How do omnichannel strategies contribute to value-based healthcare? An orchestra-based analysis☆

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ARTICLE INFO

ABSTRACT

The healthcare ecosystem is currently characterized by multiple interactions at different levels that call for new managerial approaches in line with value-based healthcare, where the omnichannel strategy is crucial. Drawing on the omnichannel approach in the B2B context, the overall objective of the current study is to unveil the underlying mechanisms through which a healthcare organization can transform the value creation process within its business ecosystem. An in-depth case study of an ecosystem has been used to demonstrate how the design and development of digital solutions can provide better services to the different agents involved in the healthcare sector. Our results show how an orchestra model of an innovation ecosystem effectively works and reveal the orchestration mechanisms operating in the healthcare industry, drawing on the example of the Patient Support Program (PSP) provider as the orchestrator. Moreover, key challenges have been highlighted, and the role of B2B marketing has been identified as crucial, providing important implications for managers and scholars.

1. Introduction

Value-based healthcare (VBHC) is an emerging paradigm for delivering healthcare services to patients, which emphasizes the value they receive and ensures that medical care is high-quality and cost-effective (Kokgashina, 2021). VBHC provides value not only to patients by helping them improve their long-term health and reduce the number of doctors' visits and medical tests but also to healthcare providers, payers, suppliers, and society in general. VBHC is particularly vital for treating chronic diseases and diseases that require increased patient engagement. Traditionally, interactions within the healthcare service ecosystem have been rather limited, with information flowing mainly from health providers to customers (Dahl et al., 2021). The emerging VBHC model calls for the introduction of new managerial approaches that embrace the complexities of interactions among multiple actors and

optimize patient service delivery (Hermes et al., 2020), with digital technologies acting as enablers.Fig. 1..

Regarding digital technologies, the omnichannel approach is becoming particularly relevant in the healthcare industry (Chang et al., 2023) due to the improved customer experience linked to the integration of data regarding patients, ecosystem actors, and interactions (Dahl et al., 2021, McKinley and Wright, 2014). However, omnichannel in healthcare is not only about information sharing. Healthcare ecosystems are characterized by multiple interactions that occur within each level and across levels, which should be taken into consideration, as the success of digital innovation in this sector strongly depends on the activities, goals, and values of the actors.

Despite the relevance of this research stream, the understanding of omnichannel management in healthcare is still in its infancy (Steward et al., 2019). Most research regarding omnichannel strategies and
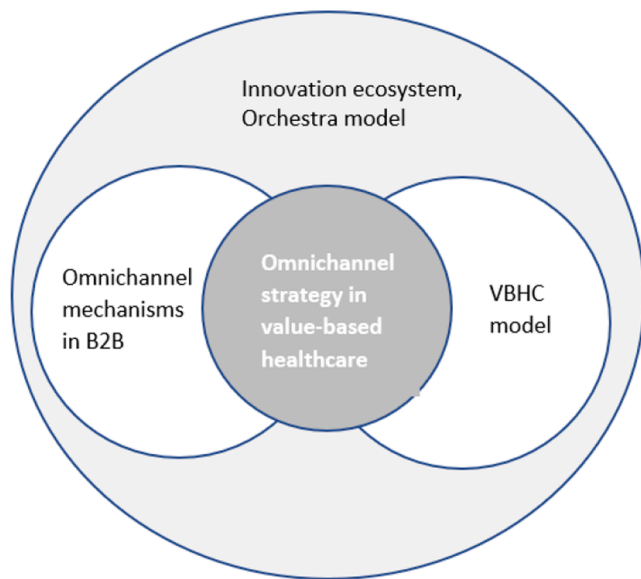
Fig. 1. Research background.

omnichannel management is focused on the B2C context, such as the retail industry, while only a few studies focus on manufacturing industries and companies that usually apply B2B models (Ailawadi, 2021, Alonso-Garcia et al., 2021) or organizations in public sectors such as healthcare.

However, with the progress of firms' digital transformation and the growth of e-commerce and platform economics, more research is needed on omnichannel strategies in the B2B setting (Alonso-Garcia et al., 2021; Hansen and Sia, 2015). BtoB firms are increasingly making online purchases, especially due to the Covid pandemic. For example, in the US, the global B2B eCommerce market was valued at US$17.9 trillion in 2021, which was over five times that of the B2C market (Statista, 2021). B2B companies are starting to implement strategies that were previously the domain of B2C firms, such as improving channel integration quality, building user communities, and increasing information consistency and personalization (Hossain et al., 2020). Digitalization is enabling deep involvement of all channel partners, which needs to be effectively orchestrated (Hansen and Sia, 2015), allowing B2B companies to explore new omnichannel strategies that have received limited attention in the literature.

Additionally, large, complex, and multi-stakeholder ecosystems have led to the emergence of the figure of the "orchestrator" in innovation ecosystem theory (Zahra and Nambisan, 2012). The orchestrator is the keystone player in the ecosystem, a strong leader who creates a network of actors interacting and participating in value creation. However, research on the orchestration mechanisms and the "orchestra model" applied to healthcare ecosystems is still scarce (see, for example, Hermes et al., 2020, Pikkarainen et al., 2017).

Given the aforementioned research gaps, the current research aims to:

- Discover the mechanisms through which healthcare value creation processes within business ecosystems can be transformed in the current technological scenario.
- Apply the orchestra model and the concepts of innovation ecosystems as theoretical perspectives to understand the strategic impact of digital technologies.
- Propose relevant qualitative empirical evidence of the possible use of these theoretical perspectives in analyzing the current evolution of value-based healthcare (VBHC).

