Business model revisited: a novel canvas for digital transformation

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Abstract

Purpose – Digital businesses defy the models and theories of traditional entrepreneurship. This study proposes a refined digital business model canvas (DBMC) to address digital entrepreneurship's unique challenges and opportunities.

Design/methodology/approach – We conducted a systematic literature review alongside a double-round validation of semi-structured interviews and qualitative research. We interviewed digital entrepreneurs from university spin-offs until we reached data saturation in the first round, contributing to internal validity. Then, the new model was validated in the second round of interviews.

Findings – The DBMC successfully bridges gaps identified in the conventional BMC by enhancing strategic focus, clarifying financial planning and improving early adopter identification. Validation interviews confirm that the adapted framework is better aligned to the operational realities of digital ventures, reinforcing its theoretical contribution through a nuanced application of the resource-based view.

Research limitations/implications – The study's qualitative design and sample from a single innovation agency may limit generalizability; further testing in diverse settings is recommended.

Practical implications – The DBMC provides a robust, adaptable framework for digital entrepreneurs, offering valuable insights for strategic planning, entrepreneurial education and policy development. It integrates new components – such as early adopters, investment sources, pricing and employee relationships – and adapts existing elements.

Originality/value – The originality is twofold: we examined the business model canvas using additional resources in a digital context, enhancing the likelihood of success for digital business practitioners; we also revamped Barney's VRIO (value, rarity, imitability and organization) model, stressing the importance of resources and capabilities in the novel (digital) context.

Keywords Digital business model, Digital business, Business model canvas

Paper type Research paper

1. Introduction

The business model concept, which emerged in the 1990s, has become a significant topic within entrepreneurship disciplines despite still being in its developmental stage (Veit *et al.*, 2014). Many business model definitions exist, and a consensus has yet to be reached regarding its components (Standing & Mattsson, 2018; Bouwman, Nikou, Molina-Castillo, & de Reuver, 2018). Hilali and Manouar (2019) suggested that a business model represents a comprehensive business structure that aids decision-makers in understanding, planning, and designing a successful business. Schallmo *et al.* (2018) noted that literature often refers to a business model as a scheme that outlines how an organization conducts business with its customers, partners, and vendors.

Osterwalder's business model canvas (BMC; Osterwalder & Pigneur, 2010) is a widely recognized representation of business models. It comprises nine components: customer segments, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structures (Hilali & Manouar, 2019).

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The digital era presents a new challenge and significant economic opportunities (Arthur & Hisrich, 2011). Within this context, a digital business model has emerged, driven by the increasing prevalence of information technology (IT) (Hilali & Manouar, 2019). Moreover, the accessibility of information and communications technology has enabled the realization of digital entrepreneurship (Oumlil & Juiz, 2018).

Prior research has identified customer experience, information, technology platforms, competition, strategy, and innovation as the most critical trends in emerging digital business models (Hilali & Manouar, 2019). Digital innovation platforms foster an environment conducive to testing new ideas and developing digital businesses through a sharing approach (Hsieh & Wu, 2019). The innovation processes of digital business models are crucial in strategy, innovation, sustainability, and entrepreneurship (Nielsen, Christensen, & Madsen, 2024). Therefore, scholars advocate for practical tools and methodologies used during this creation phase to support business model innovation (Standing & Mattsson, 2018; Nielsen *et al.*, 2024). The main issue is that BM components are usually ambiguously defined (Bouwman *et al.*, 2018): some authors present an arbitrary list of components unrelated to BMC (Bouwman, Haaker, & De Vos, 2008; El Sawy & Pereira, 2013; Hartmann, Zaki, Feldmann, & Neely, 2016); our approach aligns with Osterwalder and Pigneur (2010) as the result of the rearrangement of a BM's components.

The literature identifies digitalization as the primary driver of disruptive transformation in entrepreneurship (Kraus, Palmer, Kailer, Kallinger, & Spitzer, 2019; Ogrean, Dumitru, & Popescu, 2024). Digital technology (DT) permeates all aspects of our lives (Kotarba, 2018) and is becoming an asset for organizations' competitiveness (Ancillai, Sabatini, Gatti, & Perna, 2023). Furthermore, it is impacting important fields such as circular economy and sustainability (Ogrean *et al.*, 2024), making it crucial to examine digital drivers and their anticipated effects to comprehend the present business landscape and the impending future proposed by business model innovation (Ancillai *et al.*, 2023). Recent studies have emphasized the dynamic nature of business model evolution, highlighting how causation, effectuation, and bricolage interact to shape entrepreneurial strategies (Costa, Nelson, & Pedroso, 2025). This perspective complements the traditional view of business model frameworks and further supports the need for models that are adaptable to digital entrepreneurship realities.

Hilali and Manouar (2019) note that the digital business model is still an emerging concept, with limited studies in the field. Additional research is needed to assess digital entrepreneurship business models to understand this topic's evolution (Kraus *et al.*, 2019). According to some scholars (Ramdani, Binsaif, & Boukrami, 2019; Ogrean *et al.*, 2024), the literature on how firms change their business models takes divergent approaches.

Despite the significance of existing research on DTs and their impact on BMC, certain aspects remain unaddressed. This gap in literature leads to the research question: Is any change required for a business model canvas explicitly tailored to accommodate digital businesses?

