affirm the robustness of the causal relationships among the resources embedded in the DDIC of marketing for DDI, particularly those involved in the value capture practice, whose contribution is consistently significant across all five configurations leading to three different DDI outcomes. Additionally, the role of marketing resources embedded in the value articulation practice and the role of firm resources embedded in the value leverage practice also contribute, albeit to a lesser extent and at varying levels of importance. Thus, the connection between the DDIC of marketing, the DDI context, and the value proposition is well established and substantiated.

These findings on DDIC of marketing pave the way for a discussion oriented around three key themes: (1) a processual perspective on DDIC of marketing, (2) a confirmed relationship between DDIC of marketing, DDI, and value proposition, and (3) advancing a typology for DDI. Each theme is debated in Section 2.

2. Discussion

2.1. A processual perspective on DDIC of marketing

Our series of findings illuminates a dynamic perspective on DDIC of marketing, aligning with relevant studies on DDIC that view it as a dynamic capability based on a combination of resources and competencies enabling DDI activities to be executed. For example, the works of Alghamdi & Agag (2024) describe DDIC as a dynamic capability composed of three main capabilities: market orientation capability, infrastructure capability, and innovation talent capability. These studies primarily base their results on a precedent study by Sultana (Sultana et al., 2022a). Based on the RBT and DC views, Eriksson (Eriksson & Heikkilä, 2023) especially focuses on marketing capabilities, demonstrating

how they can lead to DDI, when combined with technological capabilities. While these studies present similar theoretical perspectives to explain DDIC of marketing, we offer a unique and fresh view on the concept, as depicted hereafter.

First, we focus on proposing a construction process for DDIC of marketing, rather than studying a model of DDIC made up of antecedents and components that influence DDI and the firm's competitive advantage. For instance, MO was not considered as a component of DDIC but rather a theory upon which we build to detail our construction process. This explains why we decided to use the Jaworski and Kohli (Kohli & Jaworski, 1990) approach to build this construction process, emphasizing the operational aspects of this capability. Indeed, the central tenets from Jaworski and Kohli(1990)'s point of view are procedural by nature, describing the organizational competencies and resources a department or an organization may adopt to generate intelligence, disseminate it, and respond to the market. Their model is more processual, outlining steps and actions. From another perspective, studies by Alghamdi and Agag (2024) and Sultana et al. (2022a, 2022b) employ the Narver and Slater framework (1990), integrating MO as an organizational culture and strategic orientation (customer orientation, competitor orientation, interfunctional coordination) in their analysis. Their model is broader, focusing on the strategic alignment necessary for MO. As a result, existing studies on DDIC and DMC are more quantitative by nature, following the strategic objective of linking the concept to firm performance or competitive advantage (Alghamdi & Agag, 2024; Homburg & Wielgos, 2022; Sultana et al., 2022a, 2022b), whereas our study, by exploring a processual perspective on DDIC of marketing, is more qualitative.

Second, this process-oriented capability model provides a practical application to overcome some barriers to the implementation of the DDIC of marketing within B2B firms. These firms may face internal factors influencing their decisions to deploy DDIC of marketing and digitalized capabilities in general (Setkute & Dibb, 2022). These factors include low awareness of digital marketing's potential advantages, fear of technology, and resistance to newer technology-enabled practices (Karjaluoto & Huhtamäki, 2010). This reluctance is often linked to a shortfall in digital marketing skills and knowledge (Matarazzo et al., 2021; Setkute & Dibb, 2022; Taiminen & Karjaluoto, 2015). We believe that this concrete explanation of how to build DDIC of marketing—by describing its phases, resources, and mechanisms, and integrating it into an overall framework, while revealing its potential facilitators and consequences—is a practical way to align marketing strategy with the overall firm strategy. More generally, this approach advances the conceptualization of digitalization and its impact on firm performance in the B2B marketing environment.

Third, this processual perspective on the DDIC of marketing underscores the necessity of combining various firm and marketing resources to successfully construct such a capability for DDI. For example, a recent study by Eriksson & Heikkilä (2023) enriches this academic view on the development of capabilities for DDI by interrelating

technological and marketing capabilities. Their findings indicate that companies can leverage their existing technological capabilities to process data and, when necessary, access complementary analytics capabilities through partners. With regard to firm marketing capabilities, a solid foundation in customer understanding is critical for DDI initiatives to deliver and innovate customer value (Eriksson & Heikkilä, 2023). They suggest that technological capabilities are manifested in a highly context-specific manner, like DDI, and that marketing capabilities are often deficient in industrial companies for achieving it. Therefore, they propose that areas where these capabilities overlap merit further clarification, both conceptually and empirically, specifically by integrating a DC view to assess how to build, adjust, and renew them. By focusing on the research context of DDI and the specific research object of DDIC of marketing, and by scrutinizing the required and potentially combined marketing capabilities to build a process capability model, we take a step forward in better conceptualizing and exploring the complementarity of these capabilities through the DC perspective.

The following subsection discusses the established relationship between DDIC of marketing, DDI, and value proposition.

2.2. A confirmed relationship between DDIC of marketing, DDI, and value proposition

With the advancement of digitalization, research examining the intersection of marketing capabilities, innovation and the value proposition concept has garnered considerable attention in academic literature over the past 15 years.

First, there is a research dimension that emphasizes the need for developing mechanisms within this established relationship. Lenka et al. (2017) highlight that manufacturing firms adopting a servitization strategy increasingly rely on digitalization capabilities to co-create value with customers. These authors utilize RBT and S-D Logic to elucidate digitalization capabilities, identifying three key components: intelligence, connectivity, and analytics. The study demonstrates how these capabilities facilitate value co-creation through proactive and responsive mechanisms in a B2B context. We concur with this study in introducing mechanisms into the development of capabilities to enable customer co-creation of value. However, their study presents a static view of how a company leverages its mechanisms connected to innovation for value co-creation. In our model of DDIC of marketing, we demonstrated how companies can dynamically utilize these mechanisms to engage in DDI, thereby adding a DC perspective. We detailed how DDIC of marketing emerge from a synthesis of mechanisms that include the accumulation of market knowledge and deliberate investments to facilitate articulation and codification (March, 1991; Zollo & Winter, 2002). These learning mechanisms interact with specific actions of the DDI marketing strategy. For instance, a pivotal learning mechanism in our

model falls under the "codify" category, specifically identifying "adapting and renewing digital tools" as essential for executing one of the embedded marketing routines in DDIC, namely "design an answer," which is part of the third phase of deployment. These mechanisms are dynamic, allowing for adjustments in resources and capabilities in response to market changes, thus continuously nurturing this routine. Their integration, reconfiguration, and adaptation enable swift responses. These learning mechanisms, encompassing essential techniques, tools, and competencies for the ongoing renewal of the marketing organization, ensure dynamic alignment with market developments and require marketers to consistently adapt and renew digital tools and enhance their operational modes, thus equipping them to withstand market turbulence and maintain market share.

A second research dimension emphasizes the necessity for developing practices within this validated relationship. Our investigation identifies three primary practices and nine sub-practices that underpin the architecture of value propositions for DDI: (1) value capture, (2) value articulation, and (3) value leverage. These practices are supported by resources embedded in DDIC of marketing as well as those within the firm. These findings align with those of Skålén et al. (2015), who delineated value proposition design around ten common practices, categorized into three main groups: provision, representational, and management and organizational practices, fostering service innovation. Furthermore, their study suggests that these practices evolve through the integration of resources and capabilities. They also confirmed that these practices and resources enable four types of service innovation—adaptation, resource-based, practice-based, and combinative innovation—and three types of service innovation processes: practice-based, resource-based, and combinative. However, their study lacks contextualization from a DDI perspective and does not empirically test these through a configurational approach, as their results are primarily qualitative. Additionally, these authors advocate for further research linking practices, service innovation, and value propositions in specific contexts; our research aims to respond to this call.

A third research dimension underscores the necessity for configurational studies within this established relationship. Indeed, the configurational approach that links marketing and firm resources, DDI types, and value proposition practices is a distinctive aspect of our doctoral work. For instance, Mikalef & Krogstie (2020) examine the alignment between BD analytics resources and their interaction with organizational and contextual factors to enhance a firm’s capabilities for both incremental and radical process innovation using an FsQCA approach. Although this study offers several configurational proposals to link digitalization capabilities, firm resources, and innovation, our research diverges in the variables (conditions) and outcomes (solutions) analyzed. Specifically, their focus is on BD analytics capabilities, whereas our research centers on DDIC of marketing. Additionally, while they consider only firm resources, we examine both marketing and firm resources. Moreover, they develop configurations for innovation

process solutions, whereas we focus on configurations for DDI solutions. Importantly, they do not establish relationships with value proposition architecture.

Another relevant study by Dahms et al. (2023) identifies combinations of organizational agility, digital competencies, and embeddedness in internal and external networks to determine varying levels of innovation performance. While they highlight the need to integrate digital and organizational capabilities for enhanced innovation performance, they do not examine the role of resources embedded in DDIC of marketing, the specific types of DDI, or their connection to value proposition practices. In general, several studies propose configurational blueprints linking capabilities, external conditions, and technological resources to drive product, process, or performance innovation (Gerke et al., 2021; Mazzucchelli et al., 2021; Waldkirch et al., 2021). To our knowledge, our research is the first to incorporate the value proposition concept and the marketing resources embedded in DDIC, based on a fsQCA analysis, offering a novel analysis of this relationship.

A fourth research dimension emphasizes the in-depth scrutiny of value proposition architecture within this established relationship. Several studies have explored the architecture of value propositions in the context of innovation and digitalization. For instance, based on the customer value proposition framework by Payne et al. (2017), Ranta et al. (2020) developed a theoretical framework that constructs value propositions through four alternative value creation logics (resurrect, share, optimize, and replace value), each built on different forms of innovations (practices, usages, resources) and highlighting various design elements. However, their extensive multiple-case study was conducted across various Finnish industries from a circular economy perspective, not a DDI perspective. Furthermore, these authors suggested quantitative conjoint analyses to determine under which conditions different customers prefer value propositions that emphasize alternative value creation logics for specific innovations. In the context of DDI, our study aims to address this quantitative gap through the use of a configurational analysis.