Our study contributes to the literature on omnichannel in healthcare

(e.g., Légaré and Witteman, 2013) by applying a multiple case study analysis to a healthcare ecosystem related to Patient Support Programs in chronic diseases in Italy. Embracing the concept of the orchestra model, the study provides an analysis of the ecosystem's company and actor interactions, revealing the underlying orchestration mechanisms and the role of the Patient Support Program provider as the orchestrator.

The study addresses the following research questions: (a) How are digital technologies enabling new forms of omnichannel strategy and orchestration mechanisms in healthcare ecosystems? (b) How are these new forms promoting value-based healthcare?

2. Research background

This chapter sets the background by presenting existing research in the domains relevant to our current study. Firstly, the concept of value-based healthcare is introduced as the focus of the research. Secondly, a brief overview of existing research on the role of the omnichannel approach in the B2B context is provided.

2.1. Value-based healthcare

Value-based healthcare (VBHC) is a healthcare delivery model that defines value as the patient health outcome per dollar invested, rather than simply minimizing expenditure (Kaplan and Porter, 2011; Kokshagina and Keränen, 2022; Porter and Teisberg, 2006). Introduced by M. Porter and E. Teisberg, the concept is now used to restructure provider organizations with the aim of enhancing value for customers and improving the overall efficiency of healthcare systems. One of the key goals of VBHC is patient satisfaction, which is defined based on the patient's treatment experience, not solely on its medical effectiveness (Teisberg et al., 2020). VBHC is crucial for treating patients with chronic diseases such as diabetes, cancer, high blood pressure, obesity, and rare diseases, as these treatments are often time-consuming and costly. Additionally, the treatment of such diseases requires significant patient participation (Berry, 2019; Légaré and Witteman, 2013).

In European countries, the healthcare system is based on insurance, where the national healthcare system purchases services from providers, such as pharmaceutical companies, and the providers must ensure the efficiency of their services and medications. According to VBHC, which has now become a strategic model in many countries, pharmaceutical companies should offer services that reduce the risk of inefficient spending of state funds (WEF, 2018). In the case of rare and chronic diseases, therapies are only effective if patients adhere to them, taking important measures regularly and at the right time. In this context, patient support systems (PSPs) aim to mitigate risks for the national health system (Wallace, 2020). The use of a PSP significantly increases the complexity of interactions among all participants: the network of involved actors expands, the amount of data to be processed grows, and so on. Communication and interaction occur through various digital and real-life channels, and consumers expect a seamless and personalized experience across all of them. Many healthcare organizations are now embracing new digital experiences and adopting new tools, but this often leads to the creation of silos when channels are not integrated with each other. All these complexities call for the application of the omnichannel approach, which can effectively and efficiently manage the system (Kraus et al., 2021; Schiavone et al., 2021).

2.2. Omnichannel strategy in B2B context

The omnichannel approach is an integrated approach to delivering the right content through the right set of channels to end users with the goal of improving their journey. Verhoef et al. (2015) define omnichannel management as "the synergetic management of the numerous available channels and customer touchpoints, in such a way that the customer experience across channels and the performance over channels are optimized" (p.176). The demand for omnichannel management is

increasing due to the accelerated digitalization of enterprises, the emergence of new digital business models, and the recent pandemic crisis (Alonso-Garcia et al., 2021). The latest B2B Pulse Research has shown that the number of B2B channels used by customers has doubled in recent years (from 5 to 10). Furthermore, 94% of customers consider the new omnichannel sales models to be more effective (McKinsey & Company, 2021). Until recently, omnichannel studies were primarily focused on the retail industry context and B2C relationships, while the role of omnichannel in B2B relationships between companies remained under-researched. Brynjolfsson et al. (2013) conducted a foundational study on strategies for omnichannel implementation in the B2B setting. Saghiri et al., (2017) developed a conceptual framework for omnichannel systems that includes multiple agents, such as manufacturers, retailers, and third parties, making the framework applicable in a B2B context. Ailawadi and Farris (2017) challenge the classic definition of omnichannel management by arguing that when retailers adopt the omnichannel approach, new challenges and opportunities arise for all three types of channel intermediaries: distribution, transactional, and communication channels. Cui et al. (2021) complement the classic definition of the omnichannel approach by proposing that the customer experience should be optimized for firms, intermediaries, and their clients. The current state of the art and existing research gaps in value-based healthcare and omnichannel research are summarized in Table 1. It is observed that only a few papers in the literature explicitly deal with omnichannel strategies applied in healthcare within a B2B context. In this regard, the paper by Radenković *et al.* (2020) is most closely related to the context of the current research. The authors discuss how to leverage communication between healthcare ecosystem stakeholders using emerging concepts and tools such as CRM, xRM, and social media: however, the paper is primarily focused on communication.

In the present study, the B2B omnichannel approach is investigated in the specific context of healthcare, and the orchestra model of the ecosystem is applied as the theoretical underpinning to provide a comprehensive view. Table 1 presents some of the most recent and highly cited papers related to our research domains, highlighting their most important findings, and identified research gaps.

3. The orchestra model mechanisms in the innovation ecosystem as a theoretical foundation

James F. Moore defined business ecosystems as an economic community that produces value for customers and is supported by a foundation of interacting organizations and individuals, including suppliers, lead producers, competitors, and other stakeholders (Moore, 1996). The ecosystem approach has been increasingly used by researchers to describe the interdependence of activities (Aarikka-Stenroos and Ritala, 2017; Adner, 2017), but there is still no complete understanding of how to apply it in the context of B2B marketing and network management (Aarikka-Stenroos and Ritala, 2017).

We draw on the concept of the innovation ecosystem, which refers to a network of relationships among directly and indirectly connected actors, as described by Adner (2017). We also utilize the four-level structure of a healthcare ecosystem proposed by Frow et al. (2016), which includes the micro level (patients, clinicians, staff), meso level (hospitals, clinics, hospices), macro level (professional associations, unions), and mega level (governmental bodies, funding organizations, mass-media). We have chosen Frow's approach because it emphasizes value co-creation, which is particularly important in innovation ecosystems within the B2B context (Kohtamäki and Rajala, 2016).