This study aims to understand which changes would be appropriate for a new digital business model, following Kraus *et al.*'s (2019) suggestions on the challenges and opportunities associated with the emergence of digital business models and also Ogrean *et al.* (2024), who identified in their advanced search of the Scopus database that digitalization and business model transformation are prominent niche research. To accomplish this objective, we conducted a systematic literature review (SLR) and double-round interviews with entrepreneurs from a database of startup companies from Brazil's leading patent registration and technology transfer office.

Our results reveal theoretical implications for Barney's resource-based view (RBV) VRIO (*Value*, *Rarity*, *Imitability*, and *Organization*) when applied to the context of technology transfer from universities via spin-off firms (Barney, 1991). To our knowledge, no previous study analyzes this theory in this context. This study emphasizes that the primary business challenges are tied to resources and capabilities, including initial financial investments, human resources, entrepreneurial and management skills, time management, market positioning, and

sales traction. It also identifies four new components/resources added to the BMC, which has practical implications by introducing four additional layers of analysis to the original BMC model. In doing so, this study contributes to digital entrepreneurs and ongoing theory.

The rest of this paper is structured as follows: a review of existing research on the business model concept and digital entrepreneurship; we then outline our methodology, which includes a literature search and refinement and an interview and validation process; findings are then analyzed, and new components are proposed for the BMC, considering theoretical and practical implications; finally, we present directions for future research and acknowledge the study's limitations.

2. Business model canvas and digital businesses

According to Bednářová, Tesařová, and Šimberová (2023), the very concept of the Business Model (BM) was first mentioned in a research paper by Bellman *et al.* (1957). However, for Zott, Amit, and Massa (2011) the Business model (BM) rose with the dotcom era in the late 1990s, and research on it has been developed from technology-oriented (Amit & Zott, 2001), strategy-oriented (Wirtz, Göttel, & Daiser, 2016), and organization-theory perspectives (Aspara, Lamberg, Laukia, & Tikkanen, 2013; Wirtz *et al.*, 2016). In most of them, the central element is value generation (Bencsik, Palmié, Parida, Wincent, & Gassmann, 2023).

Differences have been evident regarding BM elements. Over the last two decades, different scholars have researched business models from different viewpoints (Saurabh *et al.*, 2023). Senyo, Liu, and Effah (2019) suggested that value could be financial or non-financial outcomes from entity interactions. According to Kathan, Matzler, and Veider (2016), a business model comprises distinct elements that generate customer value and dimensions related to meeting customers' needs. In this context, in 2010, Osterwalder and Pigneur (2010) introduced the concept of the Business Model Canvas (BMC), a visual framework with dependent and related activities to safeguard the interest of stakeholders and shareholders, which explains the logic behind how an organization creates, delivers, and captures value. BMC has been represented using nine elements: customer segments, value proposition, revenue streams, channels, customer relationships, key activities, key resources, key partners, and cost structure.

The advent of the internet has enormously impacted on the concept of BM (Ruggieri, Savastano, Scalingi, Bala, & D'Ascenzo, 2018), and digital transformation has brought a new way of thinking about business and new strategies to achieve higher performance (Elia, Solazzo, Lerro, Pigni, & Tucci, 2024). Indeed, since the 1990s, literature has focused on the concept of a digital business model, which is defined as a business model affected by the changes brought by digital technology. It transforms how businesses deliver value to their customers, creating new entrepreneurial opportunities. However, seizing these opportunities presents the most significant challenge for entrepreneurs (Kraus *et al.*, 2019). Technology empowers companies to optimally leverage the available data (Agrawal *et al.*, 2011). Data serves as the foundation of the digital economy, and knowing how to use it is crucial for success (Hilali & Manouar, 2019). In essence, success hinges on the proper management of data and the ability to interpret its implications.

Considering all these changes, some authors, such as Bucherer, Eisert, and Gassmann (2012), Hartmann *et al.* (2016), and Frankenberger, Weiblen, Csik, and Gassmann (2013), describe Business Model Innovation (BMI) as the deliberate modification of BM components or the introduction of new ones, just as the BMC model supports.

Given its popularity among practitioners and academics, the business model canvas is an ideal framework to expand upon by integrating new components to suit other areas (Joyce & Paquin, 2016). Many authors have adopted BMC for different purposes (Ancillai *et al.*, 2023): business model canvas for social enterprises (Qastharin, 2016), energy enterprises (Dobrowolski and Sułkowski, 2021), circular economy (Braun, Schöllhammer, & Rosenkranz, 2021) and even designing innovative digital services for the public sector

(government) (The innovative digital service canvas) (Rose, Holgersson, & Söderström, 2019).

Further, we follow BMC definition for two reasons. First, our research aims to offer practical contributions by proposing a new digital business model. Second, BMC is a widely recognized representation of business models.

3. Some theories regarding this context

Acs and Armington (2006) point out a deficiency in studies and understanding of entrepreneurship models and their determinants. The microeconomics of entrepreneurship is still not fully understood and is often overlooked in theoretical discussions. While there is no agreement on theories related to digital entrepreneurship (Kuratko & Hodgetts, 2017), we have identified some.