Additionally, another line of research on industrial companies connected to value proposition has described innovative sources of revenue through digitalization, identifying three growth paths: (1) commercializing digital solutions, (2) utilizing product connectivity, and (3) establishing an IoT-platform-based application business (Gebauer et al., 2020). For each path, this study illustrates how value proposition components and related value-creation activities are modified. For instance, to commercialize digital solutions, B2B companies must create value propositions that integrate digital technologies to address problems, align customer needs through structured, iterative processes, and modularize solutions by standardizing and customizing. While these analyses provide insights into well-known companies, they lack a detailed explanation of the study design, specifically the methodology used to process qualitative data. Furthermore, the analysis is not supported by management theories such as RBT and DC,

nor does it incorporate the "practice turn" in marketing, strategy, and organizational research that highlights the crucial role of social practices in inter-organizational collaboration (Kohtamäki & Rajala, 2016). This omission diminishes the potential for managerial applicability and theoretical advancement, and complicates the possibility of subsequent quantitative investigation. Lastly, there is a mitigated emphasis on the affordances of marketing capabilities in designing value propositions that drive DDI. Our study established a proven link between the three specific elements of DDIC of marketing, value proposition design, and DDI, by thoroughly analyzing this relationship.

The next theme extracted from our findings discusses the different types of DDI identified during our investigation.

2.3. Advancing a typology for DDI

Our doctoral thesis developed a taxonomy of DDIs, identifying three primary categories: (1) digitalized service innovation, (2) data monetization, and (3) global integrated solution. Our research particularly highlighted the critical role of DDIC of marketing within DDIs, which shape their unique value propositions, especially in terms of value practice fulfillment.

From a holistic perspective on DDI, a recent study by Hossain et al. (2024) utilizing fsQCA explores various configurations for developing DDI, based on technology, organizational capabilities, external environment, and firm control variables. The study views DDI as a comprehensive concept, focusing on the broad aspects of innovation rather than on specific types. Since DDI involves a series of innovation processes that utilize techniques, such as BD analytics, and technologies, like machine learning, deep learning, and AI to extract meaningful value from data and produce innovative outcomes (Sultana et al., 2022a), it is key to examine which specific innovation results are being discussed and under what conditions they can be achieved. This necessity has driven our configurational analysis approach to explore the three types of DDI.

From an outcome analysis perspective, we examined how to drive (1) digitalized service innovation, (2) data monetization, and (3) global integrated solution by evaluating the roles of firm and marketing resources within a single configurational analysis. Notable studies assess the impact of using firm and marketing resources on digitalized service innovation (Ardolino et al., 2018; Harrmann et al., 2022), data monetization (Ritala et al., 2024), and global integrated solutions (van der Borgh et al., 2023). However, no study has yet integrated these three identified DDI categories into a single configurational analysis, nor proposed the different resource paths needed to achieve them.

Considering the type of digitalized service innovation, it has been well-documented within the digital servitization literature. Some works explore how firms transition from

traditional products to digital solutions, utilizing data to develop enhanced or entirely new product-service offerings (Kohtamäki et al., 2019; Paschou et al., 2020). However, the links between the DDI phenomenon and its established connections with value propositions have not been explicitly established.

Regarding the DDI type of data monetization, we contribute to academic research by proposing an fsQCA study, advancing some qualitative works on this type of innovation (Parvinen et al., 2020; Ritala et al., 2024). These works, along with our study, operate under the assumption that data monetization is a type of DDI (Parvinen et al., 2020; Ritala et al., 2024). To our knowledge, our work is the first to propose a quantitative study on data monetization, paving the way for future research avenues.

Considering global integrated solution, research has explained how digitalization influences firm boundary decisions as they develop digital solutions across organizational boundaries within ecosystems (Kohtamäki et al., 2019). These innovative smart solutions integrate various products, services, software, and analytics (Porter & Heppelmann, 2015). These authors have shown how digitalization has fostered an ecosystem of partners, providers, operators, and actors outside the traditional industry value chain. Other findings align with our research on DDI, employing the RBT and the S-D Logic as foundational frameworks to explain a typology of five innovative business models resulting from digital servitization (Huikkola & Kohtamäki, 2018; Kowalkowski et al., 2015). Each model could offer performance gains and a competitive advantage for the company. Nonetheless, the primary focus of these studies is on digital servitization rather than specific types of DDI. Additionally, the authors do not establish a link between this typology and a value perspective, highlighting the need for more research in this area. Our research addresses this gap by linking the value proposition elements with the three identified types of DDI.

More generally, the main studies on DDI development tend to focus on components (Bresciani et al., 2021; Sultana et al., 2022b, 2022a), factors (Jetzek et al., 2014; Yu et al., 2022), innovation strategies (Babu et al., 2024; Trabucchi & Buganza, 2019), impacts (Chatterjee et al., 2021; Zhan et al., 2018), and other related variables such as data governance or regulation (Gillan, 2021; Hemerly, 2013). These studies typically do not elaborate on how many types encompass DDI, nor how they connect to the value proposition. As digitalization emerges as the next frontier for innovation, our proposed typology aims to provide an initial classification of DDI and enrich the existing taxonomy of innovation—incremental, radical, and disruptive—updating it for the era of Industry 4.0.

We will examine the main theoretical and methodological contributions, as well as managerial and educational implications, in the next section.

3. Contributions and implications

Our research is anchored in B2B strategic marketing and aims to advance the development of its theory.

We highlight contributions in four areas: (1) MIC, (2) DDIC of marketing concept and DMC research field, (3) DDI and (4) value proposition.

3.1. Theoretical contributions

3.1.1. MIC research field

Firstly, our study delineates what constitutes MIC, helping to finely tune and deepen the literature on marketing capabilities. The literature review of this doctoral work emphasized the prominent role of marketing capabilities applied to innovation. It is argued that firms must excel in both marketing and innovation to remain competitive, according to scholars such as Moorman & Slotegraaf (1999), and Song et al., (2005). As highlighted by Kozlenkova et al. (2014), marketing capabilities applied to innovation are understudied and warrant further investigation. By providing a holistic view of MIC, we have refined the literature on marketing capabilities and answered their call.

Specifically, we advance its composition. First, we confirm MO as a major component, intrinsically linked to MIC, a theoretical pillar that has been studied from various perspectives in the scrutiny of MIC, whether from a cultural lens (Gatignon & Xuereb, 1997), a processual lens (Kohli & Jaworski, 1990), or a strategic lens (Narver & Slater, 1990). Second, this MO component is closely connected to the knowledge management activities that encompass MIC, which we define as the core routine activities enabled by MIC.

Based on the RBT and DC view of the firm, we detail how MIC contribute to the competitive advantage of the firm, namely through its potential to create value and enhance firm performance. We shed light on how MIC influences marketing decisions for innovation through the strategic deployment of value propositions that foster the firm's positional advantage.

Finally, our conceptual research on MIC contributes to the literature on B2B marketing theory by identifying a positive relationship between MO, a focus on customer knowledge management, and a focus on value, through the strategic alignment of value propositions,

to achieve the firm's competitive advantage. From a behavioral and relational perspective (Kohli & Jaworski, 1990), we present a conceptualization of MIC that enhances its understanding, viewing MO, and especially the customer-centric perspective embedded in it, as a means for the marketing department to manage knowledge for innovation strategy, and for customers as a means to obtain the value they expect.

3.1.2. DDIC of marketing concept and DMC research field

The DDIC of marketing concept and the DMC research field constitute the second area in which we advance knowledge for the B2B strategic marketing literature. By conceptualizing the DDIC of marketing, we enhance the literature on DMC. We have focused our research on explaining the components and underlying mechanisms of DDIC in the B2B environment, thus responding to several calls from both researchers (Moorman & Day, 2016; Parida et al., 2019; Verhoef & Bijmolt, 2019) and practitioners (Galante et al., 2013; Sayre et al., 2012).

Firstly, by applying a DC perspective to the DDIC of marketing, we advance understanding of the dynamic process of marketing capabilities (Morgan et al., 2019). We argue that a linear, processual view is insufficient for implementing DDIC of marketing, particularly due to the evolving nature of innovation and digitalization embedded within it. Through the operationalization of three learning mechanisms alongside the capability-building process, we demonstrate how to apply key insights from DC theory (Teece, 2007). Furthermore, Wilden & Gudergan (2015) highlight the necessity of explaining the mechanisms that lead to the creation and management of marketing capabilities. We believe our investigation represents an initial effort to close this operational gap.

Secondly, the three-phase capability-building model of DDIC of marketing offers a practical perspective for the academic research by describing how to process it. This model aligns with the marketing-as-practice approach to positively address the debate around marketing's influence on strategic decision-making. Indeed, while supporting the argument that marketing benefits an organization (Homburg et al., 2015), there is a growing interest in studying how the changing digital environment has reconfigured marketing practices and how the marketing function can be viewed as a subordinate domain of management (Quinn et al., 2016). Consequently, by utilizing a robust theoretical capability model (Zollo & Winter, 2002) and applying strategic management theories to marketing capabilities, namely RBT, DC, and MO (Barney, 1991; Kohli & Jaworski, 1990; Teece, 2007), we reinforce the pragmatic view that "we need to ensure that the concepts and methods employed are appropriate for generating valid insights into critical research questions" (Reibstein et al., 2009,p.1). This includes evaluating new

practices of marketing in the digital era, as marketing strategy implementation is a complex phenomenon (Thorpe & Morgan, 2007, p.660).