For our current research, the orchestra model is of great value (Zahra and Nambisan, 2012). In this model, interactions among the members of a business ecosystem are often guided or "orchestrated" by a central player known as the keystone player. The keystone player provides strong leadership, facilitates the development of the ecosystem, and motivates other players to contribute to its evolution. Within this model, various orchestration mechanisms need to be employed based on the

Table 1
Research background and research gaps.

	Key references	Main findings	Revealed research gaps
Value-based healthcare	Porter&Teisberg (2016)Berry (2019)Schiavone et al. (2021) Kokshagina & Keränen (2022)	Foundational work develops a new scenario for the value-based healthcare industry. Insightful for public policy developers. This conceptual paper draws attention to the uniqueness of healthcare service, highlights opportunities for innovation, and emphasize the importance of patient-centeredness and creativity.A multilevel framework of a digitized healthcare ecosystem rearranging was developed; the value co-creation process among various types of stakeholders is explored. Institutionalization of the VBHC model is studied, three phases of institutionalization and the changes in value in them are revealed	Strategies for introducing technologies are needed; the issues of ethics exist; strategies for making medicine more proactive should be developed. Avenues of research are identified in healthcare service innovation, service design, customer experience in healthcare, etc. Larger digital healthcare ecosystems should be studied; more sophisticated models of sharing and integrating resources within healthcare and other sectors should be researched. Importance to reveal inter- and intra-organizational drivers and barriers that might push forward or discourage the adoption of VBHC in the healthcare ecosystem; it would be essential to study VHBS from a vendor perspective along with a procurement perspective. Direct reflections from various stakeholders of the ecosystem are needed.
Omnichannel strategy in B2B context	Verhoef et al., (2015)Ailawadi (2021)Dahl et al., (2021)Radenković et al., (2020)	Foundational paper for omnichannel research; classic definition of omnichannel management is formulated.Discusses the relevance of omnichannel approaches in non-retail industries; emphasizes that the goals and challenges	Large agenda is provided for further research development but is limited to the retail industry. Research on applying omnichannels in other industries, and especially in the B2B context, is scarce.Research

Table 1 (*continued*)

Key references	Main findings	Revealed research gaps
	can be different for them.Identify necessary paradigm shifts in healthcare; analyze what influences customers' health awareness in an omnichannel context.Research omnichannel communication strategies among stakeholders in the healthcare ecosystem including suppliers, government, etc.; develop a new communication model by applying CRM and xRM, social media, and web technologies	into how the different omnichannel platforms interact and the consequences on health decision-making and health outcomes is needed.The number of actors should be enhanced to check the efficiency of the model. The model can be enriched by the development of sub-specialized web and mobile applications for real-time patient monitoring.

type and maturity of a company. These mechanisms include identifying the ecosystem's focus and barriers, adopting a long-term perspective, identifying new opportunities, and considering the goals of ecosystem partners during decision-making (Chin et al., 2022; Ferraris et al., 2020).

While there is increasing attention given to industries undergoing transformation, particularly in the context of digital transformation, there is limited research on healthcare ecosystems and their orchestration mechanisms (Hermes et al., 2020; Pikkarainen et al. 2017), and additional research is needed. This article aims to address two research questions: (a) How do digital technologies enable new forms of omnichannel strategy and orchestration mechanisms in healthcare ecosystems? and (b) How do these new forms promote value-based healthcare?

4. Research methodology

Our field of investigation is Patient Support Programs as valuable contexts for orchestrated and digitally based omnichannel ecosystems. Being orchestration mechanisms enabled by digital technologies in healthcare innovation ecosystems an underexplored academic stream, we designed an exploratory research approach based on a multiple case study (Bell et al., 2019). Case-based inductive research is especially appropriate when dealing with new topics that call for in-depth investigation and contextualized explanation (Welch et al., 2011) since they provide detailed data in the investigation of current managerial challenges (Eisenhardt and Graebner, 2007; Yin, 2009). Against the backdrop described in the preceding sections, we aimed at answering our research questions by adopting the ecosystem as a unit of analysis.

4.1. Patient support programs

Patient Support Programs (PSPs) are organized systems that aim to achieve several objectives (https://www.ema.europa.eu): supporting patients in adhering to their prescribed medications (compliance - adherence), helping patients to manage their condition, providing them disease education, and offering financial assistance through patient assistance programs.

The focus of the present research is on PSPs that aim to improve therapy effectiveness in terms of compliance and adherence, particularly in the context of chronic diseases such as psoriasis, rheumatoid arthritis, hepatitis, multiple sclerosis, autoimmune diseases, and immune system disorders. Non-adherence among patients in such contexts can be

intentional or unintentional and is influenced by factors such as forgetfulness, complexity of treatment regimens, difficulties with administration, costs (direct and indirect), side effects, and perceived lack of benefits (Wallace et al., 2020).

Due to the above-mentioned complexity and the length of the cure, reaching therapy adherence in chronic diseases is a challenging endeavor based on the activities of several ecosystem's actors and the effectiveness of an overarching orchestration mechanism. PSPs involve activities with a 24/7 availability and on an ongoing basis, regarding drugs delivery and administration, hospital clinical visits, nurse visits, self-administration activities, pharmacists' calls, medical and technical support. An example of activities and resources involved in a PSP is provided by Fig. 2.

The management of this complexity has been significantly influenced by digital technologies, particularly with the introduction of workflow solutions and digital platforms. These tools assist in managing the organizational complexity of ecosystems involving multiple actors. Additionally, the use of mobile applications has increased, serving as reminders, engaging patients in self-monitoring, and facilitating the logging of various patient-related data such as blood pressure and glucose measurements.

