Journal of Business Research 174 (2024) 114524

Contents lists available at ScienceDirect

Journal of Business Research

journal homepage: www.elsevier.com/locate/jbusres

Navigating the student entrepreneurial journey: Dynamics and interplay of resourceful and innovative behavior

Mario A. Manzi-Puertas [a,b,*], Izaskun Agirre-Aramburu [a], Sain López-Pérez [a]

[a] Faculty of Business Studies, Mondragon Unibertsitatea, Ibarra Zelaia Zelaigunea, 2, 20560 Oñati, Gipuzkoa, España, Oñati, Spain
[b] Department of Business Administration, Pontificia Universidad Javeriana, Bogota, Colombia

ARTICLE INFO

Keywords:
Innovative behavior
Financial bootstrapping
Entrepreneurial bricolage
Improvisation
Student entrepreneurs
PLS-SEM

ABSTRACT

One characteristic of nascent entrepreneurship is the need to innovate to achieve competitiveness and ensure the survival of new ventures. Based on the individual perspectives of the Resource-Based View and Entrepreneurial Learning Theory, we propose a novel approach to expand our understanding of the dynamics and interplay between resourceful behaviors (e.g. financial bootstrapping, bricolage, and improvisation) and innovative behavior among student entrepreneurs during the development and exploitation stages. We used data from a survey of two groups of student entrepreneurs in Spain, analyzed using advanced PLS-SEM procedures. Our findings indicate that the link between financial bootstrapping and innovative behavior is driven by bricolage at both stages, while improvisation does not moderate this relationship. Changes in innovative behavior and the impact of resourceful behaviors are not significant in the stages analyzed. These results have implications for enhancing the identification, integration, and use of resources for innovation amongst student entrepreneurs.

1. Introduction

Embarking on an entrepreneurial journey is a meaningful and complex decision for any individual (McMullen & Dimov, 2013; Mets, 2022) and entails a significant incidence of failure (Hayward et al., 2006; Headd, 2003). In this journey, the development stage (DS) and exploitation stage (ES) play a crucial role, with the highest closure rate typically seen in the first five years of any new venture. This "Valley of Death Curve" (Ritter & Pedersen, 2022) is largely caused by a shortage of resources, lack of knowledge, and insufficient innovation (Cefis & Marsili, 2012; Hill et al., 2022; Velu, 2015). Prominent studies have therefore called for a better understanding of the dynamics and needs of these stages, with a view to ensuring the competitiveness and survival of new ventures (Eckhardt & Ciuchta, 2008; Hansen et al., 2016; Zahra, 2021).

The DS and ES are neither linear nor mutually exclusive. During the DS, latent entrepreneurs identify opportunities, create, and validate solutions, form teams, and mobilize resources (Bakker & Shepherd, 2015; Brixy et al., 2012; Davidsson, 2006; Shane & Venkataraman, 2000). In the ES, nascent entrepreneurs concentrate on exploiting opportunities by applying managerial skills and sufficient resources to implement ideas, diversify solutions, and implement growth strategies (Bakker & Shepherd, 2015; Davidsson, 2006; Galanakis & Giourka, 2017; Shane & Venkataraman, 2000). Numerous scholars have explained the conceptual distinction between these stages (e.g. Becker et al., 2015; Brixy et al., 2012; Galanakis & Giourka, 2017), and empirical studies have analyzed differences in the characteristics of the two (Davidsson, 2006; Shane & Venkataraman, 2000), citing opportunity discovery and exploitation (Corbett, 2005), decision-making (Packard et al., 2017), customer focus (Webb et al., 2011), motivators and obstacles (Rosário et al., 2021) and required resources (Clough et al., 2019).

In this context, the entrepreneur's innovative behavior (IB) facilitates the generation and implementation of creative solutions that are useful or meaningful to the target audience (Tidd & Bessant, 2020). However, when entrepreneurs have limited resources with which to innovate, they need to develop mechanisms to make the most of those resources and achieve their goals. The literature has identified certain key resourceful behaviors, including financial bootstrapping (FB), in which entrepreneurs secure financial resources without external financing (Freear et al., 1995; Winborg, 2009); entrepreneurial bricolage (EB), which involves the recombination and utilization of available resources for new purposes, disregarding constraints, and emphasizing

* Corresponding author.
E-mail addresses: marioandres.manzi@alumni.mondragon.edu (M.A. Manzi-Puertas), iagirrea@mondragon.edu (I. Agirre-Aramburu), smlopez@mondragon.edu (S. López-Pérez).

https://doi.org/10.1016/j.jbusres.2024.114524
Received 16 January 2023; Received in revised form 5 January 2024; Accepted 15 January 2024
Available online 25 January 2024

action (Davidsson et al., 2017); and improvisation, characterized by fluid responses to immediate stimuli, encompassing problem representation, response generation, and response execution (Fisher & Amabile, 2008). These resourceful behaviors play a crucial role in students' entrepreneurial journey, especially in light of their constraints, since they can effectively maximize the value of their available resources. To date, however, the dynamics and interplay between resourceful and innovative behaviors have been unclear, especially during the DS and ES of new ventures (Kwon & Kim, 2020; Salam & Senin, 2022). This has hindered a greater understanding of ways in which student entrepreneurs might innovate and improve the chances of success of their new ventures.

The Resource-Based View (RBV) advocates analyzing the processes employed by entrepreneurs to build their initial resource base and exploring how the knowledge generated by these processes facilitates the development of these capabilities and progress in the entrepreneurial process (Clough et al., 2019; Zahra, 2021). For this study, therefore, we integrate RBV with Entrepreneurial Learning Theory (ELT) to understand the link between resource management and IB amongst student entrepreneurs during the DS and ES.

Empirical research on student entrepreneurs, who play an increasingly important role in economic and social development (Sieger et al., 2021), suggests that they show similar characteristics in DS and ES (Hayton & Cholakova, 2012). However, their profiles and circumstances differ from those of traditional entrepreneurs because they are simultaneously engaged in studying and creating new businesses and because of the resource constraints they face (Clarysse et al., 2022; Hägg & Kurczewska, 2019). A different approach should therefore be taken in exploring these stages among student entrepreneurs. For example, very little is known about the factors influencing IB amongst student entrepreneurs (Martín et al., 2015), in contrast to the case of employees (e.g., Kwon & Kim, 2020; Salam & Senin, 2022) who are known to differ from entrepreneurs mainly in their IB (Lukeš, 2013).

Understanding these links will enable student entrepreneurs and universities to allocate and employ resources efficiently. It will also allow new ventures to capitalize on the entrepreneur's IB to foster their innovation capacity (Ailing et al., 2013) and to tackle challenges encountered during transitions between entrepreneurial stages. Drawing on the RBV and ELT, we propose the following research questions: *What are the dynamics and interplay of resourceful and innovative behaviors during the development and exploitation stages of the entrepreneurial process?* Given that EB is known to facilitate creative and strategic integration of resources, the first specific research question is: *Does entrepreneurial bricolage mediate the relationship between financial bootstrapping and innovative behavior in the two stages?* Finally, considering that improvisation affects the way these behaviors are manifested in resource-constrained contexts, the second specific research question is: *How does improvisation moderate this relationship during these stages?*

To address these research questions, the authors consider it essential to employ advanced procedures of partial least squares structural equation modeling (PLS-SEM) (Hair et al., 2024; Matthews et al., 2018) for three reasons. First, the use of factor estimation for variables that are not unidimensional can result in significant residual values and biased results (Sarstedt et al., 2023), whereas estimating them as high-order composites, as in this study, yields more reliable results (Guenther et al., 2023). Second, reflective constructs could be better represented by a composite model that provides more accurate results because it fully accounts for the variance in the indicators (Guenther et al., 2023; Sarstedt et al., 2016). Third, PLS-SEM is suitable for analyzing higher-order constructs, performing mediation, conditional mediation, multigroup analyses, and predictive power of the model, thus allowing a deeper understanding of the underlying mechanisms of the investigation, leading to more accurate and reliable conclusions (Guenther et al., 2023).

Given the exploratory nature of the phenomenon under investigation, our theoretical framework has evolved substantially to properly address this subject. Through this iterative process, we identified RBV and ELT as the foundational theories for our study. The robust body of theoretical and empirical studies employing the RBV (e.g. Alvarez & Busenitz, 2001; Kellermanns et al., 2016; Zahra, 2021) and ELT (e.g. Nogueira, 2019; Page West & Gemmell, 2021; Wang & Chugh, 2014) provided a solid foundation for understanding and interpreting the inherent complexities of our research context. We therefore used a sample of two groups of 151 and 147 student entrepreneurs across Spain to determine variances in the model's variables and relationships by examining the effects on the two groups depending on the stage of the entrepreneurial process. Group 1 is made up of student entrepreneurs in DS, and Group 2 of student entrepreneurs in ES. The data were collected using self-administered questionnaires.