3.1.3. DDI research field

Further, we propose new insights into the DDI literature, our third theoretical contributive research area, focusing on two major aspects.

First, we more closely link DDI to the theory of B2B strategic marketing. DDI is often associated with technical, technological, and operational capabilities. Typically, this phenomenon is explored within disciplines such as information systems, production, innovation, operational research, economics, and management and organizational studies. By analyzing this concept from the perspective of marketing research, we enhance the influence of the marketing department on strategic issues related to DDI. Prior research has highlighted that technological capabilities are characteristics of DDI. Our approach delves deeper, asserting that technological capabilities alone are insufficient; market-based capabilities and knowledge of customer needs are essential complements in achieving DDI.

Second, the configuration patterns established to successfully implement the three types of DDI contribute to contextual applications in innovation, advancing the DDI research field. Recent trends in business and management studies have shown an increase in contextual studies within comparative research, especially in the field of innovation (Kraus et al., 2018). The high degree of complexity that can be captured through theory testing based on conditions such as firm and marketing resources, and contextual applications like DDI in the B2B context, has led to the growing use of fsQCA in innovation research (Greckhamer et al., 2008; Kvist et al., 2007; Marx & van Hootegem, 2007; Rihoux, 2013; Schneider & Eggert, 2014). Furthermore, our interviews revealed that practitioners might hesitate to implement DDI strategies, feeling they lack the necessary resources. Our fsQCA study confirms for both academics and practitioners that they can achieve highly accurate portrayals of real-world processes for different DDIs and that several firm and marketing resources configurations can lead to DDI, thereby mitigating potential financial and strategic risks associated with developing new offerings. Since research on DDI is still emerging within B2B marketing, our fsQCA study serves as a theoretical anchor, aiming to capture the complexity of causally relevant conditions. This approach enables further investigation into the DDI topic (Kraus et al., 2018).

3.1.4. Value proposition research field

The value proposition research field stands as our fourth theoretical contribution research domain. We have made a fresh and original contribution to the concept of value proposition for B2B marketing theory, as well as to some of its established theoretical constructs, including Practice Theory, Resource-Based Theory (RBT), Service-Dominant Logic (SD-Logic), and the context of DDI.

First and foremost, we enrich Practice Theory by linking the architecture of value propositions for DDI to a practice-based theoretical view. Building on sociological literature (Bourdieu, 1977; Foucault, 1980; Schatzki et al., 2001), the emerging "practice turn" in marketing, strategy, and organizational research emphasizes the central role of social practices in organizations. Authors such as Chia (2004) and Echeverri & Skålén (2011) define practices as a sort of "background coping skills," which actors use in their words and actions. Chia (2004) describes these skills as a repository, a habitus, from which we unconsciously draw to handle novel situations. Applied to our work, our three identified practices for value proposition are then understood as the routine activities and sensemaking frameworks that the marketing department carries out and uses in the specific context of DDI. Moreover, from an RBT view, we argue that the resources are the "building blocks" that practices integrate into DDI (Ballantyne et al., 2011; Echeverri & Skålén, 2011; Grönroos, 2011). Aligned with Korkman et al. (2010, p.236), we also state that "practices are resource integrators" and that value proposition practices are marketing capabilities integrators (Moorman & Day, 2016).

Moreover, this study advances previous works by Skålén (Skålén et al., 2015) examining practices of value proposition for service innovation through an RBT view and SD-Logic perspective, by applying it to the specific context of DDI, and by testing and configuring different paths of marketing and firm resources embedded in value practices for architecting value propositions for three distinct types of DDI.

Second, this study enriches the literature on S-D Logic and digital servitization by revealing collaboration creation practices, assessing value in use, and examining the resources of DDIC of marketing that shape the value proposition for DDI. To the best of our knowledge, this is the first study testing how a typology of DDI can take place from a micro-level analysis of the marketing department practices, through robust configuration patterns of value practices resources embeddedness.

Furthermore, this contribution to value proposition addresses calls from the literature, such as those by Frow & Payne (2011, p.236), who noted a need for qualitative and quantitative data on value propositions, and Payne et al. (2017), who emphasized evaluating the combination and relevance of key resources for creating effective value propositions. Following the S-D Logic, Frow and Payne (2017) argue for a growing need

for studies that address the activities through which value propositions are formed and how the context of resource-integrating actors influences this formation. We aim to fill this gap by detailing activities related to DDI, namely the practices of value, executed through the integration of resources integrated in DDIC of marketing, can form the corresponding value proposition.

Finally, this fsQCA study, through the identification of resource configuration patterns for value proposition, is a solid contribution to the concept of value proposition applied to the context of DDI. It aligns with the works of Ranta et al. (2020), who view value proposition as an important area for research due to the potential performance effects of different value proposition resource combinations applied to various contexts. A very recent study extends the value proposition literature by empirically testing which marketing and organizational resources can enhance value proposition implementation (Grimes-Rose et al., 2024). Nevertheless, as these authors underline, the identified resources may not represent all possible explanatory factors, especially in the context of DDI. DDI is an innovation strategy that is gaining momentum but whose boundaries have not yet been delineated due to the recency of the phenomenon and necessitating asymmetrical techniques drawing on the reasoning of complexity theory, like the fsQCA method (S. Kumar et al., 2022). As such, we go a step further by proposing different configurational patterns of value proposition architecture for DDI, with the aim of better predicting and explaining real-world business and complex phenomena (Kumar et al., 2022).

Our research also contributes by providing new insights into the methodological approaches we employed, which we depict in the following section.

3.2. Methodological contributions

Our methodological contributions concern the three approaches we employed : (1) the conceptual approach, (2) the qualitative study and abductive approach, and (3) the FsQCA configurational approach.

3.2.1. The conceptual approach

From a methodological standpoint, this doctoral work was an opportunity to test and validate two different yet complementary conceptual approaches.

Firstly, we used a bibliometric analysis to explore the volume of scientific research articles accumulated on marketing capabilities connected to innovation. There are more than 25 years of marketing research on conceptualizing marketing capabilities and their role in innovation to explain firm performance, but there was no study serving as a comprehensive review on the subject, nor a structured mapping of emerging knowledge, resulting in a scattered agenda on MIC. Our goal was to understand MIC's historical evolution, organize knowledge on new research areas (e.g., co-innovation, data-driven innovation, servitization), and connect literature and contemporary trends about MIC.

By using bibliographic coupling at the document level, we contributed to the use of a statistical approach that is considered to objectively represent research productivity and impact (Kücher & Feldbauer-Durstmüller, 2019; Ramos-Rodríguez & Ruíz-Navarro, 2004; Zupic & Čater, 2015), specifically in the field of organization and management studies where the method has been growing rapidly over the last 10 years. We scrutinized the relationships among citing publications by examining common references shared by different documents, with the objective of identifying research clusters, tracing the latest theoretical developments, and evaluating their potential future impact. We then advanced the use of bibliographic coupling in the marketing field, which has traditionally relied on co-citation analysis in literature reviews, focusing on the relationships among publications and the cross-citations between documents to identify the most influential publications and discover foundational knowledge, thus being more oriented towards impactful past research. Generally speaking, the bibliographic coupling method, which focuses on current knowledge and business trends, is highly recommended for scholars in management and organizational sciences. This method is particularly valuable given the rapid evolution of marketing innovation practices in an increasingly digitalized world, which leads to frequent changes in organizational structures. It is an effective approach for conducting literature reviews on new technologies, innovation, and marketing capabilities. Furthermore, we believe we made an important methodological contribution by using bibliographic coupling to comprehend emerging or weakly structured fields of innovation capabilities applied to the specific marketing discipline. It can be used as a pre-coding tool that enables researchers to slightly adjust the content of clusters by interpreting the data (Maucuer et al., 2022). An in-depth comparative analysis of the marketing discipline with other disciplines such as information systems innovation, or entrepreneurship, treating innovation capabilities, and based on a bibliographic coupling tool, would complement our study and provide an avenue for future research.

Secondly, we found it appropriate to conduct a systematic literature review on the DDIC of marketing, following the meticulous steps of Tranfield et al. (Tranfield et al., 2003), i.e., planning the review, conducting the review, and reporting and dissemination. This method is widely used in management sciences but still underutilized in strategic marketing, despite its transparency, rigor, and reproducibility, which are very useful for developing theories. By relying on the PRISMA protocol (Liberati et al., 2009), which includes a rigorous checklist for defining objectives with an explicit and reproducible methodology, we conducted a narrative synthesis of our results using an explanatory method and a critical realism approach (Rousseau et al., 2008). We then interpreted our results using the proven integrative framework in systematic reviews, the CIMO framework (Denyer et al., 2008). Through this approach, we advanced the theoretical potential of systematic literature reviews in marketing science. Pare et al. (2016) also emphasized that systematic literature reviews are a transparent, scientific, and replicable process, to enlarge academic knowledge and serve as a managerial guide, noting that there is an increasing recognition that most, if not all review forms should be planned and conducted with the twin aspects of quality of conduct (i.e., systematicity) and quality of reporting (i.e., transparency) in mind. We align with these authors by creating a replicable process of knowledge on DDIC of marketing that can be used as an anchorage for scientific marketing research and managers and contributed to the diffusion of such a method in the marketing discipline. Our results can be assimilated as a theoretical platform on DDIC of marketing, and by being able to thoroughly describe its successive steps of achievement, we advocate that researchers willing to advance on the subject have solid foundations to continue investigations, and managers can benefit from solid insights to pave their DDI way.

Furthermore, we highlight that this first theoretical marketing point on the construct of DDIC of marketing is evident by an interdisciplinary literature, suggesting that these extracted conceptual propositions can be tested empirically, not only in B2B marketing but also in its connected disciplines. This choice of interdisciplinarity for our systematic literature review fits with Lilien's statement: "I urge my colleagues to consider that if we believe our own rhetoric about the need for interdisciplinary work in business (after all, what business problem in marketing does not affect production or the supply chain or have an IT component and financial and human resources implications?), then we should be proactive in including such work in our top journals" (Lilien, 2011). This reflection aligns with the idea that systematic reviews in management research should be aimed at discovering and expanding the boundaries of where knowledge lies in a specified subject area (Humphrey et al., 2011).