The PSP ecosystem consists of various actors and stakeholders. Among them, three actors play a crucial role: the pharmaceutical company that promotes the PSP, the PSP provider that responds to PSP-related tenders from pharmaceutical companies, and the digital platform provider that offers the digital omnichannel platform for managing the specific PSP workflow. These are the primary actors that are the focus of this research.

4.2. Firms selection and description

PSPs have been in existence since the mid-1990s in the United States and were introduced in Italy in 2005. Italy is currently an active market for PSPs, with a value of approximately twenty-five million euros. The increasing importance of PSPs is evident through the ongoing M&A (mergers and acquisitions) activities of major pharmaceutical companies in this field. PSPs primarily focus on rare diseases, resulting in their limited availability for niche treatments offered by a small number
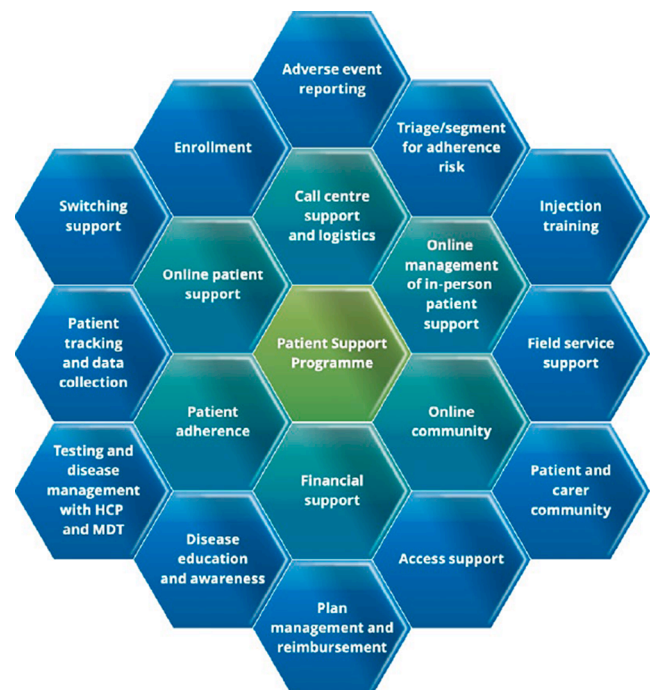

Fig. 2. PSP activities and resources (Wallace et al., 2020).

of companies. However, the adoption of PSPs is gaining momentum in Italy, particularly due to the combined impact of the Covid-19 crisis, the progressive aging of the Italian population, and the increasing use of digital technologies (Conti, 2022).

Since setting boundaries for sampling is a crucial step in case selection (Miles and Huberman, 1994), for the purpose of answering our research questions and facilitating theory-building, we collected valuable information from exemplary firms. We employed the following criteria to identify relevant firms (refer to Fig. 3 for the research framework). Firstly, we selected firms that belonged to a PSP ecosystem that was pertinent to our research questions and could provide valuable insights into the phenomena under study (Siggelkow, 2007). Secondly, we ensured that the selected firms would grant us access to current and historical information through knowledgeable informants and were conveniently accessible to the researchers (Mason, 2002). As a result, we chose a triad consisting of a prominent provider of adherence-focused PSPs, its digital platform provider (both based or branched in northern Italy), and an international pharmaceutical company actively involved in PSP provision. To enhance the reliability of our findings, we conducted information triangulation with secondary data sources (Pettigrew, 1990).

The PSP provider (PSPP) has a turnover of 13 million Euros and employs 53 people (see Table 2 for details). It is the leading provider of support services to patients in Italy, offering services such as home care and home nursing. PSPP was established in 1993 with the objective of creating a Network of Private Home Care Centers, and its focus on PSPs began in 2005 with its first PSP for multiple sclerosis. The organization has a territorial network comprising over 400 professionals, including nurses, psychologists, physiotherapists, dietitians, nutritionists, and specialized doctors (e.g., Rheumatologists and Pediatricians). Within the PSP, PSPP provides the pharmaceutical company with a range of relevant complementary services, including Program Management, a HealthCare Professionals Network, an Operational Control Room, and a Technological Platform.

The digital platform provider (DPP) is a small knowledge-intensive business service (KIBS) firm based in Northern Italy. It offers a diverse range of digital and system integration services to Italian and international companies. One of its divisions specializes in PSPs' digital platforms, and over the past 15 years, the company has progressively

Table 2
PSPP basic facts.

Revenues (mio)	13
Employees	53
Foundation	1993
Activity	PSPP is a Home Care Company that deals with the design and provision of patient support services (PSP provider)
Organizational data	2 Offices, 36 people specifically dedicated to PSP organization; 32 active PSPs; 9.000 active patients; 24 pathologies; 85.000 Counseling/ service call in 2020; Quality certification ISO 9001

developed expertise in this field. Its solutions currently serve more than 15,000 patients with 5,000 operators, tracking over half a million activities (see Table 3 for company facts).

The Pharma company is a well-known multinational biotechnology company based in the USA, specializing in therapies for the treatment of neurological diseases. The company places great emphasis on collaboration with healthcare professionals as a crucial factor in the discovery, development, and delivery of innovative therapies. While specific financial details cannot be disclosed due to the company's high recognizability, it has an overall turnover ranging between $10–50 billion. In Italy, the company operates through a local branch and provides nearly 400 PSPs, benefiting a considerable number of patients, ranging between 60,000 and 70,000 throughout the country.

Table 3
DPP basic facts.