This study contributes to the literature in several ways. First, the integration of RBV with ELT lays the foundation for developing new models that elucidate how the identification, integration, and use of resources facilitate and generate IB at different stages of the entrepreneurial process. Second, we address a persistent concern by examining the foundations of RBV at an individual level (Khan, 2013), specifically from the entrepreneur's perspective, exploring the dynamics of resourceful behaviors and their impact on IB during the early stages of new ventures. Third, we applied ELT to explain that identification, integration, and use of resources act as a source of knowledge for student entrepreneurs, enabling them to build up their capabilities. Fourth, we provide valuable insights on the need for the relationship between FB, to identify resources and EB as an integrator of those resources, both as antecedents of IB during the DS and ES. On a practical level, this study offers valuable guidance to student entrepreneurs and universities in managing resources by clarifying the role of resourceful behaviors in driving innovation, to increasing the chances of survival and competitiveness of new ventures.

The remainder of this paper is organized as follows. The first section presents the theoretical background and development of the hypotheses. The second section presents and develops a methodology based on empirical and quantitative analyses using PLS-SEM. The final section presents general results and discusses the findings. Finally, we establish the limitations of this study and suggest directions for future research.

2. Theoretical framework and hypotheses

2.1. Identification, integration, and utilization of resources

Numerous RBV-based conceptual frameworks have been proposed to explain how entrepreneurs build their resource base (Brush et al., 2001; Clough et al., 2019; Zahra, 2021). However, these models focus primarily on external resources that nascent entrepreneurs find challenging to access (Clarysse et al., 2022). Moreover, these models present a linear sequence of stages, whereas resource management involves acquiring and combining resources in various ways at different stages (de Jong et al., 2021). These models also fail to consider the challenges entrepreneurs face at each stage and overlook the potential of learning to overcome barriers and develop the entrepreneurs' capabilities (Toft-Kehler et al., 2014). To address these limitations, we proposed three mechanisms for building a resource base by integrating RBV and ELT: resource identification, integration, and utilization.

Resource identification involves the recognition and assembly of resources. RBV highlights the importance of entrepreneurs acquiring and mobilizing resources to gain competitive advantage (Peteraf, 1993), while ELT helps understand how entrepreneurs identify and acquire the right resources through a continuous learning process (Holcomb et al., 2009; Politis, 2005). Resource recognition entails identifying tangible and intangible resources with valuable, rare, inimitable, and organized (VRIO) attributes in line with business ideas (Barney, 1991); resource assembly involves gaining ownership of resources (Brush et al., 2001, 2008). Despite the liability inherent to their newness, entrepreneurs rely on their networks to access external resources (Sullivan & Ford, 2014).

For internal resources, entrepreneurs employ resourceful behaviors such as FB to leverage internal financial resources and minimize dependence on external funding (Winborg & Landström, 2001). FB practices that rely on the entrepreneur's own resources (FBO), such as obtaining loans from relatives or friends, are an indication of the new venture's unique survival and growth capabilities. According to ELT, entrepreneurs use their knowledge and resourcefulness to overcome challenges, leading to more efficient resource identification (Deakins & Freel, 1998). When FB involves leveraging customer-held resources (FBC), for example by employing routines for speeding up invoicing, it extends the firm's resource base through external relationships, enabling entrepreneurs to learn through interactions with their environment.

Resource integration involves combining newly acquired resources either with each other or with existing resources using different types of knowledge and capabilities to generate creative solutions (Deakins & Freel, 1998). According to the RBV, creative combinations of resources facilitate the creation of new VRIO resources (Barney, 1991) to enable firms to gain competitive advantages (Moscare-Balanquit, 2021; Sok et al., 2013). To optimize limited resources and create value, entrepreneurs often employ EB to utilize existing resources creatively (Senyard et al., 2014). EB practices such as putting together workable solutions from existing resources when facing new challenges, highlight their unique combinations and their impact on the entrepreneurs' capacity to tackle challenges (Clough et al., 2019). EB practices also show that entrepreneurs are creatively employing their existing resources, driven by their confidence in their learning capabilities (Deakins & Freel, 1998). Additionally, entrepreneurs may resort to improvisation in dynamic contexts to leverage resource combinations in novel ways (Duxbury, 2014). Embarking on these integration processes generates new knowledge that entrepreneurs can use in future resource combinations (Dothan & Lavie, 2016).

Resource utilization involves the effective use of the resources acquired to create value and gain a competitive advantage. This process entails leveraging and maximizing resource integration to develop innovative products, services, or business models (Zahra, 2021). Successful resource utilization allows entrepreneurs to seize new opportunities and achieve competitive positioning (Klein et al., 2012). Throughout the resource utilization process, entrepreneurs actively engage in hands-on experiences and apply the knowledge they have acquired to real-world situations. This is known as "learning by doing" (Thompson, 2010), whereby entrepreneurs develop a deeper understanding of resource management (Deakins & Freel, 1998), improving their resource utilization capabilities. This process impacts IB dimensions by facilitating the development of valuable knowledge generated through interactions and value created from resources (Chang et al., 2022). For example, through observation, entrepreneurs identify their resource constraints, but they also generate ideas by observing their environment. Thus, when entrepreneurs embark on the journey of bringing their ideas to life, through the creative and strategic identification, integration, and utilization of resources, they are building the foundations for acting more innovatively.

2.2. Innovative behavior (IB)

IB refers to the development of creative ideas that can be successfully implemented as products, services, procedures, theories, and strategies that are useful or meaningful to the intended audience (Tidd & Bessant, 2020). According to Dyer et al. (2008), IB involves the following patterns: (1) Questioning, the propensity constantly to ask questions that challenge the status quo. (2) Observation, understanding everyday experiences and inspiring the emergence of new ideas. (3) Experimentation, focusing on fostering a hypothesis-testing mentality for developing solutions. (4) Idea networking, the generation of social connections to obtain or test ideas and solutions. These dimensions highlight the complex nature of IB and the potential gains from applying it to new ventures.

IB contributes to idea generation, promotion, implementation, and knowledge acquisition (Low & Isserman, 2015), which positively impacts the firm's innovative capabilities, products, and service offerings, opportunity recognition, and growth of new ventures, leading to competitive advantages (Hogan & Coote, 2014; Poblete, 2022). Traits such as curiosity, ambition, growth aspirations, personality, attitude, and motivation have been identified as antecedents of entrepreneur IB (Poblete, 2022; Shaowei et al., 2022; Xu & Zhao, 2020). Identifying, integrating, and utilizing resources is also crucial for the generation of IB (Kwon & Kim, 2020; Sahoo & Panda, 2019). Specifically, RBV and ELT emphasize that innovative resource management (Setyaningrum & Muafi, 2022) requires learning mechanisms to facilitate the transformation of entrepreneurial experiences and knowledge into creative resource management practices (Deakins & Freel, 1998).

IB is developed through a multistage process (Janssen, 2004). In the DS, entrepreneurs utilize resources for specific activities to create and improve solutions (Kim & Lee, 2018). During this stage, observation helps acquire relevant market information (Stewart et al., 2008), providing insights for asking critical questions to identify potential gaps or opportunities (Cliff et al., 2006). Through experimentation, entrepreneurs can test hypotheses, explore alternative solutions, and gain a deeper understanding of their market (Lindholm-Dahlstrand et al., 2019), which can be validated to reduce information asymmetries and keep abreast of industry trends (Yang & Wang, 2017).

During the ES, entrepreneurs require a higher level of IB to manage diverse activities (Kim & Lee, 2018), such as the refitment of products, services, and business models, contributing to competitiveness and productivity (Low & Isserman, 2015). At this stage, observation allows successful strategies and practices to be identified (De Clercq et al., 2012). Through experimentation, entrepreneurs can adapt to changing market conditions, technological advancements, and customer feedback (Lindholm-Dahlstrand et al., 2019). By applying idea networking, they can facilitate the dissemination of best practices, adopt successful strategies, and avoid common pitfalls (Kaandorp et al., 2020). Thus, we propose the following hypothesis:

H1 (+): Entrepreneurs' IB is greater in ES than in DS.

2.3. Financial bootstrapping (FB) and innovative behavior (IB)

Financial resources play a crucial role in new ventures by generating innovation and supporting environmental changes (Hoegl et al., 2008). The presence or absence of financial resources can influence entrepreneurs' perceptions of support, barriers, innovativeness, proactiveness, and risk (Sahoo & Panda, 2019). Entrepreneurs obtain financial resources from external sources such as debt or investment. However, accessing these resources can be challenging in the early stages (Denis, 2004) and internal sources such as personal savings and the resources generated by their ventures may prove more accessible. Since the individual characteristics of nascent entrepreneurs and their embeddedness in the environment determine the bootstrapping behavior of their venture (Grichnik et al., 2014), entrepreneurs rely on FB methods such as customer-related sources, delayed payment, and owner-related resources to secure internal resources (Ebben & Johnson, 2006; Winborg, 2009; Winborg & Landström, 2001).

Viewed from the RBV, FB is a resource-leveraging activity that allows entrepreneurs to acquire and deploy resources to overcome constraints (Brinckmann et al., 2019; Deakins & Bensemann, 2019). Empirical evidence shows that FB promotes innovation in new ventures by fostering IB among entrepreneurs and encouraging cost-effective solutions (Smith, 2009). FB is particularly relevant during the DS, empowering entrepreneurs to retain control, make independent decisions, and take risks, thereby nurturing innovation (Smith, 2009). Moreover, this behavior enables entrepreneurs to experiment, iterate, and pivot, leading to the creation of innovative products, services, and processes. For example, Löfqvist (2017) found that employing FBC practices positively

impacts product innovation, and similarly, Wu et al. (2016) established that when using FBO practices, entrepreneurs can promote innovation, especially if they have access to institutional funding.