Finally, we have thus sought to address several calls in the literature for systematic reviews. For example, Rojon et al. (2021) encouraged researchers to boldly articulate potential evidence for, as well as challenges against, relevant explanatory theoretical frameworks. This involves expanding the research scope and conducting a deeper interrogation of research questions and knowledge gaps to explore how these gaps can

be addressed. In our efforts, we included multiple disciplines to offer a conceptualization, describe the process of construction, and examine connected dimensions for the DDIC of marketing, which extends beyond the confines of the marketing department alone. This interdisciplinary approach, combined with the integration of complementary theoretical perspectives as proposed in our article through a network approach, also aligns with the recommendations of Alegre et al. (2023). Published in their recent editorial on innovative conceptual contributions, they suggest that theory-driven reviews should not only rely on a rigorous methodology but also embrace author creativity to generate something truly novel. This could be achieved, for example, by combining theoretical lenses or identifying informative parallels across research domains.

To put it in a nutshell, these two methodological exercises for our conceptual approach should be strongly recommended to any doctoral student wishing to undertake a thesis by essays. They provide, first, a broad conceptual understanding of a research field, and second, a clarification of a more precise research object. This positioning allows the researcher to be clearly identified within a scientific community and offers opportunities for collaboration with leading researchers in these areas.

We elaborate on our contribution to the execution of our qualitative study through an abductive approach in the next subsection.

3.2.2. The qualitative study and abductive approach

Qualitative research is particularly used in industrial marketing, especially in topics related to innovation, new product development, and capabilities (Lindgreen et al., 2021). The aim is to describe or present specific situations and contribute to the advancement of marketing management theories. This aligns well with our objective to investigate DDIC of marketing, specifically in the context of DDI, to elaborate on the marketing innovation capabilities field.

Based on recommendations from several authors (Lindgreen et al., 2021; Pratt, 2009), we particularly advance the use of qualitative study for innovation topics by detailing the research design with precision to ensure the robustness of our results and increase the rigor and trustworthiness of our theoretical development efforts on DDIC of marketing. Additionally, as there is an increasing number of studies on innovation in B2B marketing, we continued tracking this trend as suggested by Lindgreen et al. (2021), by specifically identifying and concentrating on the notions with the greatest publishing potential, such as digitalization and DDI are.

In particular, we believe that qualitative interviews are a suitable technique to explore new business concepts that change rapidly, such as the emerging trend of concepts connected to digitalization. Understanding how companies can rely on organizational

processes and capabilities to achieve DDI, and what kinds of opportunities and challenges are related to this innovation approach, can be further explored through qualitative methodologies (Trabucchi & Buganza, 2019). Moreover, some authors on DDI (Hossain et al., 2024) suggested research should be more engaged in the context, for instance, with qualitative or ethnographic studies gathering data from a company department or function perspective. Therefore, we contributed with our qualitative study to give more qualitative insights on a marketing concept from a DDI context.

Finally, our aim was to discover new dimensions by combining insights from the field and insights from a thorough systematic literature review on DDIC of marketing within a robust theoretical framework. The abductive approach was judged appropriate. An abductive approach is fruitful if the researcher's objective is to discover new things — other variables and other relationships (Dubois & Gadde, 2002). In studies relying on abduction, there is a cross-fertilization between unanticipated empirical findings, theoretical insights gained during the process, and the original theoretical framework, which coalesce to develop existing theories (Dubois & Gadde, 2002). Indeed, systematic combining builds more on the refinement of existing theories than on inventing new ones. Thus, we advanced the use of this approach for existing theories development, in our case, enriching the theoretical aspect of marketing innovation capabilities by conceptualizing a capability model for DDIC of marketing.

3.2.3. The FsQCA configurational approach

The choice of this methodology quickly became evident to us and offered two major contributions applied to our thesis subject.

First, there is an increasing use of this method in a growing number of marketing research studies on innovation topics. While mostly unknown by researchers in this field before 2013 (Kraus et al., 2018), it has since been employed to address rapidly changing managerial contexts. Indeed, in marketing and management sciences, the decision-making methodology often adopted in business and management studies, which typically derives outcomes using linear statistical analysis with finite contextual factors, could suffer from prediction inaccuracy (Arrow et al., 2008; Pappas & Woodside, 2021). This prediction inaccuracy may be caused by constantly shifting market circumstances, indicating that the environment in which businesses operate across sectors has intricate scenarios with ambiguous or inconsistent observations (Woodside et al., 2018). These conditions may contradict projected insights derived from historical data. The new DDI standard has changed the way B2B companies innovate, and several causal variables can explain this phenomenon. Thus, in our research, it was relevant to observe and quantify the different paths companies can take to achieve DDI, and fsQCA seems to be the long-awaited answer to the question of how to discover different configurations (e.g., Harms et al., 2019) of multiple interrelated variables all leading to the same desired output (Kraus

et al., 2018). We thus delved into its use for specific strategic questions connected to marketing, data-driven decisions making processes, and the changing market environment. Additionally, through the fsQCA, we also respond to the mixed methods paradigm by combining quantitative analyses with a qualitative viewpoint in a single instance, particularly with the potential to conduct further qualitative interviews. These interviews can either confirm the quantitative results or provide better reasoning for deviations between expected and actual results for specific success paths of DDI (Kraus et al., 2018). For example, the fsQCA algorithm allowed us to highlight a sustained interest in data monetization among respondents, whose paths of configurations diverge in its achievement. The initial results warrant further support through follow-up interviews.

Second, the fsQCA method enabled us to explain the possible combinations of marketing and firm resources that lead to three distinct types of DDI. Therefore, we are responding to Kumar et al.'s call to employ this method more frequently to configure the potential motivations and causes for organizations to engage in their innovation strategies (Kumar et al., 2022). The pursuit of successful product innovation remains a challenging endeavor for most businesses (Cheng et al., 2013; Yoruk et al., 2021), particularly as the customer landscape evolves and the failure rate of product innovation initiatives grows exponentially. Innovators who previously achieved success now struggle to sustain their performance (Nijssen & Ordanini, 2020). The issues extend beyond mere execution problems (Yoruk et al., 2021), and the sophisticated fsQCA method is particularly suitable when causality is complex. In today's VUCA[20] world, this method can elucidate and verify non-linear relationships that reflect real-world business circumstances. This contrasts with the limitations of conventional linear theoretical and analytical techniques, especially in the case of emerging phenomena such as DDI. It also addresses the theory-practice gap, a persistent issue in academic research, as we tackle a practical problem, i.e., DDI achievement, through an academic configurational perspective of resources and capabilities combination.

To conclude, the conceptual, exploratory, and confirmatory approaches all contributed to relevant methodological insights, increasing our understanding of DDIC of marketing.

Section 3 outlines the managerial and educational implications of our doctoral work.

3.3. Managerial and educational implications

The following section present managerial and educational implications derived from our research results. As this doctoral work marks the first step of a career as a teacher-researcher, we believe it is relevant to link the managerial and educational perspectives to enhance the practical applicability of our research results.

[20] VUCA: Volatility, Uncertainty, Complexity, Ambiguity

We first specify managerial implications in two main areas: (1) MIC and DDIC of marketing, and (2) value proposition for DDI.

3.3.1. Managerial implications related to MIC and DDIC of marketing

In January 2024, a recent article explored the departure of several notable Chief Marketing Officers (CMOs) from companies like UPS, Etsy, and Walgreens, indicating that the position is losing clout in the C-suite[21]. Several researchers have also emphasized the diminishing influence of marketing and the CMO within the firm's executive team (Moorman & Day, 2016; Verhoef & Leeflang, 2009). Understanding the evolving role of marketing has therefore become crucial to reconciling its position within a firm and amplifying its influence.

Three underlying trends explain the controversial role of the CMO. First, data from modern marketing, driven by "martech,"[22] is richer than ever, transforming the CMO role from managing traditional media to a tech-driven, insight-rich position. Second, marketing is as necessary as ever, arguably more so, as evidenced by the absorption of the job's tasks into operational and growth-focused roles, suggesting a restructuring around the CMO role. Third, evolving customer relationships and the rising importance of customer experience make marketing a critical function in B2B companies.

These trends converge with our findings on MIC and DDIC of marketing.

Firstly, the new digital trend in marketing is closely linked to our findings on DDIC of marketing. We directly connect the marketing department to its new digital role, detailing its activities related to its secondary role as a growth-focused department, through DDI. Furthermore, this DDIC of marketing model aims to generate a knowledge ecosystem by engaging with customers and linking with internal and external partners. This involves developing an outside-in orientation capability, aligning with evolving customer relationships and the increasing importance of customer experience trends, which positions marketing as a key function in the B2B environment.

This capability model for DDIC of marketing allows us to synchronize with the evolving role of marketing in B2B industries. We delve deeper by detailing a specific framework for building DDIC of marketing, which serves as a guide for identifying development targets and optimizing the marketing function's contribution to DDI. Indeed, marketing managers can utilize this roadmap, which describes the necessary set of resources,

[21] https://fortune.com/2024/01/16/chief-marketing-officer-cmo-fortune-500-disappearing/

[22] MarTech (marketing technology) refers to the software and tools used by marketers to plan, execute, and measure marketing activities and marketing strategy.

competencies, established routines, and connected mechanisms, to create an investment plan for the step-by-step implementation of DDIC in marketing. The development of DDIC of marketing has also highlighted the emergence of a new type of marketing profile for the digital era. We recommend that practitioners assess human resources with diverse skills, including technical, analytical, and managerial abilities, to enable the discovery of unexpected insights and the proactive and reactive utilization of these insights for innovation, setting innovation priorities. For example, it requires marketers to be able to evaluate the potential of new technologies and techniques to unlock value for developing data-driven service offerings.