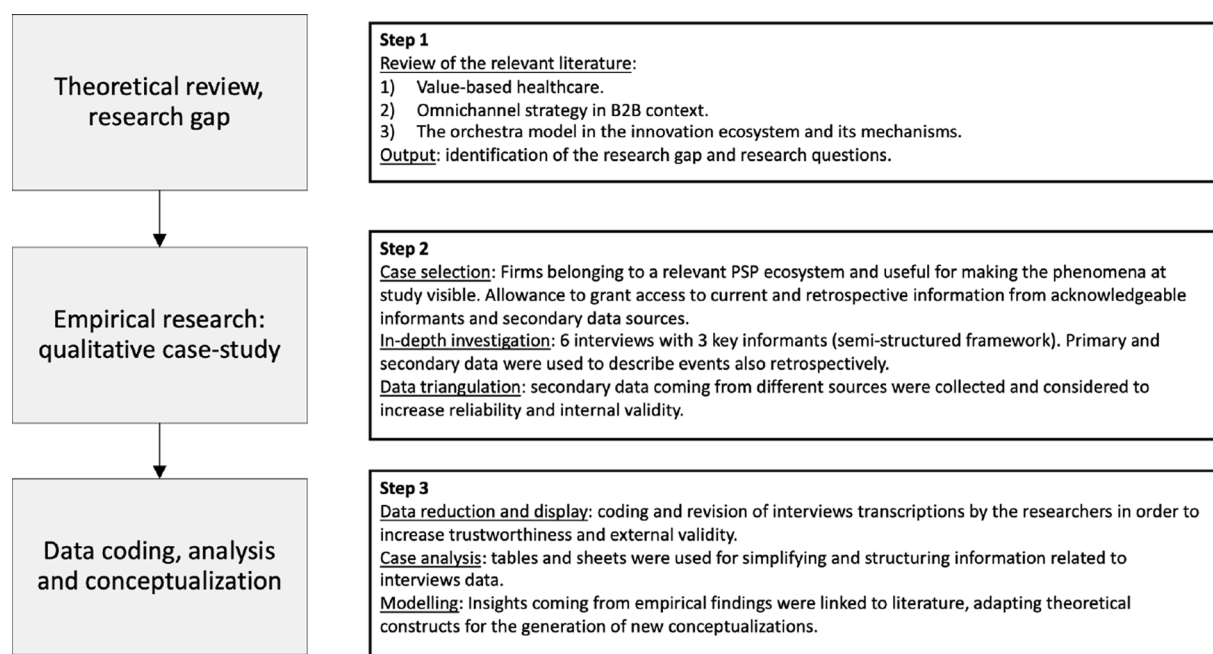| Revenues (mio)	4,5
Employees	32 (40 considering freelance people)
Foundation	1999
Activity	Develops digital platforms and enterprise-level IT systems and architectures.
Organizational data	More than 600 clients (over 1000 projects) served, among which corporations, SMEs and innovative startups, in more than 30 industries. 10 years is the average loyalty time of main Clients. Over 25 million users who have been using IT solutions based on our know-how and expertise. Quality certification ISO 27001

Step 1
Review of the relevant literature:
1) Value-based healthcare.
2) Omnichannel strategy in B2B context.
3) The orchestra model in the innovation ecosystem and its mechanisms.
Output: identification of the research gap and research questions.

Step 2
Case selection: Firms belonging to a relevant PSP ecosystem and useful for making the phenomena at study visible. Allowance to grant access to current and retrospective information from acknowledgeable informants and secondary data sources.
In-depth investigation: 6 interviews with 3 key informants (semi-structured framework). Primary and secondary data were used to describe events also retrospectively.
Data triangulation: secondary data coming from different sources were collected and considered to increase reliability and internal validity.

Step 3
Data reduction and display: coding and revision of interviews transcriptions by the researchers in order to increase trustworthiness and external validity.
Case analysis: tables and sheets were used for simplifying and structuring information related to interviews data.
Modelling: Insights coming from empirical findings were linked to literature, adapting theoretical constructs for the generation of new conceptualizations.

Theoretical review, research gap → Empirical research: qualitative case-study → Data coding, analysis and conceptualization

Fig. 3. The research framework.

4.3. Data collection and analysis

In order to enhance the research's reliability and ensure the trustworthiness of the results, we employed a triangulation approach for data analysis (Flick, 2018). This involved collecting primary and secondary data from various sources and utilizing researchers with different theoretical perspectives and distinct relationships with the firms involved (Voss et al., 2002).

Primary data was obtained through face-to-face interviews with knowledgeable individuals who were actively involved in the design and management of the overall system and the digital platform. Following Pettigrew's suggestion (1990), we considered any data and information from previous years that could provide valuable insights into the study's topic. The interviews were conducted directly with the participants and recorded, transcribed, and subsequently coded using established methods (Gioia et al., 2013). Please refer to Table 4 for further details on the interviewees.

5. Findings

In the following sections, the findings are organized into specific categories that present empirical data and information related to the main themes derived from the interviews. For a detailed overview of the data structure, please refer to Appendix 1.

5.1. The role of PSPP as an orchestrator in the ecosystem

The PSPP's reputation as a reliable provider and its strong relationships with leading pharmaceutical companies make it the focal actor within the ecosystem. The PSPP takes charge of interacting with the DPP and manages the relationship with suppliers, subcontractors, and other stakeholders in the ecosystem. According to the Pharma Co. Medical manager, "*We actually do not interact directly with the DPP, this is something the PSPP does. The PSPP also provides the omnichannel platform and manages the relationship with the supplier, as well as with all the other subcontractors and suppliers of the ecosystem.*".

At the core of PSPs is a patient journey that is tailored to the specific disease, drug, and overall therapy to maximize patients' adherence. This patient-centered approach requires PSPP to design a customized logical workflow. The PSPP's Head of Project Development explains, "*The pharmaceutical company contacts us with a more or less clear idea… What we do is to accompany them on the path that I call 'design,' that is… when we have to do the PSP, the design of the omnichannel strategy and its services must be made deciding precisely which services we are going to activate, for what kind of patient, what kind of needs, asking ourselves: 'what do we have to solve?'*".