Based on the existing literature, there is evidence of a shift in the use of FB between the DS and ES due to the evolving financing needs of new ventures (Ebben & Johnson, 2006; Lam, 2010). During the ES, FB remains relevant as entrepreneurs prioritize resource allocation and cost efficiency, reinvest revenue, and adopt lean operations for internal funds (Winborg & Landström, 2001). According to ELT, entrepreneurs acquire more experience and financial knowledge during ES, enabling easier access to external resources (Fisher et al., 2015). Thus, we propose the following hypothesis:

H2 (+): The effect of FB on entrepreneurs' IB is greater in DS than in ES.

2.4. The mediator role of entrepreneurial bricolage (EB)

Recent literature suggests that FB strategies provide the context and impetus for EB to translate the effects of FB into IB (Michaelis et al., 2021; Rutherford et al., 2022). (Levi-Strauss, 1966, p. 17) originally defined EB as "making do with what is at hand", thus describing how individuals generate solutions with available resources. From an entrepreneurial perspective, Davidsson et al., (2017,p. 117) define EB as "making do with the resources at hand, recombining resources for new purposes, refusing to enact constraints, and predisposing to action." Entrepreneurs who engage in EB exhibit resourcefulness, adaptability, and willingness to experiment with and explore unconventional ideas (Baker & Nelson, 2005). They creatively find new resources and generate novel ideas (Senyard et al., 2014). Additionally, EB enhances the creative process and fosters an entrepreneurial mindset, promoting a proactive and innovative approach to problem-solving (Hooi et al., 2016). RBV argues that once entrepreneurs have identified resources and before using them innovatively, they need to integrate them creatively (Mahoney & Pandian, 1992), for which purpose they employ EB (Fisher, 2012). From the perspective of ELT, this process of hands-on resource integration enhances entrepreneurs' resource-based capabilities, allowing them to generate creative solutions (Politis, 2005).

In a systematic review, Singh et al. (2022) noted that while FB is about accessing resources, EB focuses on creatively and strategically utilizing these resources for value extraction. They argue that FB emphasizes resource identification, whereas EB concentrates on resource integration. Baker and Nelson (2005) emphasize that EB involves using resources already owned or readily and freely available, which can come from FBO and FBC-based practices respectively. Moreover, creative use of resources can help entrepreneurs bypass resource limitations and find innovative solutions (Fan et al., 2019). Thus, EB empowers them to use their creativity, knowledge, and resourcefulness to innovate (Linna, 2013). Additionally, EB encourages out-of-the-box thinking, unconventional problem-solving, and entrepreneurial innovation (Baker & Nelson, 2005; Salunke et al., 2013; Senyard et al., 2014). Specifically, EB favors innovation by facilitating observation of the context and experimentation with resources (Ferneley & Bell, 2006).

As regards EB dynamics in DS and ES, this behavior has traditionally been recognized as being relevant in the early stages of new ventures. According to Busch and Barkema (2021), EB's predisposition to action tends to be positive in the short term; however, in the medium to long term, it can generate inefficiencies, sometimes limiting the development of learning competencies and reflecting difficulties in meeting quality standards. There is also evidence that EB increases during the early stages of ventures (Hu et al., 2020; Zorina, 2021) when there is an accumulation of experience, articulation, and codification of knowledge (Chang & Fan, 2017). Thus, we posit the following hypotheses:

H3 (+): EB positively mediates the relationship between FB and IB in DS and ES.

H4 (+): The mediation effect of EB on the relationship between FB and IB is greater in the DS than in the ES.

2.5. The moderating role of improvisation

In new ventures FB, EB, and IB are often performed under time pressure and uncertainty (Zayadin et al., 2023), which can negatively impact the generation, speed, and adoption of innovation (Mariano & Al-Arrayed, 2018; Marvel & Patel, 2018). To address these issues, entrepreneurs rely on improvisation (Adomako et al., 2018; Hmieleski et al., 2013), to act in response to immediate stimuli, in which problem representation, response generation, and response execution occur simultaneously and fluidly (Fisher & Amabile, 2008). Improvisation helps entrepreneurs perform tasks quickly and persevere in the face of failure (Hmieleski & Corbett, 2006). Moreover, the relationship between improvisation and new venture performance is stronger in contexts with higher levels of resource scarcity (Fultz & Hmieleski, 2021). This behavior can therefore be seen as a moderating variable that affects the FB/EB/IB relationship.

Empirical studies have supported the moderating effect of improvisation (Adomako et al., 2018; Macpherson et al., 2015), finding positive effects on resource identification, integration, and utilization when employing an improvisational approach. This moderating effect has also been examined in regard to resource disposition and utilization, with positive effects observed in contexts characterized by higher levels of competitive intensity and greater availability of financial and human resources (Charoensukmongkol, 2022). This positive moderating effect directly relates FB strategies to firm performance (Al Issa, 2020).

The role of improvisation in the process of building a resource base varies through different entrepreneurial stages. During the DS, improvisation holds particular significance, as new ventures frequently encounter dynamic and uncertain environments, and improvisational abilities help in adapting to these challenges (Duxbury, 2014). Entrepreneurs constantly face unexpected situations (Balachandra, 2019), making improvisation an essential part of their mental toolbox. It is particularly valuable in these circumstances because it enables on-the-spot decision-making in identifying, integrating, and utilizing resources. As a firm progresses to ES, entrepreneurs increasingly rely on planning to make decisions, balance resource supply and demand, and attain operational goals, and product innovation (Delmar & Shane, 2003). Bingham (2009) showed that firms that prioritize improvisation in opportunity execution tend to rely on it less during opportunity selection. Hence, the greater emphasis on planning and reduced reliance on improvisation can be attributed to learning and a higher flow of information, needed to ensure more structured processes for effective management (Chelariu et al., 2002; Wu et al., 2023). We therefore posit the following hypotheses:

H5a (+): Improvisation positively moderates the indirect effect of FB on IB through EB during DS.
H5b (-): Improvisation negatively moderates the indirect effect of FB on IB through EB during ES.

The proposed conceptual model is presented in Fig. 1.

3. Method

This study has an explanatory-predictive focus, employing a comparative approach with a cross-sectional design among student entrepreneurs. Our analysis includes the use of confirmatory tetrad analysis (Gudergan et al., 2008), assessment of the measurement and structural models, robustness checks for nonlinear effects, endogeneity, and unobserved heterogeneity (Sarstedt et al., 2020), and advanced PLS-SEM procedures to conduct multigroup analysis, conditional mediation analysis (CoMe), and predictive validity assessment (Hair et al., 2024; Matthews et al., 2018).

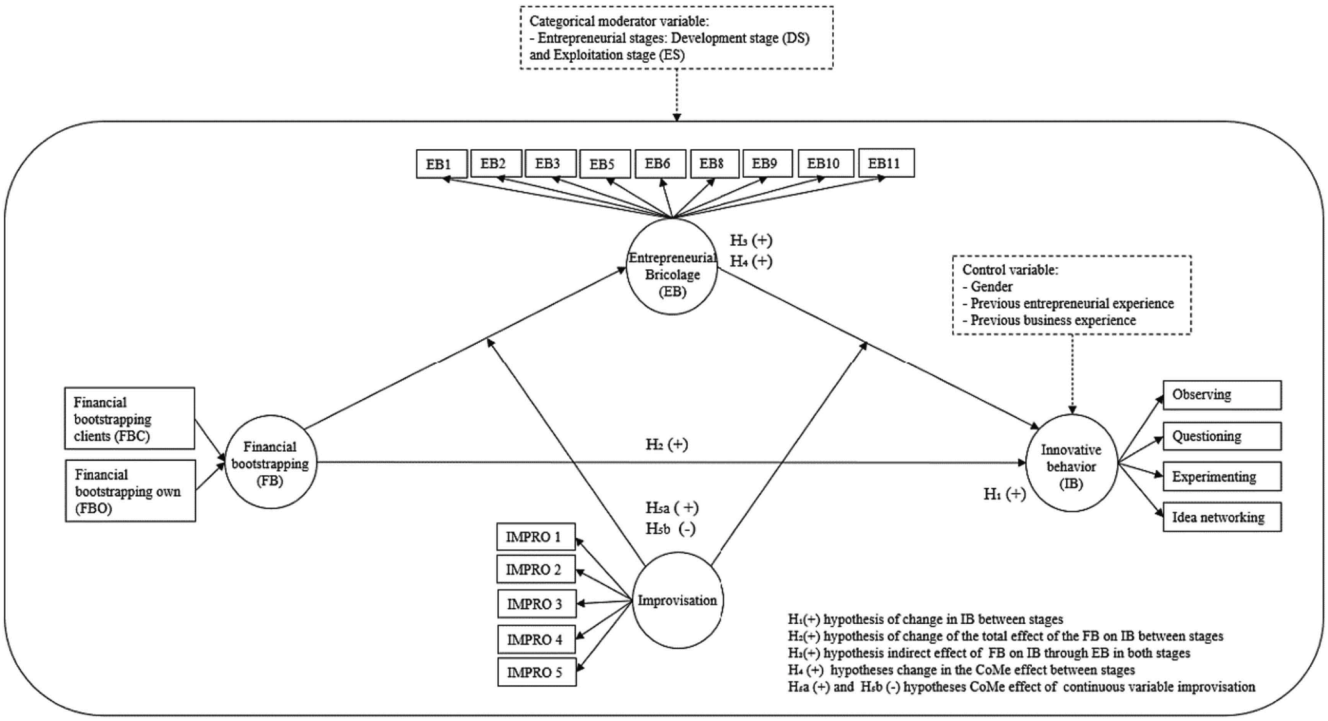

Fig. 1. Conceptual model.