Digital entrepreneurship literature has generally concentrated on recognizing opportunities and the subsequent actions entrepreneurs take to establish a business. The theory of knowledge spillover entrepreneurship suggests that new knowledge and ideas are one source of entrepreneurial opportunities. This theory proposes that knowledge is a catalyst for entrepreneurial opportunity. Incomplete knowledge creates these opportunities, and entrepreneurial activity, in turn, serves as the channel that enables the spillover and commercialization of that knowledge (Audretsch & Keilbach, 2007).

Entrepreneurship research suggests that variations in entrepreneurial behavior are linked to the founder's identity. According to identity theory, founders are not all the same; they differ in their self-perceptions and social motivations in entrepreneurship and engage differently in creating new businesses (Balachandran & Sakthivelan, 2013).

Acs, Desai, and Hessels (2008) discussed institutional theory, which suggests that individuals often mimic the actions of prominent and successful peers. This imitation can bolster entrepreneurship as a viable career choice, leading to the establishment of more new businesses. Ngoasong (2018) linked institutional theory to RBV. The institutional context pertains to formal (laws and regulations) and informal (social norms) rules within a country. These rules can either facilitate or hinder the creation of new businesses and shape the opportunity recognition of prospective entrepreneurs.

As presented by Standing and Mattsson (2018) and Richter (2016), innovation theory emphasizes the importance of time to market. According to this theory, founders should rapidly launch the initial version of a service (or platform) and then use feedback from early customers to refine its features.

Barney, Wright, and Ketchen Jr (2001) argued that a firm's enduring competitive advantage stems from its ownership of *V*aluable, *R*are, *I*nimitable and *O*rganized resources and capabilities, as the VRIO acronym encapsulates. This framework is used to assess an organization's resources and capabilities. In a later study, Barney, Ketchen, and Wright (2021) linked entrepreneurship to RBV. They further asserted that entrepreneurs could be essential in leveraging resources and capabilities to generate economic value.

4. Methodology

The new framework has been developed in three steps: (1) analyzing previous studies (Elia *et al.*, 2024; Schneider & Kokshagina, 2021), (2) interviewing (first round) digital entrepreneurs (Standing & Mattsson, 2018; Schneider & Kokshagina, 2021), and (3) validating (second round interviews) with digital entrepreneurs (Elia *et al.*, 2024). The first step involves employing a systematic literature review method, namely, the knowledge development process constructivist (ProKnow-C) tool (Ensslin, Ensslin, Lacerda, & Tasca, 2010). This approach identifies and selects pertinent papers concerning the elements that have influenced the concepts of business model and digital business models (Shapiro & Varian, 1998). In the second step, a questionnaire was designed based on the literature review

(Standing & Mattsson, 2018), and interviews were conducted with digital entrepreneurs in Brazil. Lastly, the findings were validated with a group of digital entrepreneurs.

Given the research's objective and the novelty of digital business as a field of study (Cheng, 2016; Richter, 2016), a qualitative methodology is deemed suitable (Strauss & Corbin, 1994). Furthermore, interviews are an apt choice when the study involves an exploratory component. Drawing from the literature review (Standing & Mattsson, 2018), a questionnaire was developed, and 21 comprehensive interviews were conducted between February and May 2023. Unlike quantitative research, qualitative research typically involves more minor, more intensively studied samples (Miles & Huberman, 1994). As recommended by Miles and Huberman (1994), both raw materials (interview notes) and partially processed data (write-ups, transcriptions, initial and revised versions) were documented. The focus was on content analysis, or the communication of messages, rather than documentation (Bardin, 2011).

The digital entrepreneurs were chosen by convenience. The understudies were identified from the database of the Innovation Agency of Universidade Estadual de Campinas (*State University of Campinas*) – Inova/Unicamp, a prominent Technology Transfer Office (TTO) in Brazil. As Kimbu and Ngoasong (2016) and Vasilchenko and Morrish (2011) suggested, a cross-case analysis was performed on all responses to pinpoint significant elements and construct an empirical analysis.

Inova/Unicamp was established in 2003 to foster connections between the university and the broader community and bolster research activities. Additionally, this institution aids entrepreneurs in creating startups (mainly digital) via incubation processes and oversees the Unicamp Science and Technology Park to stimulate the growth of an innovation ecosystem. Unicamp, a public university that offers free education, was officially established on October 5, 1966, in the countryside of São Paulo, Brazil.

Considering both companies and universities, Unicamp holds the top patent position in Brazil. The firms registered with Inova are included in the "Inova Unicamp database." As of February 2023, the database lists 1,100 subscribed companies (the database can be accessed at https://en.inova.unicamp.br/).

4.1 Literature search

The first step of the ProKnow-C method (Ensslin *et al.*, 2010) involves defining keywords aligned to the research theme. These chosen keywords were combined, and articles were selected if they had them in their titles, abstracts, or keyword lists.

The chosen keywords for this study were "digital entrepreneurship", "digital business", "digital business model", and "business model canvas". To ensure comprehensive coverage, the literature search was initiated from two primary databases: Scopus and Web of Science.

The academic discourse on digital entrepreneurship has been approached from various disciplines, including Information Systems (Du, Pan, Zhou, & Ouyang, 2018), Management and Business, Policy (Nambisan, Wright, & Feldman, 2019), and Strategy (Autio, Nambisan, Thomas, & Wright, 2017). For this study, we specifically selected Management, Business, and Economics manuscripts.