The PSPP builds and coordinates a physical network of various partners (specialized medical doctors, physiotherapists, psychologists, nurses, counseling staff, dieticians, nutritionists, logistical operators, hospitals, and pharmacists) providing aiding, medical, and logistical services within the PSP. These partners are key resources for achieving the goal of patient adherence in the PSP.

Given the specificity of the solution, the PSPP also develops trusting and long-standing relationships with other major actors in the ecosystem. The Pharma Co.'s Medical manager emphasizes, "*When we

choose a provider, there is always a bid that puts several providers in competition, and then we make a choice with the support of the procurement department. However, the great majority of the PSPs we have managed so far have been designed with the same PSPP, with whom we have a very good relationship*.".

Different PSPs involve varying levels of collaboration and interaction among different actors in the ecosystem, such as specialized medical, paramedical, and logistical partners who are contracted by the PSPP. All these factors are considered during the PSP design phase by the PSPP in coordination with the pharmaceutical company. The PSPP's expertise in analysis and design of User Requirements and User Experience Interface (UXI), validation services, software development needs, deployment coordination, and activation of platform services is utilized in this process.

As explained by the PSPP Head of Project Development, "*We develop the project with the functionalities of the omnichannel platform, but not the interfaces. We do the requirements analysis part, we have a team that takes care of validating the solution before putting it into production, and we coordinate the suppliers: we share the planning, user requirements, functional details, we do the validation tests before start-up, we coordinate the porting to production. We don't do all the things that are done in a software house, DPP does them … we tell them what they have to do, and they also do application system support for us*".

The PSPP collaborates with the digital platform provider (DPP), which translates the logical workflow into a digital one and contributes to the ongoing improvement and evolution of the solution. The PSPP's Head of Project Development highlights the partnership with the DPP, stating, "*DPP is our partner, and we have been collaborating for years now; we have a platform, we make web portals, CRM, workflow management… this was a strategic choice at the time, I pursued it.*".

5.2. The orchestration mechanisms

The PSPP holds a prominent position and drives the focus of the ecosystem, guiding the main actors towards effective management of activities related to patient adherence. According to the PSPP Head of Project Development, "*One core stakeholder is the doctor, and the patient will never come to him and say, 'Look, the drug did not work, you have to change my therapy because the drug you prescribed does not work.' The first thing the doctor asks is, 'Are you adhering to the therapy?' This question leads us to the data-driven service.*".

Strategically, PSPP also manages the relationship with the pharmaceutical company, designing PSPs tailored to the customer's needs and adopting a value-based approach. The Pharma Co. Medical manager explains, "*The PSPP helps us answer questions such as: What is our need? What is our patient journey? What can truly help the patient, and what can we support economically? It is a moment of co-creation, where we express our needs and the PSPP presents a solution package targeted to our specific pathology. We start from a modularized base that is iteratively customized.*".

The design of a PSP is a collaborative effort between the Pharma Co. and PSPP. The PSPP Head of Project Development emphasizes the critical elements of the offering, including transparency, clarity, and co-design with clients. They describe the involvement from the development phase, starting with defining the needs of the users (patients and doctors), determining feasible and infeasible service parameters, and filtering services based on the customer's budget.

Finally, PSPP accommodates innovative requests from therapies and drives the evolution of the solution in coordination with the DPP. They balance the needs and goals of stakeholders while coordinating a specific network of freelancers contracted by PSPP, including doctors, nurses, physiotherapists, psychologists, dieticians, nutritionists, rheumatologists, and internists. The PSPP Head of Project Development refers to them as "pseudo-collaborators" who are stable suppliers, emphasizing the importance of understanding their distinct needs due to the strong relationship and familiarity.

Table 4
Interview data.

Company	Interviewee	Date	Duration
PSPP	Head of Project Development	July 14, 2021	00:19:00
		August 3, 2021	01:38:00
		March 3, 2022	00:51:00
DPP	Owner & CTO	June 28, 2021	46:22:00
		March 7, 2022	47:20:00
Pharma Co.	Medical manager	April 27, 2022	01:13:44

5.3. The role of the digital platform and of the DPP

Digital platforms and modern software have significantly enhanced traditional coordination management instruments, leading to increased efficiency and effectiveness of the ecosystem. The platform enables proactive action, meticulous consideration of details, and the ability to learn and make corrections based on real situations, effectively managing complexity in both a proactive and on-demand manner centered around the patient. "*The omnichannel solution includes various components that offer different operational functions, such as the ability to exchange reports, maintain a therapy diary, have control over programming and scheduling of interventions and medication administration, as well as an app through which the patient can send reports to the doctor. This way, doctor-patient communication can be much more agile,*" explains the Pharma Co. Medical manager.

In fact, PSPP's value proposition encompasses a comprehensive web-based responsive proprietary platform provided as Software as a Service. The technology stack includes a cloud infrastructure and a modular and scalable platform with features such as a Contact Center, CRM, Web Portals, and native apps (iOS and Android) for doctors and patients. Additionally, there is a customer team web portal, customizable technological solutions, and devices to support adherence monitoring.

"*Omnichannel solutions consist of different components. We have the client's web portal, web portals and apps for doctors, web portals and apps for patients and caregivers. Our operators also use the web portal, including nurses, psychologists, dieticians, and logistics providers involved in drug delivery and waste disposal during home infusions... Basically, anyone operating within the scope of the PSP,*" explains the PSPP Head of Project Development.