This ecosystem view also indicates a new structural role for the marketing function that requires horizontal rather than vertical organization, moving away from operating in silos within an organization. The study on DDIC of marketing revealed that a digital culture and top management support are crucial for managing this change. Social, behavioral, and relational aspects are key to effectively restructuring the new role of marketing as a digital ecosystem manager, shifting from a traditionally more operational focus—now almost automated by key ready-to-use technologies such as analytics—to a more strategic role. Marketing, at the heart of this information ecosystem that it must share internally, must therefore implement this change with strong support from top management, a crucial ally for unlocking the digital arsenal for DDI, and by disseminating this digital culture throughout the company via internal communication campaigns.

Finally, the two conceptual approaches to MIC and DDIC have identified the predominance of customer-centricity, which is not always the case in all industrial companies, often attached to a product-centric innovation marked by technicality, R&D, and engineering. Without neglecting this technical stage, which prevails in many industries such as automotive or pharmaceuticals, it appears essential to train engineers, technicians, and R&D managers to understand what the customer wants and what data-driven products, monetization of data streams, or digitalized integrated solutions could bring them benefits, alleviate their pain, and increase their utility value. The role of marketing is key in this activity, as it is the point of contact with all the company's clients. It records customer data and captures relevant insights for DDI purposes. It is thus well-positioned to engage in deploying sessions on customer-centricity so that its colleagues understand the necessity of empathizing with the client and the work they could perform for them in order to develop a value proposition that satisfies them. Social and psychological dimensions (e.g., trust, open interactions, a sense of belonging, openness to change), as well as operational dimensions (e.g., process codification, best practices, and user cases), will need to be considered if firms wish to make this change on a significant level. This managerial application point is particularly important as it allows, in a second phase, to develop the rate of customer loyalty and recruitment, thereby conferring more accountability on marketing, which can sometimes be criticized.

3.3.2. Managerial implications related to the value proposition for DDI

The results from Article 4 revealed an architecture of value propositions for driving DDI that is anchored in three main aggregate practices and their sub-practices, nurtured by an array of marketing and firm resources. For firms, the strategic decision to opt for a specific DDI rests on their arbitration to integrate different resources. Firms need to inventory the bundles of resources they have in stock and determine which ones to acquire to fulfill their strategic DDI roadmap. These configurations will help them to project a dedicated budget.

The findings particularly emphasized the role of marketing in for the value capture practice. To develop their data-driven offerings, firms need to capture data from the environment, using sensor-equipped products, or Application Program Interface (API) connections. The more customers engage in exchanging data with the company, the more relevant, rapid, and extensive the number of insights received by the marketing department to be incorporated into the shaping of new value propositions. This is called the network effect, which enables value creation beyond the classical value chain and its economies of scale. Here, the larger the sources of data, the greater the relative power of analytics, generating superior digital features of the strategized DDI, and such superiority attracts more customers. Therefore, the role of marketing is to facilitate the sharing of external data to increase its variety, volume, and velocity, while also facilitating internal access and transformation into potential DDI. This is often accomplished through digital platforms, where strategic, rather than technical, management is typically entrusted to marketing for innovation purposes. We thus invite marketers eager to develop DDI projects to establish such platforms and involve the marketing department in their management.

Furthermore, DDI requires marketers to actively collaborate with clients to ensure the successful realization of each type of DDI. Our study elucidates collaboration mechanisms by detailing various levels of collaboration for marketers to consider, depending on the type of desired DDI and the role of data in architecting the value proposition.

We detail below a schema to guide marketers on the implementation of value propositions according to the envisaged DDI, focusing on two aspects: (1) the level of collaboration practices, and (2) the role of data. The figure below also distinguishes between the classical innovation scope and the DDI scope.

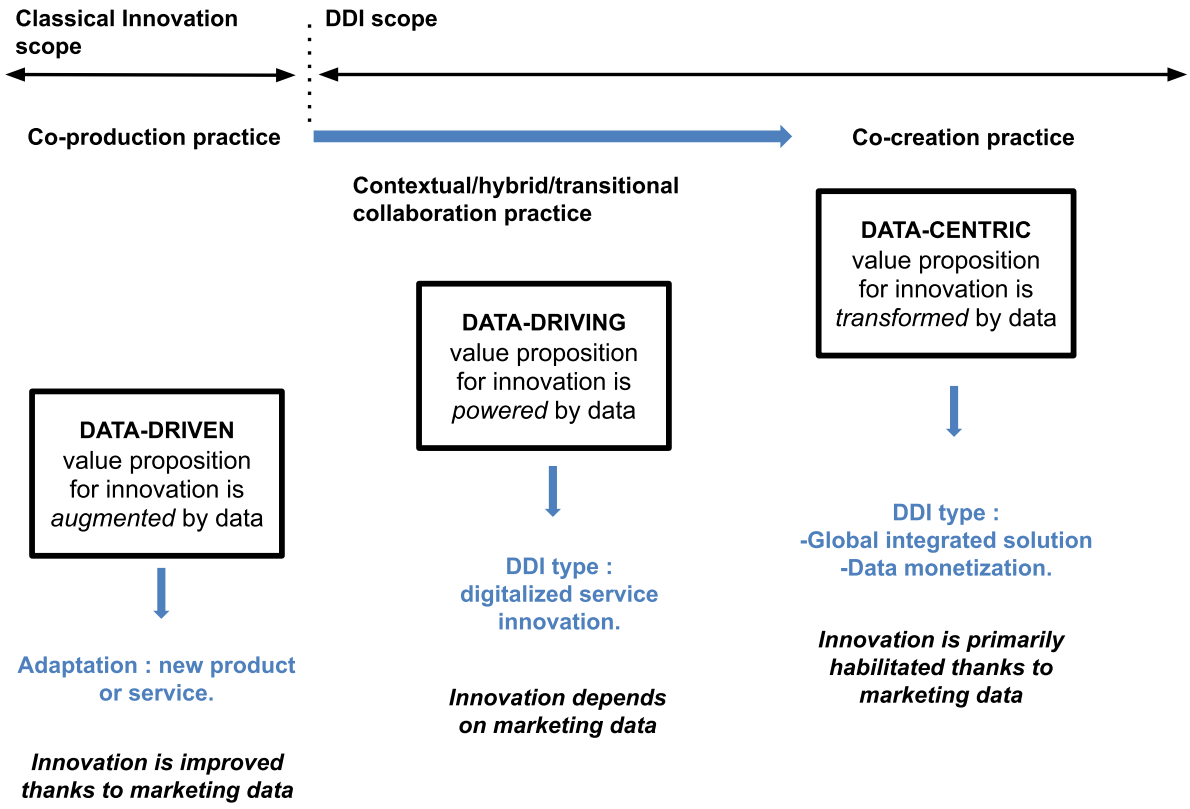


Figure 5-3. A guideline for the value proposition of DDI according to the collaboration level and the role of data

Our study also highlights patterns of identical marketing resource configurations for designing value propositions, regardless of the type of DDI envisioned, primarily for the value capture practice, and to a lesser extent, for other firm and marketing resources included in the practices of value articulation and value leverage, at varying levels of importance. This implies that, depending on their budgets and business objectives, companies may experiment with multiple data-driven value propositions simultaneously and market two or three DDI outcomes concurrently. This also demonstrates the potential for capturing insights by the marketing department. For example, a single insight can serve multiple value propositions for DDI, which is not typically the case in traditional new product development processes. Marketing can use these arguments to justify investments in building its outside-in information capture ecosystem, which may involve specific recruitments, modifications or implementations of digital infrastructure, and partnerships with numerical data companies, IT architecture firms, hosting services, or data procurement.

Furthermore, we wish to discuss a specific type of DDI, namely data monetization. The fsQCA algorithm reveals that marketing capability and the capability for mass customization prevails in the implementation of data monetization. This type of DDI has garnered significant interest in our interviews as a source of additional revenue.

Marketing departments capture both internal and external data to construct and articulate the value proposition. For example, companies like Carrefour give marketing a predominant role, collaborating with suppliers to draft specifications for data monetization offers and ensuring high partner retention. Data monetization provides an opportunity for marketing to enhance its role by leveraging its expertise in implementing an outside-in ecosystem, demonstrating its capability in defining targeted value propositions. Moreover, the firm's ability to mass-customize these offers suggests that transforming data into business benefits can be a scalable and innovative strategy for B2B companies. As these DDIs are still emerging in the B2B environment, convincing the C-suite, especially those focused on product lines, is essential. This study can aid marketers in creating value propositions for data monetization.

3.3.3. Marketing educational implications

First, our results on developing the DDIC of marketing capability model and on the value proposition architecture are based on practices observed from interviewed managers. These findings advance the nascent theory of DMC applied to innovation. We suggest that marketing courses focus more on case studies to understand current marketing practices and their necessity, thus contributing to established B2B marketing theory. This theory should integrate foundational economic approaches and behavioral organizational aspects while combining the today's analytical and computationally intensive digitalization methods to adopt an ecosystem perspective beyond dyadic customer-provider relationships.

Second, we urge academic institutions to understand the strategic implications of AI in B2B marketing, recognizing how to use this tool effectively for data-driven decision-making in innovation, improving marketing operations, and fostering creativity for larger ideas and innovations. Courses should also address issues of data privacy, data security, and general ethics. The promise of AI lies in enhancing the value by acquiring new skills within the marketing department, and business schools can develop the AI-marketing dyad for effective Marketing 4.0.

Third, in a connected environment involving the Internet, IoT, sensors, and AI, future marketing managers must understand complex, dynamic systems and manage relationships with customers and a network of actors. As DDI relies on a servitization perspective, most marketing class examples should come from the service sector, focusing on servitization, customer-centricity, and ecosystems rather than the goods sector and transactional sales. Traditional concepts like the 4 Ps should be replaced by relational, customer-centricity and ecosystem-based conceptualizations.