4.2 Literature refinement

Using the ProKnow-C methodology, we refined our process to yield only relevant papers. The initial filtering step recommended by ProKnow-C involves eliminating duplicate papers (Ensslin *et al.*, 2010). This study used Mendeley software to exclude such repeated articles. We detected that 5% of the papers appeared more than once, reducing the total from 816 to 279.

The second step involves title filtering. All titles were read and analyzed during this process, and those relevant to the research area were selected. It was crucial to exclude papers that did not directly pertain to the research topic, despite the presence of keywords (Ensslin *et al.*, 2010). Out of the 279 titles read, 244 papers were discarded in this step, leaving 35 in the sample.

In the third step, we verified the scientific relevance by considering the citation count of each paper as of the date of this research (January 2023), using Google Scholar, as per Senyo *et al.* (2019). The fourth step divides the papers into two categories: (1) articles with confirmed scientific recognition and (2) with unconfirmed scientific recognition. The classification threshold between these two categories was determined by calculating each paper's citation count representativeness. ProKnow-C (Ensslin *et al.*, 2010) set the cut-off point at approximately 85%. In this study, 11 papers, representing 85% of total citations, were recognized scientifically. After reviewing all abstracts, we concluded that 8 papers were relevant to the research area.

Per the methodology, we conducted a closer examination of the 24 papers classified as having unconfirmed scientific recognition, reading the abstracts for those published less than two years ago. Out of these, 20 were selected to remain in the database.

Finally, the selected papers from both groups were consolidated. From the 11 papers with confirmed scientific recognition, 8 were deemed relevant after abstract screening. Additionally, 20 papers from the group with unconfirmed recognition were selected based on their recent publication date and thematic alignment. As a result, a total of 28 papers were retained for this study.

4.3 First round interviews

Following Kraus *et al.* (2019), we examined entrepreneurs' business websites post-sample selection to assess their appropriateness for interviews. We reached out to the entrepreneurs, inviting them to participate in interviews via Zoom or Google Meet.

A cross-case analysis was conducted across all digital entrepreneurs to highlight key points and support the empirical analysis (Kimbu & Ngoasong, 2016; Vasilchenko & Morrish, 2011). Following data collection, conclusions were drawn and verified. Identifiable similarities, patterns, recurring words, explanations, and propositions were noted (Miles & Huberman, 1994), creating categories for information coding. In content analysis, categories are viewed as classes that group common characteristics. The selection of categories considered semantic criteria (themes), syntactic criteria (verbs, adjectives, and pronouns), and lexical criteria (sense and meaning of words, e.g. antonyms or synonyms). This process has enabled the consolidation of a significant volume of information, organized in two stages: inventory (isolating common elements) and classification (dividing and organizing common elements) (Bardin, 2011).

The saturation point was achieved after conducting 21 interviews between February and May 2023. The authors used their judgment to determine the ideal sampling point, a technique to confirm when data collection has reached saturation (Damasceno, Morini, & Pannellini, 2023). Consequently, the saturation points for the three specific questions (I, II, and VII), which were not open-ended, were also reached after these 21 interviews. Internal validity could be confirmed.

The questions focused on the components of digital business models. The questionnaires were developed based on the work of Standing and Mattsson (2018), who explored how entrepreneurs identify business opportunities and translate them into viable business ideas. They used six specific questions in their interviews with entrepreneurs to help shape a conceptual business model in digital entrepreneurship.

(1) How was the digital business idea identified?

(2) How was it conceptualized in the online environment? (Did it evolve through prototyping?)

(3) Which components of the online mechanism were identified and conceptualized?

(4) What were the values of the drivers of the business model (novelty, lock-in, complementariness, and efficiencies)?

(5) What were the problems and challenges faced during identification and conceptualization?

What should have been done differently, and why?
For this study to accomplish its objective, we added a question:

(6) In your view, does BMC suit the digital business model, or should a new field be created? If so, which one?

4.4 Second round interviews: validation

Following the establishment of the DBMC framework, a validation phase was conducted. We utilized a semi-structured interview protocol to capture the perceptions of entrepreneurs who had previously engaged with the traditional BMC and subsequently applied the DBMC. Seven digital entrepreneurs were selected from the sub-set of startups that deal with digital entrepreneurship. They are part of the investor hub and integrated into the Unicamp entrepreneurial ecosystem. This round of interviews was done with a new set of companies, not matching the first one. Interviews were conducted online (Google Meet) in March 2025. The validation instrument consisted of a set of five open-ended questions:

(1) Their initial experiences and perceived utility of the traditional BMC;

(2) The extent to which the DBMC adaptation addressed specific digital challenges;

(3) The most significant benefits derived from utilizing DBMC;

(4) Suggestions for any additional components; and

(5) Identification of any elements within DBMC that were deemed less valuable.

The transcribed interviews were analyzed using content analysis methods outlined by Bardin (2011). An initial coding scheme was developed based on interview questions and emergent themes. The process involved two main stages: (1) identification of recurring categories and key issues related to adapting BMC to a digital context; (2) organization of these categories into thematic groups that correspond to the specific components of the DBMC, such as "Early Adopters," "Investment Sources," "Pricing," and "Employee Relationship." The validation analysis sought to uncover whether the additional components enhanced strategic clarity and operational relevance.