The use of IoT technology devices and a well-designed omnichannel platform contribute to engaging and involving all actors in the ecosystem, particularly the patient. IoT devices aid in therapy adherence detection, such as devices connected to a blister case with a pill extraction sensor, which sends real-time adherence status to the cloud platform integrated with the CRM and Medical Web Portal. "*We have mobile applications, so the patient also has their own app where they can track their progress and virtuosity. There are even concepts of 'gamification' to provide the patient with psychological stimuli to support and motivate them,*" says the DPP Owner & CTO.

The platform allows for data-based management since data collected by the digital platforms are stored in the PSP's databases and can be analyzed and utilized in various ways to streamline the PSP organization. "*Our expertise extends beyond the technology, and we are currently providing a wealth of advice to help PSPP understand their true needs,*" states the DPP's Owner & CTO.

Table 5 summarizes the key elements and findings of the research, highlighting their main implications for omnichannel VBHC, which will be discussed in detail in the subsequent sections.

6. Discussion and implications

The study findings provide answers to our research questions. Digital technologies and tools, such as platforms, enable new forms of omnichannel strategy and orchestration mechanisms in healthcare ecosystems. They facilitate the coordination, long-lasting collaboration, and integration of various B2B stakeholders, and support the leadership of the focal organization (the orchestrator) within the innovation ecosystem. Our research, in addition to what Radenković and co-workers (2020) have already pointed out, shows that digital technologies and tools are not just communication instruments. They are important drivers for innovation development, coordination, strategy implementation, and leadership enactment.

Regarding the second research question, these new forms of omnichannel strategy and orchestration mechanisms promote value-based healthcare (VBHC) by facilitating the co-creation of new services and products and enhancing cohesion within the ecosystem. Our findings

Table 5
Main findings: description and relevance.

Main finding	Description and meaning	Relevance for omnichannel VBHC
Relevance of the relationships among the ecosystem's actors	Long-lasting relationships exist among the main actors of the PSP ecosystem, particularly between the PSPP, Pharma Co., and DPP.	Relationship management is vital for the thriving of the ecosystem. Reputation serves as a primary source for reinforcing relationships and is a key factor in relationship management within the ecosystem.
Relevance of collaboration and co-creation in the ecosystem	Collaboration and co-creation are integral aspects of the relationships among the main actors of PSP ecosystems.	Collaboration and co-creation skills and resources need to be developed and deployed to sustain omnichannel VBHC ecosystems. They are essential for the efficient and effective operation of these complex solutions.
Relevance of the PSPP leadership and orchestration in the ecosystem	Ecosystem leadership and resource orchestration are fundamental elements of the PSP ecosystem.	A value-based orientation in orchestrating the actors and resources is a critical activity for the effective operation of the ecosystem. The ecosystem leader (the PSPP) must develop specific knowledge for value-based orchestration.
Relevance of the digital platform in the ecosystem orchestration	A modularized and flexible digital platform is key to enabling the complex coordination and orchestration of the PSP ecosystem.	The functionalities and performance of the digital platform are key enablers of the omnichannel orchestration of the PSP ecosystem. Digitalization amplifies and reinforces the value of the ecosystem, but it does not replace the physical relevance of the actors and resources, which remains fundamental.

provide further insights into how new managerial approaches, such as omnichannel strategies, can contribute to achieving VBHC (Hermes et al., 2020). The study offers additional empirical evidence regarding the importance of specific actors' behavior and capabilities in the success of omnichannel solutions in healthcare. We emphasize the role of a focal player in the organization and management of complex health programs and solutions. In our case, the program provider (PSPP) acts as a keystone player and performs critical activities, such as building the specific local ecosystem for the PSP, coordinating and orchestrating the different actors involved, aligning patients' needs with the therapy designed with the pharmaceutical company, and providing a valuable digital solution that enables a true omnichannel strategy for managing the complex design of the PSP. Our research expands on prior literature on information sharing in healthcare ecosystems (Dahl et al., 2021; McKinley and Wright, 2014) by showing that the process itself is not enough for strategy success and value creation. In the current industry scenario, our study demonstrates that information sharing needs to be guided by a focal organization applying its omnichannel strategy and orchestrating the ecosystem via digital technologies.

The PSPP is a fundamental connecting element between the pharmaceutical company's strategies and the ecosystem's actors participating in the program. It drives program differentiation in relation to different treatments and promotes evolution over time. It mediates different healthcare professionals' objectives and builds trust within the ecosystem. It offers effective, easy-to-use, and engaging solutions that alleviate pain points and build trust with patients.

Furthermore, our study highlights the critical role of the digital platform provider (DPP) in the success of the omnichannel strategy and

ecosystem orchestration. The digital solution is the fundamental enabler of the omnichannel strategy underlying PSPs and is a resource that is difficult to replace for the overall success of the PSPP. The optimization and synchronization of the complex workflow management would not be effective without a digital engine that automates back-office processes and allows for rapid adjustment to unforeseen changes in scheduling. This aspect is particularly relevant in the context of the COVID-19 pandemic, contributing to streamlining flows and enhancing the overall efficiency and sustainability of the solution.

Finally, the digital platform also plays a central role in the future evolution of the solution. While the current use of data analysis outputs is limited, our cases clearly demonstrate that the future evolution of omnichannel solutions like PSP will heavily rely on the increased use of AI applications or machine learning for system optimization.

6.1. Implications for theory

A first implication for value-based healthcare (VBHC) theory is the description of the nature of value creation within the orchestra model in the healthcare ecosystem. Our findings clearly highlight the key role of the program provider (PSPP) in orchestrating the ecosystem and enabling the coordination of various actors, resources, and capabilities involved in providing a complex solution like PSP. This implies that researchers focusing on VBHC need to consider how the notion and conceptualizations of value change across different ecosystem actors to properly analyze and provide guidance for omnichannel strategies in the healthcare industry.