Lastly, courses on DDI and B2B marketing strategy should prepare future managers to see their role in innovation as crucial for achieving competitive advantage. Modules on

unleashing value from data and creating value through customer value propositions should be emphasized. Traditionally, marketing classes have focused on operational aspects like communication, advertisement, new product development, and social media analytics. However, the proliferation of data demands a strategic orientation in B2B marketing, making strategy and management more important than ever. Thus, a strategic approach for B2B marketing in the digital world is an educational path to pursue.

Section 4 addresses the limitations and future research of our investigation.

4. Limitations and future research

4.1. Limitations

We categorize our limitations into three main areas: (1) theoretical background, (2) integration of variables, and (3) the constructivist perspective.

4.1.1. Theoretical background

We adopted a specific theoretical approach to frame our results and advance the conceptualization of DDIC of marketing and the broader theory of DMC. Specifically, we delineated the composition of DDIC of marketing according to RBT, highlighting the heterogeneity and complementarity of the resources involved. However, we did not extensively study the complementarity of DDIC of marketing with classical marketing resources in innovation. It would have been pertinent to measure this complementarity based on the envisioned DDI. Applying this approach to DDI would reinforce the study by Homburg & Wielgos (2022) on the interaction effect of DMC and classical marketing capabilities on firm performance.

Other theoretical perspectives on innovation could also have been considered. For example, this study does not link DDI types to existing innovation typologies, such as those proposed by Chandy & Tellis (1998), which include incremental and radical innovation, or that of Garcia & Calantone (2002), which uses market versus technology and macro-level versus micro-level dimensions. This perspective could have enabled comparative studies between the respective characteristics of each typology, i.e., DDI and existing innovation types.

Additional perspectives on value proposition could have been explored, such as the framework proposed by Payne et al. (2017), which outlines an architecture of the value proposition using different design elements. This architecture crystallizes a firm's value creation logic and the superior value package delivered to target customers. A recent article by Ranta et al. (2020) applies this theoretical lens to the circular economy, showing how B2B suppliers articulate customer value propositions in this context. One could consider how this framework might be relevant to DDI.

Furthermore, from a servitization perspective on DDI, another theoretical approach that relies on service marketing research could have been used to increase our understanding of the DDI ecosystem, as we identified different parties involved in the creation process. In particular, the Eiglier and Langeard servuction model (Eiglier & Langeard, 1975) representing the French school in service marketing research, is based on resources active in the service (production) process. More precisely, it is essential to distinguish between the resources and activities responsible for making promises and those responsible for fulfilling them. The former are likely to be primarily full-time marketers, while the latter include part-time marketers and various other resources and systems—both physical and digital—that customers interact with or are exposed to in other ways (Grönroos, 2020). The processes active in such interactions between customers and firms, and more extensively, within the DDI ecosystem, could have constituted another way of modeling the necessary resources embedded in the DDIC of marketing and the firm, as well as the activities and practices required for achieving DDI and designing value propositions.

Lastly, our study revealed collaboration practices between suppliers and customers for architecting value propositions for DDI, suggesting different levels of interaction, from collaboration to co-creation, depending on the DDI type. However, it did not delve deeply into the mechanisms leading to these collaboration practices, focusing more on the necessary mechanisms to build DDIC of marketing, which was the core research objective of this doctoral work. An additional approach based on the theory and practice of value co-creation in B2B systems could have enhanced our understanding of such practices, inspired by relevant studies like Kohtamäki & Rajala (2016), suggesting more institutional and practice theory perspectives on value co-creation and co-production of value propositions. Another lens may also consider ecosystem, networking and cooperation theories to address these collaboration practices.

The following subsection introduces some limitations in terms of the integration of variables.

4.1.2. Integration of variables

Regarding the managerial context, our research was not deliberately limited to a specific sector or industry to enhance the generalizability of our findings. However, industry-specific scrutiny might reveal unique characteristics. For instance, our study highlighted uncertainties about the role of marketing agility across the three DDI types, ranging from unnecessary to a necessary and core resource. Specifying a particular sector might have yielded less polarized results.

Additionally, the perspective of data quality managed by the marketing department in the context of DDI projects was not addressed. Detailing data quality according to the TDQM framework[23] could have added nuances to our results. These dimensions help organizations systematically assess and improve data quality, ensuring accuracy, completeness, consistency, timeliness, validity, accessibility, relevance, and reliability. The importance of these dimensions for the marketing department in achieving DDI projects remains questionable.

Moreover, the interviews identified obstacles in providing data to generate the first step of the DDIC of marketing construction process, during the "ideation" phase. These obstacles mainly stem from the difficulty managers face in establishing connections with B2B partners and customers to access information due to mutual data privacy concerns. Nonetheless, our literature review and qualitative study proposed facilitators for building the DDIC of marketing. Our doctoral work did not examine the direct link between these facilitators, such as digital orientation and top management support, and data privacy concerns. This relationship could have included psychological and behavioral aspects, which are important in the study of organizations in B2B marketing.

We discuss the limitations of our constructivist approach below.

4.1.3. The constructivist perspective

Finally, our research, focused on the contextual perspective of DDI, adopted a constructivist approach. DDI in marketing is a recent phenomenon, prompting us to initially explore the concept to describe and understand marketers' perceptions, and subsequently confirm its impact on the value proposition within the DDI context. This approach was taken to progress towards more quantifiable notions of experiences in DDI projects and value proposition construction. The goal of this constructivist approach was to achieve a deep and contextual understanding of the DDI phenomenon in marketing. Had we selected a specific industry or sector for our study, a positivist approach might have been appropriate. This would have allowed us to establish generalizations about the

[23] The Total Data Quality Management (TDQM) framework was created in the early 1990s by Richard Wang and colleagues that helps organizations systematically assess and improve the quality of their data.

relationship between DDI, value proposition architecture, and the context of DDI. We could have identified causal relationships specific to that industry or sector by testing precise hypotheses. However, we acknowledge the nascent stage of the DDI phenomenon in B2B marketing compared to B2C marketing, necessitating more exploratory investigations before objectively testing its reality.

4.2. Future research

"Somewhere, something incredible is waiting to be known."

Carl Sagan, astronomer, astrophysicist, cosmologist

Since the completion of our articles, additional work has been published on DDI (Babu et al., 2024; Hossain et al., 2024), indicating a relevant study context in management sciences and marketing in particular, and opening a promising research agenda in this area. Below, we suggest some research avenues to continue our thesis work.

We make several research propositions in five main areas of investigation: (1) DDIC of marketing, (2) DDI, (3) potential contingencies, (4) value proposition practices, and (5) the methodologies used. We conclude this section by summarizing our future research directions in Table 5-1..

4.2.1. DDIC of marketing

First, our study highlighted a composition of different resources and capabilities that make up the DDIC of marketing. Based on this information, we believe it would be interesting to establish a measurement scale for the DDIC of marketing to quantify the weight of each integrated marketing resource. Subsequently, the relationship between this constructed scale and DDI can be measured, particularly its impact on the three types of DDI identified in our doctoral work: (1) digitalized service innovation, (2) data monetization, and (3) global integrated solution. This approach would allow the formulation of hypotheses regarding the link between the DDIC of marketing and the types of DDI, based on the results of this thesis, and then confirm or refute them. This analysis would advance towards a generalizability approach of our results, proposing a replicable approach to the concept of DDIC of marketing. This scale constructed for the DDIC of marketing and the measure of its impact on the types of DDI could also open a research avenue for comparisons with other DDICs from other management fields, which also have an impact on the types of DDI.

4.2.2. DDI

Our fsQCA approach highlighted a strong interest in the DDI type of data monetization. The genesis of research on data monetization mainly consists of exploratory qualitative studies, and, as far as we know, our article is the only one to develop a quantitative approach by configuring conditions. Given the growing managerial interest in data monetization as a generator of additional revenue for companies, as evidenced by our interviewees, this type of DDI requires researchers' attention. We propose advancing work in this area by combining mixed approaches, including detailed case studies and applying structural equation modeling via Partial Least Squares (PLS) analysis. This combination will allow researchers and practitioners to test complex theoretical models, estimate relationships between observed and latent variables, and make predictions, as data monetization is still in its infancy.

4.2.3. Potential contingencies

A contingency approach to fine-tune the relationship between DDIC of marketing, value proposition practices, and DDI types is another recommended area for future research.

First, as discussed in our limitations, we did not empirically test the influence of identified facilitators of DDIC of marketing, such as data-driven culture, level of digitalization, or upper management support, in structuring value propositions to drive DDI types. These factors are often analyzed as moderators or mediators in studies on digitalization and innovation. We suggest adopting the contingent view of RBT (e.g., Aragón-Correa et al., 2007) to select the organizational contingency factors that may enable B2B firms to build value propositions for DDI. Another key group of organizational factors relates to the organization itself, such as industry, size, or sector, to broaden our perspective on this relationship.

Second, the contingency theory approach highlights that management practices should align not only with the organization but also with contextual external environmental factors (Donaldson, 2001). This suggests that DDI outcomes can be influenced by multiple contingencies. Specifically, we identify two types of external contingencies that may moderate or mediate the relationship between DDI in marketing and value propositions for DDI. Firstly, the quality of data from external parties may influence this established relationship and can assist managers in engaging in DDI. We recommend drawing inspiration from the work of Madnick et al. (2009) and their data quality framework to test the relevance of this external contingency. Secondly, the country context may serve as a proxy to understand the specificities of DDI in marketing and its impact on shaping value propositions for DDI. Since the level of digitalization may vary according to governmental or sectorial efforts for DDI, testing and comparing this configurational

approach across different countries can reveal whether our identified causal configurations remain consistent across various settings or populations.