By triangulating the qualitative findings with extant literature on digital entrepreneurship and business model innovation (e.g. Ancillai *et al.*, 2023; Kraus *et al.*, 2019), the validation process corroborated the DBMC's practical and theoretical merit. This phase of the methodology thus serves as a critical bridge between the DBMC's conceptual development and its empirical application in the digital environment.

5. Results and discussion

Following Standing and Mattsson (2018), we also describe the phase of opportunity recognition by entrepreneurs, the primary challenges, and the lessons learned from the business model development process. By consolidating all the findings, we propose practical implications, such as new components for BMC and a theoretical contribution related to RBV.

5.1 Opportunity recognition

This study, as shown in Table 1, reveals that most entrepreneurs (16 out of 21, or 76%) recognized opportunities by identifying real-life problems or drawing from their previous job experiences.

For instance, Company 3 (C3) created a tool for carriers, introduced at a meeting with shippers to enhance efficiency and safety and reduce market costs. The co-founders of

Table 1. Opportunity recognition

Company	Interview date (2023)	Foundation year	Qty employees	Opportunity recognition
C1	04–14	2017	20	Problem in real life
C2	04–19	2010	230	Previous jobs
C3	04–19	2020	6	Previous jobs Networking
C4	03–29	2003	36	Problem in real life
C5	03–30	2015	130	Previous jobs
C6	03–15	2020	5	Problem in real life
C7	04–28	2016	4	Previous jobs
C8	04–03	1987	250	Problem in real life
C9	05–15	2012	33	Previous jobs Networking
C10	04–28	2021	15	Previous jobs
C11	03–15	2022	13	Previous jobs
C12	03–13	2007	3	Market demand
C13	03–09	2016	50	Market demand
C14	04–28	2016	3	Previous jobs
C15	04–14	2019	30	Market demand
C16	03–27	2014	100	Market demand
C17	04–14	2019	5	Market demand
C18	03–13	2016	22	Problem in real life
C19	03–13	2013	1	Previous jobs Networking
C20	04–28	2022	17	Problem in real life
C21	04–28	2012	1	Problem in real life

Source(s): Authors' own work

Company 5 (C5), who had experience working in startups, recognized the common challenges startups face in managing and developing solutions for their clients; consequently, they concentrated on imparting best practices to these startups and assisting them in creating solutions for their clientele. Company 4 (C4), a provider of solutions for managing amicable and litigious billing across various sectors since 2003, was established in response to the challenge of collecting overdue payments.

Note that there are alternative methods to identify opportunities. Chitsazzadeh, Walbroel, Senderek, and Stich (2023) discovered that cross-industry innovation is being used to develop BMs for Industry 4.0. They highlighted a case where a platform like Grammarly (an online English language grammar, spelling, and plagiarism checker) was developed for the Portuguese language. This platform leverages artificial intelligence to assist writers in finding more suitable words, improving semantic errors in the context of their writing, and correcting grammatical and orthographic mistakes (Chitsazzadeh *et al.*, 2023). Another example is the three types of industrial IoT-based BMs: (1) an adoption of BM, (2) a virtual diversification BM, (3) and a complete IIoT BM (Laudien & Daxbock, 2016). The author mentions that opportunity recognition and perceived low growth potential based on the actual BM are accelerators of digital-driven types of BM change (Laudien & Daxbock, 2016).

5.2 Value proposition

The value proposition is a fundamental element of the BMC (Standing & Mattsson, 2018). Therefore, entrepreneurs must understand the problems they are solving and how they maintain competitiveness in the market.

Table 2 shows that C10 is a platform that accelerates the digital transformation of businesses by linking them with the perfect IT service providers for each corporate project. By leveraging curated information and intelligent algorithms, they can recommend the top three suppliers for each IT project led by a technology contractor. As Kathan *et al.* (2016) point out, businesses are capitalizing on the swift progression of digitalization to generate additional value propositions, and different typologies of BMs frequently come from coevolutionary interactions between DTs, institutions, users, and strategies and ecosystems (Ancillai *et al.*, 2023).

Customization and services are also trends in seven companies (32%): C1, C5, C9, C11, C13, C15, and C16. These companies typically develop software for other businesses, considering their unique needs and providing guidance. The modifications in value proposition usually impact the customer interface (Ancillai *et al.*, 2023).

Interestingly, despite Standing and Mattsson's (2018) findings on the significance of networking and community creation in the value proposition, none of the entrepreneurs interviewed for this study acknowledged this importance in their respective cases.

During the interviews, a significant majority (81%) of the companies mentioned having developed prototypes (C2, C3, C4, C6, C7, C8, C9, C11, C12, C13, C14, C16, C17, C18, C19, C20, and C21).