3.1. Sample and data collection

We collected data from anonymous volunteer student entrepreneurs from one university and two higher education institutions in seven different cities/campuses in Spain: Mondragon Unibertsitatea (in Irun, Oñate, Bilbao, and its international team), TeamLabs (in Madrid and Barcelona), and Florida Universitaria (in Valencia). The students surveyed were part of the same undergraduate degree in Entrepreneurial Leadership and Innovation (LEINN), taught using the same pedagogical bases with certain adaptations. LEINN uses an experiential learning approach in which students form part of entrepreneurial teams and work on innovation, intrapreneurship, and entrepreneurship projects. Learning is achieved through practice, problem-solving, and direct interaction with the market. The first group of entrepreneurial students were in their third year, which focuses on an advanced study of these areas and on generating projects and ideas with a greater impact and level of innovation. These activities match those proposed by Stayton and Mangematin (2016) as DS. The second group of students were in their fourth year, where they focused on projects generating opportunities for growth and innovation. They defined a business model and consolidated a customer base to maintain and grow their sales. These activities correspond to ES (Stayton & Mangematin, 2016). We collected data from the two groups by means of a self-administered online questionnaire.

We determined the required sample size using two methods recommended by Hair et al. (2022). We first performed an a priori power analysis using G*Power 3.1.9.7 software (Faul et al., 2009). The results suggested a sample size of 291 or greater for 0.95 statistical power and a medium effect size of 0.06. Second, we performed the inverse square root method (Kock & Hadaya, 2018), with a minimum path coefficient of 0.173 resulting in a minimum of 206 observations for 0.8 statistical power to reach a significant effect at 0.05. We obtained 298 responses (91 %). We performed the same procedures to test the minimum required sample size for the multigroup analyses. For the power analysis using G*Power, the results suggested a sample size of 137 or greater for 0.8 statistical power and a medium effect size of 0.13. The inverse square root method suggests a sample size of 286 for Group 1 and 186 for Group 2. Nonetheless, Hair et al. (2022) note that while this method is easy to use for calculating the sample, caution should be exercised, since it tends to overestimate the minimum sample size to make an effect significant at a given power level. According to the guidelines presented by Hair et al., (2022,p. 27), for a minimum path coefficient between 0.11 and 0.2 to achieve a statistically significant effect at 5 % with a statistical power of 0.8, a minimum of 155 observations is required. Thus, our sample for Group 1 (DS) consisted of 151 responses (90 %) and 147 responses (93 %) for Group 2 (ES). Table 1 shows the characteristics of the sample in the two groups.

3.2. Measurements

The measurements of the variables were adapted from scales validated in previous studies (Table 2). For instance, the measurement of the dependent variable innovative behavior (IB) was adapted from Dyer et al. (2008), which comprises four dimensions: questioning, observing, experimenting, and creating networks of ideas. The literature specifies

Table 1
Sample characteristics.

		DS	ES
Sample	Irun (MU)	20	18
	Oñate (MU)	19	13
	Bilbao (MU)	36	38
	Inter. (MU)	6	8
	Madrid (TL)	35	39
	Barcelona (TL)	16	14
	Valencia (FU)	19	17
	Total	**151**	**147**
Gender	Male	70	66
	Female	79	80
	Other	2	1
Age	<20	4	0
	20–25	146	146
	>25	1	1

Notes: DS: development stage; ES: exploitation stage Inter.: International team; MU: Mondragon Unibertsitatea; TL: TeamLabs; FU: Florida Universitaria.

Table 2
Measurement model assessment.

Composites/Dimension/Indicator	VIF	Loadings	Weights	ρ_c	ρ_a	AVE
Innovative behavior (IB) (HOC Mode A)				0.852	0.782	0.592
Observing (Composite Mode A)	1.670	0.831***	0.388***	0.882	0.822	0.651
OBS1: New business ideas often come to me when directly observing how people interact with products and services	1.966	0.797	0.281			
OBS2: I have a continuous flow of new business ideas that comes through observing the world	2.319	0.853	0.325			
OBS3: I regularly observe customers' use of our company's products and services to get new ideas	1.409	0.727	0.320			
OBS4: By paying attention to everyday experiences, I often get new business ideas	2.013	0.846	0.315			
Questioning (Composite Mode A)	1.429	0.715***	0.274***	0.860	0.822	0.510
QUEST1: I am always asking questions	2.087	0.768	0.236			
QUEST2: I am constantly asking questions to get to the root of the problem	2.213	0.804	0.276			
QUEST3: Others are frustrated by the frequency of my questions	1.199	0.520	0.153			
QUEST4: I often ask questions that challenge the status quo	1.828	0.764	0.229			
QUEST5: I regularly ask questions that challenge others' fundamental assumptions	1.518	0.664	0.223			
QUEST6: I am constantly asking questions to understand why products and projects underperform	1.488	0.729	0.267			
Experimenting (Composite Mode A)	1.740	0.814***	0.323***	0.861	0.832	0.559
EXP1: I love to experiment to understand how things work and to create new ways of doing things	1.594	0.738	0.271			
EXP2: I frequently experiment to create new ways of doing things	1.854	0.795	0.275			
EXP3: I am adventurous, always looking for new experiences	1.777	0.744	0.272			
EXP4: I actively search for new ideas by experimenting	2.486	0.880	0.336			
EXP5: I have a history of taking things apart.	1.220	0.539	0.154			
Idea networking (Composite Mode A)	1.326	0.709***	0.309***	0.818	0.682	0.600
IN1: I have a network of individuals whom I trust to bring a new perspective and refine new ideas *(Removed)*	1.410	0.613	0.350			
IN2: I attend many diverse professional and/or academic conferences outside of my industry/profession	1.222	0.709	0.385			
IN3: I initiate meetings with people outside of my industry to spark ideas for a new product, service, or customer base	1.412	0.792	0.400			
IN4: I have a large network of contacts with whom I frequently interact to get ideas for new products, services, and customers	1.339	0.820	0.500			
Financial bootstrapping (FB) (HOC Mode B)						
Financial bootstrapping own (Composite Mode A)	1.047	0.663***	0.500**	0.831	0.748	0.622
FBO2: I use income from other employment *(Removed)*	1.477	0.483	0.329			
FBO4: I use of own credit card *(Removed)*	1.419	0.357	0.028			
FBO6: I withhold my own salary *(Removed)*	1.550	0.443	0.120			
FBO8: I obtain loans from relatives/friends	1.283	0.769	0.429			
FBO10: I delay payment to suppliers	1.543	0.873	0.528			
FBO11: I delay the payment of taxes	1.405	0.717	0.292			
Financial bootstrapping clients (Composite Mode A)	1.047	0.872***	0.776***	0.776	0.624	0.539
FBC1: I choose customers who pay quickly	1.141	0.668	0.389			
FBC3: I offer customers discounts if paying cash *(Removed)*	1.219	0.532	0.173			
FBC5: I obtain advance customer payments	1.184	0.678	0.366			
FBC7: I use routines for speeding up invoicing	1.236	0.843	0.584			
FBC9: I use interest on overdue payment *(Removed)*	1.241	0.478	0.269			
Entrepreneurial bricolage (EB) (Mode A)				0.892	0.869	0.510
EB1: I am confident of my ability to find workable solutions to new challenges by using my existing resources	1.957	0.727	0.176			
EB2: I gladly take on a broader range of challenges than others with my resources would be able to	2.080	0.759	0.212			
EB3: I use any existing resource that seems useful to respond to a new problem or opportunity	1.625	0.684	0.144			
EB4: I deal with new challenges by applying a combination of my existing resources and other resources inexpensively available to me *(Removed)*	2.214	0.591	0.116			
EB5: When dealing with new problems or opportunities I take action by assuming that I will find a workable solution	1.729	0.717	0.179			
EB6: When dealing with new problems or opportunities I immediately take action by assuming that I will find a workable solution	1.663	0.692	0.165			
EB7: By combining our existing resources, I take on a surprising variety of new challenges *(Removed)*	2.036	0.585	0.115			
EB8: When I face new challenges, I put together workable solutions from my existing resources	1.745	0.661	0.137			
EB9: I combine resources to accomplish new challenges that the resources were not originally intended to accomplish	2.017	0.729	0.189			
EB10: To deal with new challenges I acquire resources at low or no cost and combine them with what I already have	1.806	0.739	0.192			

Notes: VIF: variance inflation factor; ρ_c: Jöreskog's composite reliability; ρ_a: Dijkstra- Henseler's composite reliability; AVE: average variance extracted. HOC: Higher order construct. OBS: observation; QUEST: questioning; EXPE: experimentation; IN: idea networking; FBC: financial bootstrapping customers; FBO: financial bootstrapping own; EB: entrepreneurial bricolage.
***P <.001, **P <.01, *P <.05 based on percentile bootstrapping (n = 10,000; two-tailed test).
The data of the removed items correspond to the first analysis performed. The data of the items that were retained correspond to the analyses performed after the removal of the items.