4.2.4. Value proposition practices

Our results emphasized a collaborative innovation lens of DDI for shaping value propositions, derived from the implementation of several practices and sub-practices. These practices fall into the field of marketing-as-practice, which has garnered continuous interest in strategic marketing since the special editorial by Per Skålén and Chris Hackley (2011). This editorial opened research avenues on how marketing is actually practiced within organizations. Marketing-as-practice is of high importance in B2B for establishing connections to value propositions and the notion of value in general, as evidenced by various works on the subject (Eggert et al., 2018; Kohtamäki & Rajala, 2016; Skålén et al., 2015).

The openness of the marketing department and the development of an outside-in ecosystem that assists in building DDIC of marketing have transformed how companies encapsulate value for DDI. The norms, beliefs, social roles, meanings of value, and behaviors of the involved actors have changed in the specific context of DDI, opening fertile areas for research. Qualitatively speaking, our study did not delve into the idiosyncratic practices of actors in architecting value propositions for developing DDI. There is a need to investigate the value co-creation practices within this ecosystem. We recommend conducting single-case research studies to gain a comprehensive understanding of the inner workings and mechanisms underpinning these co-creation practices for DDI, which can then be followed up with comparative case studies.

Quantitatively speaking, our results on value proposition architecture are facilitated by a set of three aggregated practices and their inherent sub-practices. We suggest extending our results with more realistic positions. For example, we can cross-validate our findings using regression analysis or Structural Equation Modeling (SEM) to ensure consistency. Based on our results, the dependent variables to study would be the types of DDI, while the independent variables would be the practices and sub-practices related to the value proposition. By applying these statistical methods, we can robustly test the relationships between the practices and sub-practices related to the value proposition and the types of DDI, thereby strengthening the validity of our research findings.

4.2.5. The methodologies used

We highly recommend continuing to use the fsQCA algorithm to propose configuration results regarding marketing topics, specifically those related to the evolution of consumer behaviors in the era of artificial intelligence, entrepreneurial attitudes and employee

beliefs, and innovation ecosystems and performance. For example, in the Journal of Business Research, the diffusion of this method has been growing, with an average of 100 publications per year over the past five years. B2B marketing theory involves multiple perspectives such as economic, strategic, behavioral, and psychological, which are reflected in the contemporary challenges of DDI in B2B companies. A DDI project integrates these different perspectives by involving various departments within companies and actors in the ecosystem. Using fsQCA more systematically could lead to higher levels of DDI achievement by precisely detailing how different conditions and resources interact. The ecosystem in which the marketing department operates in the digital world involves greater complexity in DDI projects, requiring marketers to be responsive, adaptable, and agile. Thus, the fsQCA method facilitates a richer and more nuanced understanding of the complex management issues related to DDI, meeting the requirements of an interdisciplinary approach for marketing scholars.

Finally, the dispersed concept of marketing innovation capabilities and the recent research focus on DDIC of marketing that determined the positioning of our doctoral work led us to use accurate conceptual methods, i.e., bibliometric analysis and systematic literature review, to establish the theoretical starting knowledge, which we further tested through our qualitative and confirmatory studies. We can only encourage the continued use of these methods, as they allow us to unpack the evolutionary nuances of the specific field of B2B marketing. Whether summarizing large quantities of data to present the state of intellectual structure and emerging trends, as with bibliometric analysis, or synthesizing findings from existing literature on a specific topic, as with a systematic literature review, these methods provide scientific specificities that have increased the applicability power of classical literature reviews due to their systematicity and transparency in conducting them. Moreover, the role of marketing, the way we practice marketing, and the fact that B2B markets receive far less research attention compared to B2C markets, necessitate organizing what we know in B2B marketing to help bridge the B2B knowledge gap (Lilien, 2016) and achieve marketing excellence (Moorman & Day, 2016). Using established guidelines for conducting literature reviews, such as protocols and thorough methodologies, but also deepening these procedures by scrutinizing a specific methodology or developing new bibliometric software, may help us theorize literature insights, conceptualize emerging trends, and discover unexpected notions with more rigor, reproducibility, and confidence. These efforts of clarification, explanation, and meticulousness will help build a strategic platform of knowledge (Breslin et al., 2020) on B2B marketing theory and navigate the troubled waters of the transformation of marketing in a digital world (Quinn et al., 2016).

The table below synthesizes our future research directions.

Table 5-1. Synthesis on future research directions

Dimensions	Future research directions
DDIC of Marketing	Explore establishing a measurement scale for DDIC of marketing to quantify each marketing resource's contribution and examine its impact on different types of DDI. This scale could also facilitate comparisons with other DDICs from different management fields.
DDI	Advance research on data monetization by employing mixed methods, including case studies and structural equation modeling, to explore its aspects as a DDI type and address its managerial implications as a revenue generator.
Potential contingencies	Utilize the contingency approach to fine-tune the relationships between DDIC of marketing, value proposition practices, and DDI types. This includes testing the influence of identified facilitators like data-driven culture, digitalization level, and management support, organizational factors like industry, size, or sector and considering external factors like data quality and country-specific digitalization efforts.
Value proposition practices	Further investigate the collaborative innovation lens of DDI for shaping value propositions through detailed case studies and comparative analyses, to gain a comprehensive overview of the inner workings and mechanisms underpinning these co-creation practices for DDI. Extend findings with regression analysis or SEM to validate the relationships between various practices/sub-practices and DDI types.
Methodologies used	Continue utilizing fsQCA to explore marketing topics, such as the impacts of AI on consumer behaviors, entrepreneurial attitudes, and innovation ecosystems. Encourage the use of bibliometric analysis and systematic literature reviews to establish foundational knowledge and explore emerging trends in B2B marketing, aiming to bridge the knowledge gap and support strategic marketing decision-making in the digital era.

We finalize this dissertation with a concluding section on what we believe will drive the future of B2B marketing, digitalization, and DDI.

5. What future for B2B marketing, digitalization and DDI?

"The road ahead is digital for innovation management and there is no way to back."
Wetzels, 2021

In this section, which addresses the future of B2B marketing, digitalization, and DDI, we present two primary orientations. The initial proposition is to establish foundational trends for the future of B2B marketing, digitalization, and DDI. The subsequent proposition is to explicitly delineate the challenges that must be overcome by marketers in order to effectively manage this relationship between B2B marketing, digitalization, and DDI.

Finally, Box 5-1 synthesizes the essential trends, challenges, strategic imperatives, and prospective outlooks on B2B marketing, digitalization, and DDI.

5.1. Towards foundational trends

More than ever, the age of digitalization has defined a new mandate for B2B firms. It has opened numerous opportunities across every industrial sector. The question is not how innovation can be supported by data, but how innovation can be enabled by data. Embracing the DDI journey will help leaders expand their strategic vision and overcome the traps of marketing 'digital' myopia[24]. A legacy firm may succumb to marketing 'digital' myopia by predominantly adhering to a product-industry mindset for competitive advantage. This narrow focus prevents them from recognizing shifts in customer preferences towards new data-driven services and digital experiences, as well as the potential value these innovations can create from data. Our work demonstrates the various dimensions of DDI and how interactive data can extend the existing scope of innovation to create value and achieve competitive advantage. DDI has opened new vistas for growth, and firms must seize them by building strong digitalized marketing capabilities, such as the DDIC of marketing.

We identify three foundational trends for B2B marketing connected to DDI that guide its future: (1) ecosystem, (2) customer-centricity, and (3) servitization of industries.

[24] In his seminal 1960 article "Marketing Myopia," Theodore Levitt argues that businesses often fail because they focus too narrowly on their products rather than on the needs and desires of their customers. This short-sighted approach, which Levitt dubs "marketing myopia," prevents companies from adapting to changing market conditions and consumer preferences.

First, marketing must be able to create a blueprint of its value chain network to list all the market-based assets it possesses that can serve the DDI roadmap. Then, it must create a blueprint for its complementor network to identify all the business opportunities it can grasp by connecting to third entities, capturing market-based information, disseminating relevant insights throughout the organization, and leveraging value for shaping value propositions in the context of DDI. This ecosystem living requires marketing to think outside the box by questioning not which industry it is in but which business it is in. For example, Fujifilm created value from innovation by shifting from an industry based on producing photographic films to an extended business encompassing three main domains: healthcare, equipment, and imaging[25]. Thus, to live in an ecosystem and develop expertise, marketing must think big beyond its existing business boundaries to capture the valuable information that will nurture DDI. This is the price to avoid the digitalization paradox by ensuring that investments in digitalization will generate the needed returns (McAfee et al., 2012).

Second, customer-centricity is key to pursuing DDI for B2B firms in this ever-expanding world of data. As illustrated in our introduction section, without customers willing to connect their profile to a Caterpillar excavator, feed data into a platform like the one developed by Peloton, or open the Ford app when entering their car, DDI cannot be achieved. The role of B2B marketing has radically shifted from a product-centric orientation to a customer-centric orientation. Its relational capabilities allow it to provide interactive and dynamic market-based insights and knowledge potential, transitioning its role in innovation from an often-traditional operational aspect to a strategic customer interfacing one. This customer-centricity is facilitated by sensors, IoT, and AI-equipped products, which have exponentially developed customer data for innovation with more granularity, systematicity, and accuracy. This customer orientation is also reflected in the fact that today DDI is not only improved thanks to customer data but also enabled and legitimized by the data customers share during the co-creation process.

Finally, in line with Rust's reflections (Rust, 2020), the future of marketing is undoubtedly connected to service, whether the company is selling goods or services, especially in the context of digitalization. Our results demonstrated an array of data-driven services that compose DDI and confirm this tendency. The new extended reality (XR) techniques, platforms, clouds, and the development of API foster the degree of connectivity between businesses, enabling easy and free information sharing to create value rapidly transformable into potential data-driven services. Inevitably, the boundaries between product marketing and service marketing are blurring. Marketing's role is to help companies move from providing pure stand-alone products and add-on services to servitization, seen as a full transformation from product to service orientation (Windahl & Lakemond, 2010). As for the future of B2B marketing, connected to digitalization and

[25] https://www.siemens-healthineers.com/perspectives/mso-digitalization-and-innovation.html

DDI, the path of digital servitization is already underway, undoubtedly opening new perspectives for the new product development process in marketing. This future promises less formality and a sequential approach, and instead emphasizes more agility, interactivity, and an experiential approach.