5.3 Business challenges in the digital context

When asking about the challenges companies face, the analysis followed content analysis criteria (Bardin, 2011). These included financial aspects, such as initial investment sources (C3, C7, C10, C12, and C19). In the literature, authors point out that adopting new DTs

Table 2. Value proposition

Company	Prototyping?	Value proposition
C1	No	Customization and high-quality team
C2	Yes	High-quality software
C3	Yes	Meet-up between carriers and shippers (brought more efficiency, safety, and lower costs for the market)
C4	Yes	Experts in client market (know-how regarding business rules)
C5	No	Consultative work, feasibility, founders involved in the business
C6	Yes	Meet-up between investors and startups. Real-time information, novelty, and impartiality (breaking conflict of interest)
C7	Yes	Novelty and diversity of services
C8	Yes	Innovation and high-quality product
C9	Yes	Customization
C10	No	High technology and connection between IT service provider to a corporate program
C11	Yes	Consultative work and customization
C12	Yes	Performance, data reliability, postage service and personalization
C13	Yes	High-quality and customization
C14	Yes	Animal registration by cities segment, animal recognition by image, minimizing animal registration duplication
C15	No	High product quality, low costs, customer service, consultative work and customization
C16	Yes	Accelerating e-commerce construction and customization
C17	Yes	Meet-up between doctors and patients and low cost
C18	Yes	Real-time information, novelty and low cost
C19	Yes	Novelty, efficiency and transparency
C20	Yes	Novelty, low costs and efficiency
C21	Yes	Novelty

Source(s): Authors' own work

changes the cost structure due to expressive investments in IT infrastructures (Ancillai *et al.*, 2023). Other categories included tax policies (C4), pricing (C2, C4, and C18), and human resources, encompassing recruitment, development, and retention (C4, C8, C9, C10, C11, C12, C15, and C19). Entrepreneurial and management skills were also highlighted, with many of the interviewed entrepreneurs being IT professionals lacking administrative or entrepreneurial skills (C2, C5, C6, C8, C11, C15, C16, C17, C19, C20, and C21).

Managers and entrepreneurs play a crucial role in creating value by offering resources and capabilities (Barney *et al.*, 2021). Key aspects include time management, prioritizing tasks, allocating time, assigning responsibilities (C6, C8, C11, C12), and market positioning, which requires identifying and understanding ideal customers. Entrepreneurs acknowledged that they had focused primarily on technology, underestimating the importance of establishing online and offline brand images (C11, C12, C15, C16, C20, C21). Other important factors include sales traction and growth strategy, which entail initiating and sustaining sales. Collaborative consumption, for instance, which happens by an intermediating digital platform, is jeopardized by a complex set of multidimensional functional and psychological barriers (Ancillai *et al.*, 2023). Entrepreneurs noted the challenge of selling their ideas to potential early users (C2, C7, C9, C11, C12, C14, C16, C21), the availability of customer support (C6, C11, C12, C19), the low acceptance in the public sector (C14), and the conversion of a BMC into a tactical plan (C17).

Eventually, entrepreneurs have expressed difficulty in translating the BMC into a tactical plan. Moreover, as Nielsen *et al.* (2024) pointed out, having the right processes, procedures and governance structure increases the company's chance of success.

According to RBV, entrepreneurship analysis should focus on resources rather than products and services (Wernerfelt, 1984; Barney *et al.*, 2021). We believe this aligns with our research findings: entrepreneurial and management skills, human resources, sales traction, growth strategy, market positioning, initial financial investment sources, and time management represent 80% of the primary business challenges faced by entrepreneurs.

As stated by Lanzolla *et al.* (2020) and Elia *et al.* (2024), other challenges, such as data security, the emergence of new regulations, and digital fraud, are also new risks for digital businesses. Institutional barriers may make it difficult for digital-driven BMs to obtain internal and external legitimacy among employees, customers, suppliers, and financing institutions (Ancillai *et al.*, 2023).

5.4 BMC's component novelty in the digital context

As suggested by Schallmo *et al.* (2018), these entrepreneurs understand that a business model outlines how an organization interacts with its customers, partners, and vendors. However, some entrepreneurs found the BMC confusing and overly simplistic (C5, C6, and C11).

Governments must acknowledge that startups drive technological advancement, influence the global economy, and generate and deliver value. Therefore, they should foster BMC knowledge among entrepreneurs and serve as a financial source for initial investments.

Drawing from the entrepreneurs' suggestions and the literature review, the proposed digital business model canvas (DBMC) is shown in Figure 1. This version includes four additional components: "Employee Relationship" (Men, Chen, & Ji, 2021; Men, 2021), "Early Adopters" (Standing & Mattsson, 2018; Hilali & Manouar, 2019), "Pricing" (Mohout, 2015; Gómez-Prado *et al.*, 2022) and "Investment Sources" (Juríčková & Gregová, 2021). Furthermore, the "Key Activities" component has been refined to "Key Activities and Processes" (Margherita & Petti, 2010), and "Cost Structure" (Chammassian and Sabatier, 2020) has been elaborated to include "Initial Costs" and "Ongoing Costs" (Chammassian and Sabatier, 2020). This allows entrepreneurs to gain a more comprehensive understanding of the crucial and strategic components of all kinds of business models, except "Early Adopters", which is specific to the digital context. As Richter (2016) pointed out, in this context, launching a service (or platform) as soon as possible, getting feedback from early customers