this construct as both formative (Mode B) (e.g. Choi et al., 2016; Janssen, 2004) and reflective (Mode A) (e.g. Kleysen & Street, 2001) and thus the extent to which the dimensions of IB share common variance remains unclear. Recognizing the complexity of the latent variable, we performed a confirmatory tetrad analysis (CTA-PLS), which sought to ensure precise measurement models and distinguish between formative and reflective indicators (Gudergan et al., 2008). The results indicated that a substantial number of tetrads for IB were not significant. Thus, a second-order reflective measure appears more appropriate for IB. The scale of the independent variable, financial bootstrapping (FB), was adapted from Grichnik et al. (2014). The scale of the mediator variable, entrepreneurial bricolage (EB), was adapted from Davidsson et al. (2017). In this study, we employed two moderator variables. The first was the categorical moderator, entrepreneurial stages, which has two values: Development Stage (DS) and Exploitation Stage (ES) (Stayton & Mangematin, 2016). The second was the continuous moderator, improvisation, whose scale was adapted from Fultz and Hmieleski (2021). For EB and improvisation composites, the CTA-PLS indicated that using a reflective model (Mode A) is more appropriate, and for FB it has not been verified. Still, it is expected that the dimensions are not related, so it is modeled as formative (Mode B). For composites IB, FB, EB, and improvisation we used a 7-point Likert scale ranging from 1

(strongly disagree) to 7 (strongly agree).

Guided by theoretical and empirical considerations, we have carefully incorporated gender, previous business experience, and previous entrepreneurial experience as control variables. The RBV (Oliver, 1997) and ELT (Donnellon et al., 2014) posit that access to and employment of resources, and the development of capabilities are contingent on societal norms and expectations. Furthermore, previous research has substantiated gender-related distinctions in entrepreneurial innovation and disparities in resource access and management (Bullough et al., 2022; Vamvaka et al., 2020). Likewise, entrepreneurs' familiarity with business and entrepreneurial environments shapes their decision-making capabilities, providing a unique perspective on resource management and innovation activities (Deligianni et al., 2022; Emami & Dimov, 2017). We modeled gender as a dummy variable (1 = male, 0 = other) (Henseler, Hubona et al., 2016). Previous business experience and previous entrepreneurial experience were measured as categorical variables (1 = yes, 0 = no). We conducted a pilot test with 14 student entrepreneurs to adjust the final version. To guarantee the equivalence of the instrument, we used a back-translation procedure (Brislin, 1970) to translate the questionnaire from English to Spanish.

3.3. Data analysis method

To test our model and hypothesis, we use partial least squares (PLS), a structural equation modeling (SEM) technique that employs a principal component-based estimation approach (Chin, 1998). PLS-SEM is also more fitting for estimating variables that are not unidimensional as high-order composites, to obtain more reliable results (Guenther et al., 2023) and avoid significant residual values and biased results due to factor estimation (Sarstedt et al., 2023). Likewise, it is also more suitable for analyzing reflective constructs, which are better represented by a composite model providing more accurate results by fully accounting for the variance in the indicators (Guenther et al., 2023; Sarstedt et al., 2016). In addition, PLS-SEM is appropriate for conducting permutation multigroup analysis, CoMe, and predictive validity analyses (Guenther et al., 2023).

We began by assessing the measurement model, which is valid and reliable (Table 2). We then employed different robustness checks such as nonlinear effects, endogeneity, and unobserved heterogeneity to assess the consistency and reliability of the model results (Sarstedt et al., 2020). We proceeded to assess its invariance going on to evaluate the measurement and structural models of the resulting two groups (DS and ES). As recommended by Hair et al. (2024) we employed the disjoint two-stage approach proposed by Becker et al. (2023) to assess FB. We also performed permutation multigroup analysis, conditional mediation analysis (CoMe), and predictive validity assessment. To assess the significance of the estimated parameters —such as loadings, weights, path coefficients, and parameter differences— we used the percentile bootstrapping approach based on 10,000 subsamples to obtain p-values (p) and 95 % bias-corrected confidence intervals (CI) (Chin, 1998). We employed the software SmartPLS version 4.0.9.6 (Ringle et al., 2022).

3.4. Common method bias

The possibility of common method bias (CMB) should be considered in questionnaire-based studies when the same individual answers the dependent and independent variables (Podsakoff et al., 2012). We avoided psychological CMB by separating the predictor and criterion variables and by guaranteeing response anonymity (Podsakoff et al., 2012). Additionally, at the beginning of the questionnaire, we included detailed research purposes and instructions (Jordan & Troth, 2020). We performed a full multicollinearity test for the internal and external models of DS and ES. All the resulting VIFs were less than 3.3, therefore, our model was not contaminated by CMB (Kock, 2015) (Table 2). Additionally, we performed Harman's single-factor test (Jordan & Troth, 2020; Podsakoff et al., 2003), where all study items experienced principal component analysis (PCA) with an unrotated factor solution. The aim was to ascertain whether a single factor accounted for more than 50 % of shared item variance. In our case, only 20.94 % of the variance was explained by one factor, indicating that this problem did not arise (Tehseen et al., 2017).

4. Results

4.1. Assessment of the measurement model

The study evaluated the measurement model in terms of its internal consistency, indicator reliability, convergent validity, and discriminant validity (Hair et al., 2022) for composites modeled in Mode A. As Table 2 shows, nearly all the composite reliability values were above 0.7 (Hair et al., 2022), although FBC and idea networking show a reliability rho_a close to 0.7. With few exceptions, the values for outer loadings were above 0.7. We continued to assess convergent validity by examining the Average Variance Extracted (AVE). We had to make two adjustments in FB to achieve the threshold of 0.5 (Hair et al., 2022). First, we used the conceptual division of resourceful behaviors proposed by Michaelis et al. (2022). We grouped the items into two dimensions: self-reliant (within the firm or under the entrepreneurs' control) and joint (owned or shared by other actors). The resulting groups were (a) Financial Bootstrapping Own (FBO), i.e., techniques that depend on the entrepreneur's own capabilities, means, and resources; and (b) Financial Bootstrapping Customers (FBC), those that are related to customer-owned means and resources owned by customers. Second, we had to remove some items that had loadings below 0.7. In addition, discriminant validity was assessed for the first- and second-order model using the heterotrait-monotrait (HTMT) ratio of the correlations (Henseler et al., 2015). As shown in Table 3, all values were below 0.85. On the recommendations of Ringle et al. (2023) we checked the significance of all HTMT values by applying the bootstrapping procedure. The resulting CIs show that all upper (one-sided) limits are below 0.85 (Table 3), demonstrating the significance of the HTMT values and supporting discriminant validity in our model.

For the composite FB estimated in Mode B, we ran a redundancy analysis (Cheah et al., 2018). All measures showed convergent validity, scoring above 0.969 on their respective paths (above the minimum threshold of 0.7), and they were also statistically significant at the 0.001 level. Further, we evaluated collinearity using the variance inflation factor (VIF). The values obtained were less than 3, showing no multicollinearity issues. Additionally, we calculated the weights of FB and their significance; all values were significant. Finally, following Urbach and Ahlemann (2010) we assessed discriminant validity using the inter-construct correlations between FB and all other constructs. In our case, inter-construct correlation values were lower than 0.7, indicating sufficient discriminant validity. Therefore, FB was reliably formed by two dimensions.

4.2. Robustness checks

To ensure the validity and trustworthiness of PLS-SEM results with regard to the structural model, we followed the recommendation of Sarstedt et al. (2020) to assess nonlinear effects, endogeneity, and unobserved heterogeneity.

4.2.1. Nonlinear effects

To test for potential nonlinearities in the structural model relationships, we followed a two-stage approach (Hair et al., 2024) to assess potential nonlinear effects. First, we generated the latent variable scores of the latent predictor variables. Second, we included the quadratic effect term in the three paths of our model with latent variables, representing the potential nonlinear relationships between the predictor and outcome variables. Our results with regard to the effect of FB on EB ($\beta = 0.004$, $p = .462$, $f^2 = 0.000$), FB on IB ($\beta = 0.025$, $p = .218$, $f^2 = 0.002$),

Table 3
HTMT results for the first-order and second-order models.

	FBC	FBO	EB	Experimenting	Idea networking	Observing	Questioning
First-order							
FBC							
FBO	0.309 [0.142 0.475]						
EB	0.363 [0.207 0.519]	0.234 [0.121 0.363]					
Experimenting	0.301 [0.160 0.442]	0.252 [0.136 0.378]	0.535 [0.420 0.643]				
Idea networking	0.332 [0.171 0.489]	0.243 [0.115 0.385]	0.542 [0.400 0.667]	0.574 [0.422 0.709]			
Observing	0.398 [0.249 0.553]	0.223 [0.120 0.345]	0.641 [0.524 0.735]	0.706 [0.609 0.792]	0.608 [0.468 0.726]		
Questioning	0.288 [0.152 0.420]	0.191 [0.101 0.298]	0.450 [0.290 0.585]	0.645 [0.534 0.734]	0.464 [0.323 0.589]	0.531 [0.398 0.652]	
Second-order							
IB			0.708 [0.501 0.705]				

Notes: FBC: financial bootstrapping customers; FBO: financial bootstrapping own; EB: entrepreneurial bricolage. The brackets indicate the range between the lower and upper bounds of the 95% confidence intervals (two-tail test).

and EB on IB (β = 0.010, p =.392, f^2 = 0.000) suggest that given the non-significance of the quadratic effect in any of the relationships and the small effect sizes, we should consider a linear relationship in our model.