A second theoretical implication emphasizes the relevance of digital technologies in making the orchestra model viable and enhancing PSP effectiveness. It underscores the role of the omnichannel digital platform in enabling multi-actor information flows among participants, facilitating interaction between the three fundamental components of the ecosystem, and engaging patients and professionals in the field. It is important to note that digital technologies in this context are not substitutes for physical resources but rather amplifiers of healthcare activities through data integration and multi-point data exchanges.

This paper addresses an important research gap by identifying the challenges faced by an orchestrator in the healthcare ecosystem, such as identifying new opportunities, adapting to market changes by updating the business architecture, seeking new sources of value creation, and more (Pikkarainen et al., 2017). Through in-depth case study analysis, we gain a better understanding of why B2B relational marketing is crucial and how to proceed with it when a provider of digital solutions orchestrates a healthcare innovation ecosystem.

6.2. Implications for practice

The findings of our study also have relevant implications for industrial organizations that aim to design an omnichannel strategy and for practitioners supporting organizations in achieving this goal. Firstly, our orchestra model demonstrated that business managers need to be aware of the current role played by their organization within the innovation ecosystem before embarking on designing an omnichannel strategy. If necessary, the company should assess how it can become the leader of the ecosystem. To gain a proper understanding of this information, frequent meetings between corporate management and omnichannel strategists should be arranged. Regarding ecosystem leadership, top management needs to allocate specific and adequate tangible and intangible resources at the business level for the implementation of medium to long-term effective omnichannel strategies. Leadership requires resource investment, and only substantial investments can create the necessary conditions, such as reputation and effective inter-firm relationships, that enable the organization to be a reliable and effective leader in the innovation ecosystem.

Our research also demonstrated that long-lasting and trustful inter-firm collaboration is a crucial condition for the successful implementation of an effective omnichannel strategy in B2B settings. The design and implementation of an omnichannel strategy should consider external networks and collaborations. Therefore, a preliminary assessment of networks and relationships is necessary to evaluate how much the company can truly benefit from an omnichannel strategy and ultimately achieve value-based healthcare.

Lastly, managers need to develop strategies and/or short-term actions to strike a balance between the digital and physical elements of inter-firm collaborations. Practically, organizing in-person meetings and specific physical events can be useful to maintain this balance and strengthen long-lasting business relationships. Additionally, the organization should formally incorporate the regular delivery of updated information and data about its omnichannel strategies as part of the regular tasks of its key account managers who visit and interact with business partners. These actions, along with similar ones, can contribute to integrating the two sides of the coin (digital and physical) of the omnichannel strategy and are essential for effectively aligning the various ecosystem stakeholders over time.

6.3. Limitations and future research

The digital transformation of the healthcare industry is still in its emerging phase. Our multilevel analysis offers several contributions to theory and practice. However, this article is not without limitations. The qualitative nature of our research may limit the generalizability of our findings. Different configurations of innovation ecosystems could result in different dynamics of value creation for healthcare companies and have a significant impact on their omnichannel strategy.

Considering these potential limitations, further research could expand our analysis by exploring how orchestrators with different organizational and structural characteristics manage their omnichannel strategies in different ways. Additionally, future advancements in our analysis could involve the application of new technologies, such as Machine Learning and Artificial Intelligence, for processing interviews and other data sources.

CRediT authorship contribution statement

Marco Paiola: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Tatiana Khvatova:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Francesco Schiavone:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Alberto Ferraris:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Acknowledgements

The authors want to thank the Guest Editors and the reviewers of the Journal of Business Research for their valuable and constructive comments and suggestions which helped to improve the manuscript. The authors also want to thank the cultural association "Knowmedtech" (Italy) for the support in the development of this article.

Appendix 1. Data structure

Ist order categories	II order themes	Aggregated concepts
PSPP manages a vast network of local operators that are involved on a project basis Complex set of logistical and communicational activities oriented to assist the patient	Local medical and service operators network elements	Collaboration and orchestration management complexity
The patient journey is based on the type of disease, the drug type and assumptions and the therapy on the whole The system automatically programs the scheduled necessary activity for each stakeholder of the ecosystem	Patient-centered therapies and omnichannel solutions complexity	
PSPP co-designs with the pharmaceutical company a proper therapeutical program, with specific services and resources Value proposition is designed with co-design and customization around the patient's needs	Pharmaceutical company - PSPP collaboration elements	
A fundamental strategic decision for PSPP was the collaboration with a technological service provider (DPP) The DPP supply organizational services along with technological services to the PSP	PSPP - DPP collaboration elements	
The platforms allows a real time sharing of patients' data with ecosystem actors Platform's data can be used in different ways for streamlining the PSP organization Patients' data can also be shared with the medical community to improve medical research Data allows to precisely understand the adherence of every single patient to the cure	Ecosystem data collection and analysis characteristics	Digital technologies critical role in Omnichanel Health systems
AI can allow a clustering of enrolling patients in order to better classify the risk profile and have a dedicated treatment Future development are related to the integration of IoT, medical devices and home- and tele-medicine Scalability and replication capabilities are necessary to spread the use of PSPs	Future digitally based evolution of the solution	
Gamification aspects help stimulating patients' involvement and proactivity The platform's engine allows to interconnect web portals and apps dedicated to the different actors involved in the PSP IoT technologies are used in order to get feedbacks of patients' adherence to the therapy	Specific technological solutions are adopted for supporting adherence	
Learning curve related to the use of the digital platform by the network of collaborators PSP can be modularized using operational routines that can be assembled and customized The current platform benefits of five years' accumulated knowledge and is a critical resource for developments	Design- and use-related learning curves and lock-in effects	Value based Healthcare challenges and opportunities
PSP's logistical activities coordination has positive effects on the pharmacists' activity PSP's comprehensive organization and patients' engagement have a positive effects on the doctors' activities Italy is and enhanced context for PSPs also compared to other UE nations	Omnichannel and digital platforms sustain to value-based healthcare	

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