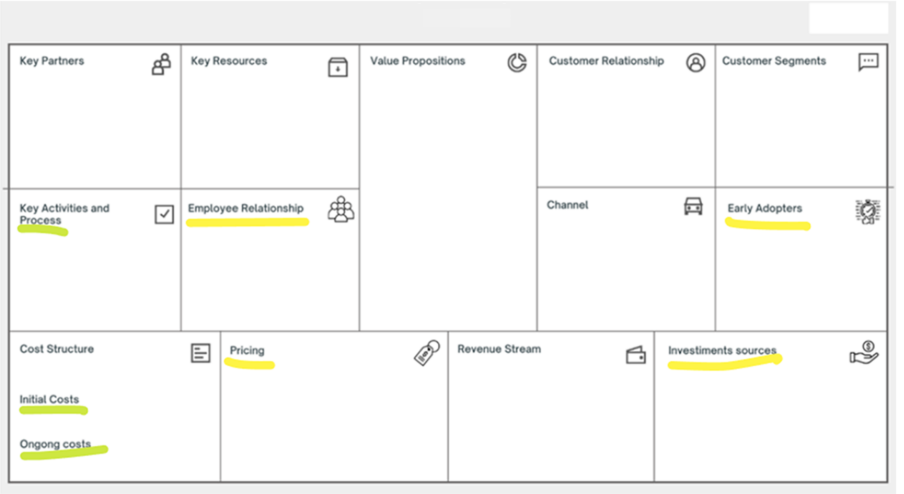

Figure 1. Digital Business Model Canvas (DBMC). Note: colors highlight changes (green) and inclusions (yellow). Source: Authors' own work

and managing and interpreting data (Hilali & Manouar, 2019) are essential for feature improvement and consequential success. It ensures customer value delivery and business sustainability. Different from other studies, DBMC has not focused on other aspects such as sustainability (Joyce & Paquin, 2016; Ogrean *et al.*, 2024) or circular economy (Braun *et al.*, 2021). Neither have they focused on a specific niche (Rose *et al.*, 2019; Dobrowolski and Sułkowski, 2021).

Considering each business model component (boxes in the canvas) as a resource to better understand the model, we have identified the resources and capabilities validated in the digital environment. While the VRIO framework is typically applied to internal resources, we propose a VRIO + perspective, adapting the VRIO model to the DBMC as follows: (a) we added "process" to the "key activities" resource (*Organization* in the VRIO acronym); (b) we divided cost into two, adding "pricing" to cost structure and "investment sources" to revenue stream (*Value*); (c) we added "employee relationship" to "key resources" (*Rarity*); and (d) we included an additional dimension in the "customer segment" resource as "early adopters" (*Imitability*). In doing so, we have addressed the research question. VRIO+ is a perspective that applies to DBMC: it may enhance digital value creation by making it inimitable, rare, more valuable, and organized with the new layers of resources and capabilities we have added, not limited only to internal resources. This is the rationale behind adding the "+" to VRIO.

Barney *et al.* (2001) distinctly identified that an emerging area in entrepreneurship where RBV could be relevant is the context of technology transfer from universities through spin-off firms, which aligns with our research. To the best of our knowledge, no prior research aligns with this objective, emphasizing the value of our empirical application toward theoretical contribution. Some studies have approached this idea differently, such as through capabilities (Lockett & Wright, 2005; Zhou, Minshall, & Hampden-Turner, 2010) and venture capital for venture development (Mueller, Westhead, & Wright, 2012).

5.5 Analysis of the DBMC validation: second round of interviews

Following the development of the Digital Business Model Canvas (DBMC), we conducted a validation phase, by interviewing digital entrepreneurs who had previously employed traditional BMC. These interviews aimed to capture their perceptions of DBMC, precisely its

usefulness, added value, and limitations. We collected their responses through five open-ended questions and consolidated them, considering the existing literature discussed. In this phase, we did not pursue the saturation point, due to interview depth, the variety of perceptions collected, and the method triangulation with literature analysis.

All the entrepreneurs generally regarded BMC as a practical, straightforward framework for understanding key elements of their ventures (e.g. customer segments, value proposition, etc.). However, three entrepreneurs noted that the traditional BMC felt "too broad" or "insufficiently granular" considering digital ventures. This observation aligns with Standing and Mattsson (2018) and Hilali and Manouar (2019), who argue that digital business models require more profound insight into data-driven processes, early adopters, and technology infrastructures — dimensions not emphasized in the original BMC.

When presented the adapted DBMC and their four new components ("Employee Relationship," "Early Adopters," "Pricing," and "Investment Sources") and refined ones ("Key Activities and Processes" and "Cost Structure"), they reported a more precise alignment between the model components and their actual operational challenges in digital contexts. They highlighted that, unlike the original BMC, DBMC prompts explicit thinking about where seed funding might come from and how to segment early adopters — two aspects they believed were critical to their ventures but rarely addressed in the traditional canvas. Recent research on digital entrepreneurship, such as Ancillai *et al.* (2023) and Elia *et al.* (2024), supports this stance, indicating that technology-based startups require more explicit guidance on funding sources and data-driven customer segmentation strategies.

It was possible to identify three core benefits that emerged from the interviews.

(1) Enhanced strategic focus: most participants emphasized that completing the DBMC compelled them to reflect on strategic elements (e.g. unique digital capabilities, user feedback loops, new monetization models, etc.) they had previously overlooked. This resonates with Kraus *et al.* (2019), who emphasize that entrepreneurs must consider how digital platforms and early-user feedback shape strategic decision-making.