4.2.2. Endogeneity

To assess endogeneity in our model, we used the methods suggested by Hult et al. (2018). First, we explored application of the Gaussian copula method (Park & Gupta, 2012) following the guidelines proposed by Becker et al. (2022). After performing both the Cramer-Von Mises and the Anderson-Darling normality tests we found that the independent latent variables FB (CVM, p = 0.233 / AD = 0.47014, p = 0.2452) and EB (CVM, p = 0.059 / AD = 0.69731, p = 0.068) do not exhibit a non-normal distribution. Therefore, according to Becker et al. (2022), the Gaussian copula method is inadequate for assessing endogeneity in this model and should be replaced by alternative methods. We thus considered application of the instrumental variable (IV) approach. However, we lack an additional variable that is correlated with the endogenous variable and uncorrelated with the error term in the structural equation (Rutz & Watson, 2019) and cannot therefore apply this approach. Consequently, we are left only with an alternative suggested by Hult et al. (2018), namely the control variable approach (Bernerth & Aguinis, 2016). Our examination revealed that the three control variables did not show significance: gender (β = -0.020, p = 0.828), prior entrepreneurial experience (β = 0.105, p = 0.312), and prior entrepreneurial experience (β = 0.148, p = 0.208). Since endogeneity arises when crucial variables are unintentionally excluded from the model, based on these results, our model is not affected by endogeneity problems.

4.2.3. Unobserved heterogeneity

We assessed potential unobserved heterogeneity to confirm that no unobservable characteristics generate data partition into different groups, leading to separate model estimations (Sarstedt et al., 2017). To check unobserved heterogeneity, we used the FIMIX-PLS technique (Sarstedt et al., 2011). Initially, we repeated the FIMIX-PLS procedure with five consecutive partitions, considering our sample size (n = 298). On the recommendation of Sarstedt et al. (2011) and Hair et al. (2016), we compared values generated by criteria i) CAIC (consistent AIC) and AIC3 (modified AIC with Factor 3); ii) AIC3 with BIC (Bayesian information criterion); and iii) BIC with AIC4 (modified AIC with Factor 4). However, these results indicated different segment numbers (see Table 4). According to Hair et al. (2016), if the criteria are not met, the number of segments should be reduced, or extraneous segments discarded. We therefore selected two segments. The percentage of data for Segment 1 is 95.7 %, and for Segment 2 4.3 %, showing a clear distribution towards a single segment, as supported by CAIC and BIC results indicating one segment (see Table 4). Finally, we considered entropy evaluation by calculating the standardized entropy statistic (EN). As shown in Table 4, all EN values are above 0.5, indicating clear data classification. We can therefore assert that the data does not present unobserved heterogeneity issues.

4.3. Assessment of model invariance

This study employs a comparative approach with a cross-sectional design to evaluate the structural model and all the hypotheses. We performed a multi-group invariance analysis following the three-step process recommended by Roemer (2016). Initially, we divided the sample into two groups (Group 1 (DS) and Group 2 (ES)) and created two separate models. We compared the path estimates across groups to ensure measurement invariance of the composites. This comparison showed that the change effect was limited to the path coefficients of the structural model, not the parameters of the outer model. Consequently, we analyzed the measurement invariance of the composite model (MICOM), which consists of three stages (Henseler, Ringle, et al., 2016): i) Configurational invariance, ii) Compositional invariance, and iii) Assessment of equal means and variances. Table 5 shows full measurement invariance between DS and ES for all variables.

4.4. Assessment of the structural model

After verifying that our model met all the requirements of the measurement model, we evaluated the collinearity of the composites in the structural models in the two groups and obtained VIF-acceptable values below 3. We performed the structural assessment by testing the size and significance of the parameters and path coefficients. We evaluated H_1 considering the categorical variable. As shown in Table 6 the difference of the means of IB between ES and DS is non-significant ($\mu_{ES} - \mu_{DS} = 0.15$, p = 0.099), and we therefore reject H_1. We then proceeded to examine H_2. Considering the data set out in Table 7, the results show a non-significant difference in the total effect of FB on IB between DS and ES (β_{DS}-β_{ES} = 0.098, p =.181). Based on these results, H_2 is rejected. Additionally, we found that the three control variables were not significant: gender (β = -0.020, p = 0.828), previous business experience (β = 0.105, p = 0.312), and previous entrepreneurial experience (β = 0.148, p = 0.208).

Table 4
Unobserved heterogeneity results.

	Number of segment				
Criteria	**1**	**2**	**3**	**4**	**5**
AIC	1535.631	1519.236	**1509.786**	1513.846	1513.130
AIC3	1540.631	1530.236	**1526.786**	1536.846	1542.130
AIC4	1545.631	**1541.236**	1543.786	1559.846	1571.130
BIC	**1554.116**	1559.904	1572.636	1598.879	1620.346
CAIC	**1559.116**	1570.904	1589.636	1621.879	1649.346
EN	0	0.899	0.917	0.876	0.807

Notes: AIC: Akaike's information criterion; AIC3: modified AIC with factor 3; AIC4: modified AIC with factor 4; BIC: Bayesian information criteria; CAIC: consistent AIC; EN: entropy statistic.

Table 5
Invariance of composite models (MICOMs) procedure.

Step 1		Step2				Step 3a					Step 3b				
Compositional Invariance		Compositional Invariance				Equal Variance					Equal Means				
Composite	Configural invariance	Original Correlation	5 %	Per. p-value	PMIE	Variance-Original difference	5 %	95 %	Per. p-value	Equal	Mean-Original difference	5 %	95 %	Per. p-value	Equal
FB	Yes	0.959	0.803	0.393	Yes	0.000	−0.191	0.188	0.507	Yes	0.042	−0.282	0.287	0.402	Yes
EB	Yes	0.998	0.994	0.698	Yes	−0.178	−0.187	0.189	0.060	Yes	0.036	−0.313	0.310	0.426	Yes
IB	Yes	0.998	0.991	0.634	Yes	0.000	−0.189	0.189	0.050	Yes	0.005	−0.257	0.257	0.485	Yes

Notes: Per. p-value: permutation p-value; PMIE: Partial Measurement Invariance Evaluation. FB: financial bootstrapping; EB: entrepreneurial bricolage; IB: innovative behavior.

4.5. Conditional mediation analyses

To test hypotheses H_3, H_4, H_{5a}, and H_{5b}, we performed a conditional mediation analysis (CoMe) following the steps outlined by Nitzl et al. (2016). In line with Cheah et al. (2021), differences in the mediated effects between the data groups are interpreted as a CoMe effect. The results shown in Table 7 indicate that the specific indirect effect of FB on IB through EB was significant in both stages (*H_3*) (β_{DS} = 0.223, p = 0.000; β_{ES} = 0.103, p =.014). Since the direct effect of FB on IB was also significant in both stages, this relationship is partially mediated by EB in a complementary manner (Hair et al., 2020) in both stages. Based on these results, we assessed the strength of the mediated portion by calculating the ratio of the indirect effect to the total effect (VAF). The resulting VAF values were 58.53 % for DS and 36.39 % for ES, confirming that this relationship is partial mediation (Nitzl et al., 2016). Therefore, H_3 is accepted. To evaluate H_4 we followed the recommendations of Cheah et al. (2021) to use the permutation-based procedure (Chin & Dibbern, 2010), showing that the difference between the mediation path coefficients between the two stages is not significant (β_{DS} - β_{ES} = 0.120; CI [-0.118, 0.115]). Therefore, H_4 is rejected. Finally, to evaluate H_{5a} and H_{5b} (Fig. 2), we followed the approach of Becker et al. (2023) who suggest including the continuous moderator variable improvisation from this point. Hence, we followed the three steps suggested by Cheah et al. (2021), to calculate the CoMe index (Hayes, 2015). We tested the CoMe index significance using the percentile bootstrapping procedure (n = 10,000). The results indicate that the CoMe effect of improvisation is not significant for either of the stages (Table 8) (β_{DS} = 0.019, 95 % CI [-0.046, 0.017]; β_{ES} = 0.014, 95 % CI [-0.056, 0.060]). Thus, hypotheses H_{5a} and H_{5b} are rejected.

4.6. Predictive model assessment

Our research also assesses the predictive power of the global model to generate accurate predictions of new observations (Shmueli & Koppius, 2011). The predictive validity (out-of-sample prediction) was evaluated using cross-validation with hold-out samples following the approach of Shmueli et al. (2019). We used the PLS Predict with 10 folds. We focused our predictive analysis on the model's key target construct IB, and we analyzed the prediction statistics of the dimensions of IB. According to the data presented in Table 9, all $Q^2_{predict}$ values exceeded 0.0, signifying that the endogenous constructs in the conceptual model possess predictive relevance. We analyzed the asymmetry of the prediction errors suggesting that the PLS-SEM errors are not normally distributed (asymmetry < 1). The outcomes revealed that the Root Mean Square Error (RMSE) values from the linear model (LM) surpass the values from PLS-SEM for the key target construct, IB, and its four dimensions. The model therefore exhibits high predictive power.