5.2. Some challenges to overcome

The future of B2B marketing, digitalization, and DDI also presents challenges for practitioners and academics, such as data privacy, security, and ethics.

In 1999, I opened my first email account on Yahoo and began actively surfing the Internet. I remember the concerns that the Internet raised, such as privacy and security, the negative impact on employment, the spread of false information, and the ethical and responsible use of technology. It is curious to note how these concerns are similar to those we discuss today regarding new technologies, particularly AI. I argue in favor of the concept of "AI for Good" and its positive applications in various fields such as health, education, the environment, and human rights, highlighting opportunities to improve quality of life, solve complex problems, and promote sustainable development. Despite the challenges and ethical considerations associated with AI, particularly regarding privacy, transparency, and fairness, some multinational companies and countries are making commendable progress towards a fairer and more respectful use of AI. For example, Apple recently launched its personal intelligence system, Apple Intelligence[26], which integrates powerful generative models to enhance device functionality while maintaining user privacy through on-device processing and private cloud compute for more complex tasks. The European Union's GDPR[27] is another example, considered pioneering in personal data protection as it imposes strict and uniform standards across the EU, influences data protection legislation worldwide, and strengthens individuals' rights to privacy and control over their personal data.

As of June 2024, ChatGPT[28] has over 180.5 million users globally. This widespread usage indicates its importance and integration into daily tasks and professional workflows for many users worldwide. In other words, it is no longer a question for B2B marketing departments whether adopting AI is beneficial but rather how to coexist with it. As the Lisbon daily Jornal indicated, AI is unavoidable, and trying to impede it is like trying to stop the rain with your hands[29]. AI-augmented operations allow for smarter data-driven decisions, and by 2025, organizations using AI across the marketing function will shift

[26] https://www.apple.com/fr/newsroom/2024/06/apple-extends-its-privacy-leadership-with-new-updates-across-its-platforms/

[27] General Data Protection Regulation

[28] ChatGPT is an advanced AI language model developed by OpenAI, designed to understand and generate human-like text based on the input it receives, https://chatgpt.com/

[29] https://ionline.sapo.pt/

75% of their operational activities from production to more strategic activities[30] . A recent Salesforce report indicates that AI is marketers' main focus—and biggest headache[31]. AI has revolutionized how companies connect with customers, and taking advantage of AI involves marketers maintaining trust to deploy AI successfully. In fact, 68% of customers say advances in AI make it more important for companies to be trustworthy[32].

This is why new marketing roles will emerge in the coming years, adapted to the digital world, such as those related to data trust and reliability, to accomplish tasks related to content authenticity and verification and AI ethics and compliance. AI language models like ChatGPT or Gemini[33] have vulnerabilities that can be exploited for phishing or scams. By 2027, 80% of enterprise marketers will establish a dedicated content authenticity function[34]. Marketing roles related to AI and the personalization of the customer experience will also develop, as AI will be leveraged for highly personalized marketing, enhancing customer engagement, and improving customer journey mapping. Designers and creatives in marketing will see their tasks transformed, focusing more on AI-driven content development to ensure engaging and tailored advertisements. Finally, AI-driven automation and task optimization will give rise to new marketing roles, with positions dedicated to identifying and implementing AI-driven automation solutions.

In conclusion, as marketers enhance the capabilities and scope of their AI, it is crucial to ensure that privacy and security controls are transparent. Customers should have a voice in how their data is collected and used, and they should receive fair value in return.

A second challenge for the future of B2B marketing, connected to digitalization and DDI, is the type and degree of innovation, specifically understanding how marketing, depending on its digitalization level, will influence incremental or radical innovation.

The distinction between incremental and radical innovation is well-established in the innovation management literature (Chester Goduscheit & Faullant, 2018). While incremental innovations build on existing knowledge, radical innovations generate new knowledge or recombine existing knowledge with new insights (Hill & Rothaermel, 2003). Radical innovations are relevant for companies because they create market disequilibria (Utterback & Abernathy, 1975), allowing companies to gain a competitive advantage over a longer period. The smartphone, for example, is a radical innovation that combines functions of mobile phones, cameras, navigation systems, computers, and other devices.

In terms of impact, it is commonly accepted that DDI reduces innovation cycles, time-to-market, investment levels, and improves the risk-taking level of enterprises, engaging

[30] https://gartner.com/marketing/
[31] https://www.salesforce.com/resources/research-reports/state-of-marketing/
[32] https://www.salesforce.com/resources/research-reports/state-of-marketing/
[33] https://gemini.google.com/
[34] https://gartner.com/marketing/

them in more incremental innovation. By facilitating rapid iterations and continuous improvements in products and services, companies can focus on smaller, more frequent incremental innovations.

However, this does not mean that radical innovation disappears; it simply becomes more challenging to achieve and requires strategic commitment and long-term investments to explore truly disruptive ideas beyond incremental improvements. Take the medical industry, for example. A recent report by Siemens Healthineers[35] elaborates on "digitalization driving innovation or innovation driving digitalization." It argues that the context determines the relationship. In some cases, digitalization is crucial for innovation, but not always. For instance, immunotherapy, which leverages the immune system to treat solid tumors like melanoma and non-small cell lung cancers, does not rely on digitalization. RNA[36]-based therapeutics show promise for various conditions, and upcoming pharmacogenomic testing could personalize medical treatment by determining patients' genetic makeup. However, data from such tests may need digitalization for thorough interpretation.

The role of humans, like marketing managers, is then crucial in making digitalization intertwined with innovation and deciding whether to adopt it for radical or incremental innovations. The article states that radical or incremental innovations are not because of digitalization but because of people—providers, patients, and politicians—who call for value-based technologies. The adoption of these technologies naturally impacts work processes. In medical imaging, digitalization has enabled both incremental and radical innovations. Breakthroughs include magnetic resonance imaging and computed tomography imaging, while advancements in radiography represent incremental improvements.

Applied to the specific context of servitized DDI, digitalization alone is not sufficient to achieve radical service innovation. It should be combined with other factors. Particularly important is a company's ability to mobilize necessary resources to capitalize on digitalization, either internally within the company or through collaboration with other organizations within the value system (Chester Goduscheit & Faullant, 2018). Radical innovation differs from incremental innovation in the extent to which it adds new value to customers (Souto, 2015) by integrating the required strategies and structures and novel knowledge intensity (Ettlie et al., 1984). With this regard, marketing plays a key role in accumulating and integrating extensive knowledge gathered through digitalization. In the case of DDI, marketing departments will focus on understanding the granularity of the data to which they already have some level of access (Chester Goduscheit & Faullant, 2018). Organizational marketing management supports the positive role of digitalization on radical innovation performance (Gong et al., 2022). However, if firms pursue

[35] https://www.siemens-healthineers.com/perspectives/mso-digitalization-and-innovation.html

[36] RNA stands for Ribonucleic Acid**.** It is a crucial molecule involved in various biological roles, including coding, decoding, regulation, and expression of gene

digitalization excessively and use too many types and scopes of digital technologies, a mismatch between marketing management and technology will appear (Gebauer et al., 2020), leading to the inhibition of digitalization on radical innovation performance. For example, Gong et al. (2022) emphasize an inverted U-shaped relationship between digitalization capability and radical innovation performance.

Lastly, as explained in the Siemens Healthineers report[37], it is important to note that digitalization is a relatively recent phenomenon in B2B industries, and its lasting impact on innovation is not guaranteed. In the future, the report states that digitalization could be surpassed by a currently unknown technology, similar to how the development of penicillin and subsequent antibiotics revolutionized medicine. Therefore, one key solution for B2B marketing may be to use digitalization to simultaneously exploit incremental opportunities while exploring insights before a new industrial revolution 5.0 challenges this status quo.

Key takeaways on the future of B2B marketing, digitalization, and DDI are synthetized in the box below.

[37] https://www.siemens-healthineers.com/perspectives/mso-digitalization-and-innovation.html

Key takeaways: Future of B2B marketing, digitalization, and DDI

FOUNDATIONAL TRENDS

- *Ecosystems: develop blueprints to leverage market-based assets for DDI.*
- *Customer-centricity: shift to a data-driven, customer-focused approach.*
- *Servitization: transition from products to digitalized servitization.*

CHALLENGES

- *Data privacy, security, and ethics: address increasing concerns around privacy and security and create new marketing functions*
- *Innovation balance: manage the tension between incremental and radical innovation. Digitalization impacts the speed and scope of innovation but requires strategic commitment to realize radical innovations.*

STRATEGIC IMPERATIVES

- *Digital tools: integrate AI to enhance engagement and efficiency.*
- *Agility: stay adaptable to rapid technological and market changes.*
- *Ethical standards: maintain transparency and ethics in AI applications for building trust and sustaining long-term customer relationships.*

FUTURE OUTLOOK

- *Continual evolution: keep pace with digitalization's impact on B2B marketing strategies and operations.*
- *Dual focus: use digitalization to exploit current needs while exploring future opportunities.*

Box 5-1. Foundational trends, challenges, strategic imperatives and future outlook on B2B marketing, digitalization, and DDI

References

Each article is presented with its respective references. See PART 1, Subsection 1.10 for the references of Article 1, and Subsection 2.11 for the references of Article 2. In PART 2, references for Article 3 are included in Subsection 1.9. Lastly, in PART 3, references for Article 4 are provided in Subsection 1.10.

The references listed below correspond to the citations included in the general introduction and general conclusion.

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