(2) Early adopter identification: four interviewees noted that systematically identifying and profiling "Early Adopters" promoted more precise targeting and marketing. They pointed out that focusing on early adopters enabled them to iterate product features more efficiently, echoing Richter (2016) and Standing and Mattsson (2018), who underscore the importance of rapid feedback for digital startups.

(3) Financial clarity: respondents found "Investment Sources" and "Pricing" to be the most beneficial additions, as these forced them to articulate concrete funding and revenue strategies. This finding corroborates Juríčková and Gregová (2021), who argue that early financial planning is paramount to sustaining growth in digital ventures, particularly in volatile environments.

When asked if any other components should be added, only one respondent proposed including a "Regulatory Environment" box, pointing out that digital businesses often face sector-specific regulations (e.g. data privacy laws, fintech licensing). While regulatory factors can be integrated into existing DBMC fields (e.g. Key Partners or Key Activities and Processes), this suggestion aligns with broader findings that institutional and regulatory considerations significantly influence digital entrepreneurship (Ngoasong, 2018; Ancillai *et al.*, 2023).

None of the entrepreneurs considered any of the newly added fields superfluous. However, two participants indicated that "Employee Relationship" was "less immediately relevant" for very early-stage startups with only one or two team members. Nevertheless, they agreed it could become critical as the startup scales. They must formalize internal structures and culture — consistent with Men (2021) and Men *et al.* (2021), who highlight the importance of effective internal communication in sustaining growth.

The new DBMC elements address challenges frequently cited in literature. One example is how "Early Adopters" tie closely to the concept of speed-to-market and iterative prototyping (Standing & Mattsson, 2018; Richter, 2016). Another is "Investment Sources" reducing uncertainty by prompting startups to examine funding avenues (e.g. angel investors, venture capital, crowdfunding), a central determinant of survival in the digital domain (Mueller *et al.*, 2012; Juríčková & Gregová, 2021). "Pricing" fosters strategic clarity in a fast-moving digital marketplace, often characterized by "freemium" and subscription models (Mohout, 2015; Gómez-Prado *et al.*, 2022). Also "Employee Relationship" reflects emerging scholarship linking internal communication and culture to better innovation outcomes (Men *et al.*, 2021).

6. Conclusions

Our theoretical contribution is tied to RBV. Barney *et al.* (2001) posits that routines and capabilities evolve, and entrepreneurs' ongoing expansion of their knowledge base and ability to assimilate new information through experience and learning are crucial for achieving a sustainable competitive advantage. Further, considering the digital context, "early adopters" and initial investment sources have been seen by digital entrepreneurs as essential to business success, adding a new layer to Barney's theory and suggesting other studies to understand how DTs affect BM components focusing in one or more components (Ancillai *et a1*., 2023).

Further, the validation interviews underscore that digital entrepreneurs perceive DBMC as more aligned with their realities than the original BMC, mainly due to the explicit consideration of investment sources, pricing models, early adopters, and internal employee dynamics. These findings echo the Resource-Based View (RBV) perspective in highlighting the critical role of specialized resources and capabilities — such as early-adopter acquisition tactics and digital funding expertise — in achieving sustainable competitive advantage (Barney *et al.*, 2021).

Our findings resonate with prior research on startup business model evolution. Similar to Costa *et al.* (2025), we observe that digital entrepreneurs move fluidly between different decision-making logics, strategically leveraging available resources while iterating on their business models.

This study proposes new components to prompt entrepreneurs to consider these topics from the outset, enhancing their likelihood of success in the digital context, by offering a simplified and adaptable tool. DBMC has the potential to democratize the process of creating and validating digital business models. Therefore, this paper contributes to improving the competitiveness of startups in the increasingly digitalized global market.

The validation interviews offer several implications for both scholars and practitioners. Incubators may integrate DBMC into training programs, especially those targeting early-stage digital entrepreneurs who need structured approaches and funding to target early adopters. Policymakers should be aware that digital startups, often perceived as drivers of innovation, require tailored support (e.g. seed funding, regulatory guidance) to address the unique challenges identified in the DBMC added components.

In summary, the practical relevance of DBMC corroborate recent calls in academic literature for a more nuanced, resource-based, and digitally oriented approach to business model innovation. Although further testing with more extensive and more varied samples is advisable, these initial findings suggest that DBMC can better capture the intricacies of digital entrepreneurship, mainly where speed, resource orchestration, and early market traction are critical success factors.

This study has certain limitations, as follows:

(1) Note that of the digital entrepreneurs interviewed, only one was a woman. Future studies should aim to include more women to mitigate potential gender bias.

(2) Only Brazilian digital entrepreneurs were interviewed. Future research should extend the context and consider differences.

(3) From a methodological standpoint, while the sample of five entrepreneurs is small, it provides rich, qualitative evidence that aligns with Miles and Huberman's (1994) view on the value of in-depth interviews for exploratory research. Future studies could apply to the DBMC to incorporate additional theoretical perspectives (e.g. dynamic capabilities, institutional theory) to deepen our understanding of how digital ventures evolve.

(4) Explore how digital entrepreneurs combine different business modeling strategies over time is another suggestion for future research. As highlighted by Costa *et al.* (2025), integrating causation, effectuation, and bricolage provides a more comprehensive understanding of business model evolution in rapidly changing markets.

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