Additionally, we employed the more restrictive cross-validated predictive ability test (CVPAT) to improve the out-of-sample prediction assessment in PLS-SEM (Liengaard et al., 2021) and test the predictive capability of the model (Sharma et al., 2023). This method enables us to statistically compare a model with a simple benchmark based on the mean value to evaluate the predictability of the model. Based on the results presented in Table 9, the global model has a significantly lower average loss than both the naïve IA benchmark (PLS-IA = -0.057; p =.001) and LM benchmark (PLS-LM = -0.006; p =.003). Hence, the model has a predictive validity for IB.

5. Discussion

Overall, this study examines the dynamics and interplay between student entrepreneurs' resourceful and innovative behaviors, focusing on the distinctive characteristics during the DS and ES. This study offers valuable insights into the complex dynamics and requirements of the DS and the ES within the entrepreneurial process, with profound implications for the survival and competitiveness of new ventures. The evidence

Table 6
Change of IB between DS and ES.

	DS		ES						Support
	Mean	SD	Mean	SD	Difference of means (H_1)	t	df	p-value	
IB	59.35	15.46	59.20	15.16	0.15 ^{ns}	0.087	296	0.990	No

Note: DS: Development stage; ES: Exploitation stage; IB: Innovative behavior. SD: Standard deviation; t: Independent sample t student-test; df: degrees of freedom; ^{ns}: non-significant.

Table 7
Structural model results and conditional mediation analysis (CoMe) of the categorical variable entrepreneurial stages.

		DS				ES				Multigroup analysis based on permutation		Support
		β	CI	R^2	f^2	β	CI	R^2	f^2	β(DS)-β(ES)	CI	
Direct effect	FB -> IB	0.158*	[0.045 0.276]	0.157	0.037	0.180*	[0.050 0.306]	0.179	0.043			
	FB -> EB	0.384***	[0.247 0.522]		0.172	0.202**	[0.078 0.346]		0.046			
	EB -> IB	0.581***	[0.483 0.680]	0.580	0.507	0.508***	[0.384 0.638]	0.508	0.369			
Total effect (H_2)	FB -> IB	0.381***	[0.254 0.512]			0.283***	[0.168 0.408]			0.098 ^{ns}	[−0.184 -0.178]	No
Indirect effect (H_3/ H_4)	FB -> EB -> IB	0.223***	[0.146 0.311]			0.103*	[0.036 0.193]			0.120 ^{ns}	[−0.118 0.115]	Yes/No

Note: β = beta coefficient; CI: 95 % bias-corrected confidence interval based on percentile bootstrapping (n = 10,000; one-tailed test); R^2 = explained variance; f^2 = effect size. FB: financial bootstrapping; IB: innovative behavior. EB: entrepreneurial bricolage.
***P <0.001, **P <0.01, *P <0.05, ns = non-significant based on percentile bootstrapping (n = 10,000; one-tailed test).

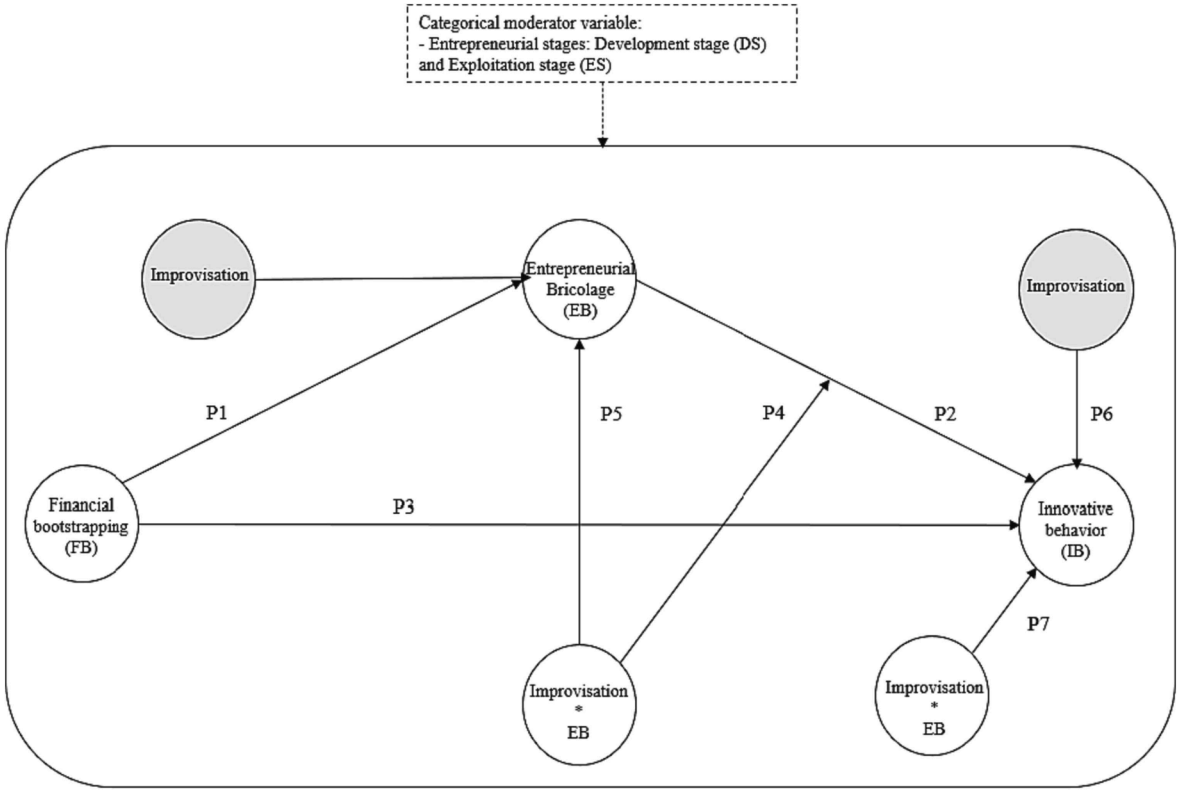

Fig. 2. CoMe analysis.

shows the constancy of IB among student entrepreneurs between the two stages, despite the distinctive demands posed by each phase. Surprisingly, this finding diverges from prior research, which postulated significant changes in entrepreneurial behaviors over short timeframes and across different venture stages (Martín et al., 2015; McCarthy et al., 1991), as well as the evolution of entrepreneurial capabilities through progressive learning from one stage to another (Jang, 2013; Rae & Carswell, 2001). However, it is important to acknowledge that our study primarily involves students, who may not yet possess real-world entrepreneurship experience. As a result, it is plausible to consider that

Table 8
Conditional mediation analysis (CoMe) of the continuous variable improvisation

	DS				ES			
	Index of CoMe	Significance		Support	Index of CoMe	Significance		Support
	(P2*P5M) + (P1*P7M)	Percentile lower	Percentile upper		(P1*P5M) + (P1*P7M)	Percentile lower	Percentile upper	
Improvisation x FB -> EB -> IB (H_{5a} and H_{5b})	0.019	−0.046	0.017	No	0.014	−0.056	0.060	No

Note: DS: development stage; ES: exploitation stage. Significance based on percentile lower: 0.05 and percentile upper: 0.95.

Table 9
Predict model assessment for IB.

	Q^2predict	PLS RMSE	LM RMSE	PLS-RMSE-LM RMSE
IB	0.095			
Experimenting	0.054	0.976	0.977	-0.001
Idea networking	0.054	0.976	0.981	-0.005
Observing	0.076	0.965	0.967	-0.002
Questioning	0.044	0.981	0.986	-0.005
	Average loss difference	**t-value**	**p-value**	
CVPAT (PLS-IA)	−0.057	2.544	0.001	
CVPAT (PLS-LM)	−0.006	3.284	0.003	

Note: IB: innovative behavior.

entrepreneurial behaviors among students may not be subject to similar changes as those observed among real entrepreneurs. It is particularly worth noting that both stages place paramount importance on observation and idea-networking as critical drivers of IB. It is therefore plausible to consider that a notable shift in IB among student entrepreneurs requires a profound accumulation of experiences, particularly accentuating the benefits of observation and idea networking (Deakins & Freel, 1998). This rationale is in line with research highlighting the prolonged learning trajectory of student entrepreneurs, which may persist even after their formal academic endeavors have concluded (Kwong & Thompson, 2016).

Regarding the antecedents of IB among student entrepreneurs, this study supports prior literature (Löfqvist, 2017; Smith, 2009) on the direct and positive influence of FB, with EB as a partial and complementary mediator. Empirically, it verifies the theoretical relationship between FB and EB proposed by Singh et al. (2022). This finding underscores the importance of EB as a mechanism that integrates identified resources, fostering innovative outputs. It also supports the idea that resourceful behaviors play a central role in the individual perspective of RBV (Zahra, 2021). Beyond building entrepreneurs' resource bases, these behaviors, when applied creatively and strategically, facilitate IB development, regardless of the entrepreneurial stage. The non-significant findings regarding the control variables gender, previous entrepreneurial experience, and previous business experience challenge traditional notions of RBV and ELT by suggesting that access to and management of resources, and the development of capabilities, may be less influenced by societal norms and expectations. Moreover, these findings indicate that resourceful behaviors have a more substantial impact on innovation than individual factors such as gender or past experiences. This discovery reveals a more inclusive landscape in which individuals, regardless of gender identities and diverse experiences, can exhibit similar levels of innovation.

Notably, FB and EB are linked to IB through the dimensions of observation and idea-networking, confirming previous findings (De Clercq et al., 2012; Kaandorp et al., 2020; Stewart et al., 2008). While this mediating relationship was expected to be stronger in DS than in ES due to greater external resource constraints and the liability of newness faced by student entrepreneurs, it remains consistent across the two stages. This finding has significant implications. Firstly, it suggests that regardless of whether student entrepreneurs are in the DS or ES of their venture's lifecycle, resource integration through EB continues to play a significant role in influencing their IB. Secondly, it underscores the importance of fostering the resource integrative function of EB at different entrepreneurial process moments, regardless of access to external resources. This suggests that even when external resources are limited or scarce, the ability to creatively combine and leverage available resources internally is a critical factor in driving innovation.

Third, the analysis revealed a non-significant CoMe effect of improvisation on the relationship between FB, EB, and IB at both DS and ES. This indicates that improvisation is not a decisive factor in facilitating changes in IB. Instead, the evidence underscores that the indirect effect independently drives IB. This outcome is in line with the notion that improvisation does not consistently exhibit a synergistic association with EB (Baker & Nelson, 2005). Furthermore, it supports the recommendation to exercise caution in utilizing improvisation as a moderator in entrepreneurial contexts (Wu et al., 2023). This finding may be attributed to the learning experiences acquired by student entrepreneurs leading to a heightened reliance on planned strategies rather than improvisational approaches (Chelariu et al., 2002). Consequently, the study provides insights into the nuanced role of improvisation in influencing the dynamics of FB, EB, and ultimately IB in the entrepreneurial setting.

Finally, we found evidence that our model has predictive power (out-of-sample prediction) to predict values for IB using data that are not included in our data set. This model will provide a tool for predicting the direct effect of FB on IB and the mediating role of EB amongst different types of entrepreneurs and individuals. This finding contributes to the conceptual development and measurement of IB regarding mobilization and utilization of limited resources.

6. Theoretical implications

Integration of the RBV (Barney, 1991; Peteraf, 1993) and ELT (Holcomb et al., 2009; Politis, 2005) establishes a robust foundation that contributes to our understanding of resource management capabilities and IB among student entrepreneurs throughout the entrepreneurial process in several key dimensions. Firstly, our integrated framework offers a novel lens through which to examine the intricate relationship between resource identification, integration, and utilization, and the subsequent generation of innovative behavior at distinct entrepreneurial

stages. This holistic approach not only enhances our understanding of the way in which a resource base is built but also provides a nuanced perspective on the dynamic nature of resource management.

At an individual level, our study addresses a gap in the literature by exploring the foundations of RBV from the entrepreneur's perspective (Khan, 2013). In doing so, it sheds light on the dynamics of resourceful behaviors and their pivotal role in influencing innovation during the early stages of new ventures. Our contribution goes beyond conventional organizational-level analyses, providing insights into the experiential and individual aspects of resourcefulness in entrepreneurship. Additionally, ELT clarifies how student entrepreneurs derive and employ knowledge from their identification, integration, and utilization of resources. In this regard, RBV provides the lens through which we view resources as a critical factor in entrepreneurship, offering an insight into *what* defines a valuable resource. ELT complements this perspective by explaining *how* learning from experiences influences the required capabilities for effective and creative resource management.

Our study introduces mechanisms of innovative resource management —resource identification, integration, and utilization— which offer a nuanced understanding of the way in which entrepreneurs creatively navigate resource challenges. In contrast to existing RBV-based frameworks (e.g., Brush et al., 2001; Clough et al., 2019), which typically describe a linear progression through different stages, our suggested mechanisms emphasize the dynamic and non-linear aspects of resource management. Moreover, in response to recent calls in the literature (Eckhardt & Ciuchta, 2008; Hansen et al., 2016; Zahra, 2021), our research considers resource management across different entrepreneurial stages and integrates behavioral and cognitive perspectives. This holistic approach underscores the interconnectedness of learning, behavioral development, and resource management, offering a comprehensive view of the entrepreneurial process.

7. Practical implications

One of the principal implications of our study is that resource constraints in entrepreneurship should not be viewed as obstacles but as opportunities for innovation, provided that certain resourceful behaviors are employed to extract the greatest value from the available resources. For example, by employing FB techniques to leverage internal financial resources and integrating them with other resources through EB, student entrepreneurs can be more innovative. Universities should therefore adopt a proactive approach to inculcate resourceful behaviors adapted to entrepreneurship, to identify key resources, integrate them, and use them creatively and strategically. This approach will better position student entrepreneurs and even nascent entrepreneurs to overcome the "Valley of Death Curve". While these findings are most directly applicable to student entrepreneurs, one might consider whether they could be transferred to other educational contexts or early-stage entrepreneurial endeavors. The specific dynamics of student entrepreneurship are unique, but the principles of resourceful behavior and IB may be found to be relevant in similar settings. This suggests that there is potential for adaptability beyond the confines of our study.

While FB and EB play an important role in the development of IB in entrepreneurial students, it is imperative that universities and educators integrate additional variables into their curricula for entrepreneurial development. This integration must consider the unique identity of these entrepreneurs as well as the distinctive challenges and opportunities of the development and exploitation stages of new ventures. Moreover, although improvisation did not exhibit a synergistic effect on the relationship between FB, EB, and IB in this specific context, it remains a valuable tool for entrepreneurial students facing time constraints. Thus, it should be regarded as a distinct skill set that is worth cultivating, especially within the academic environment, where time constraints can be a common challenge.

8. Limitations and future research

This study has numerous limitations, which in turn present new opportunities for future research. First, the participants all came from three Spanish universities where they were studying the same undergraduate program (LEINN). It is therefore unclear to what extent the results may be generalizable to a broader population of student entrepreneurs, even to other types of entrepreneurs, given the identity of the population studied. Although we attempted to address this issue by recruiting a considerable number of students from seven different cities/campuses, future cross-cultural studies involving student entrepreneurs need to be conducted to enhance the external validity of our findings. It is essential to investigate the extent to which these results can be generalized to diverse countries and to consider the potential influence of cultural variations. Second, this research was based on a multigroup comparison between student entrepreneurs in DS and ES. For future studies, it may be important to explore the behavioral and cognitive differences and requirements needed for other entrepreneurial stages. Third, in future studies, we recommend that the scope of the control variables be extended to encompass broader societal and contextual factors alongside individual attributes that might potentially influence an entrepreneur's strategies in identifying, integrating, and utilizing resources. These factors might include variables such as financial capital, network size, family background, and personality traits such as tolerance for ambiguity. Fourth, future studies should consider other behaviors as determinants of IB amongst student entrepreneurs, such as improvisation. Finally, in future studies using the proposed model, in order to evaluate endogeneity, it is recommended that additional variables be incorporated that meet the criteria for being considered instrumental variables (IVs). Additionally, researchers are encouraged to explore the application of the Gaussian Copula method, given that the control variable approach has certain limitations.

9. Conclusions

This study integrates the individual perspectives of RBV and ELT, using advanced PLS-SEM procedures to investigate the relationship between resourceful behaviors and IB in entrepreneurial students. This research shows that the identification of resources through FB, their integration through EB, and the utilization of resources by applying IB, are equally necessary in the DS and ES of the entrepreneurial process. Similarly, of particular interest is the finding that improvisation is not a factor that interacts by modifying the relationship between FB, EB, and IB; its effect should therefore be considered from other perspectives and contexts. Finally, this study contributes to the understanding of the different stages of entrepreneurship and the need for entrepreneurs to develop their IB throughout the entrepreneurial process. It also offers practical guidelines for cultivating this behavior through the creative and strategic management of resources.

CRediT authorship contribution statement

Mario A. Manzi-Puertas: Conceptualization, Investigation, Data curation, Formal analysis, Methodology, Project administration, Writing – original draft. **Izaskun Agirre-Aramburu:** Conceptualization, Formal analysis, Validation, Writing – review & editing. **Sain López-Pérez:** Conceptualization, Validation, Writing – review & editing.

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.

Acknowledgments

We would like to give special thanks to all the LEINN team coaches from Mondragon Unibertsitatea, TeamLabs, and Florida Universitaria who helped us during this research.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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Mario A. Manzi-Puertas is a Ph.D. student in Advanced Management in Organizations and Social Economy at the Faculty of Business Studies, Mondragon Unibertsitatea in Spain.

Izaskun Agirre-Aramburu Ph.D. is a professor of marketing and researcher at the Faculty of Business Studies of Mondragon Unibertsitatea in Spain.

Sain López-Pérez Ph.D. is a professor and team coach of the Mondragon Team Academy at the Faculty of Business Studies of Mondragon Unibertsitatea in Spain.