ISSN: 2359-1048
Novembro 2023

UNRAVELING THE CONFIGURATIONS OF ENTREPRENEURIAL ECOSYSTEM ELEMENTS THAT GENERATE BLENDED VALUE CREATION IN KNOWLEDGE-INTENSIVE ENTREPRENEURSHIP

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Introdução
Over the years, entrepreneurship has been considered a catalyst for economic growth worldwide. Regarding sustainability, entrepreneurship has played an important role related to the introduction of more sustainable business practices by offering innovative solutions in response to environmental and societal challenges. In this particular situation, a reciprocal relationship has been observed, wherein entrepreneurs have the ability to influence the regional environment while the regional environment, in turn, can shape the behavior of its entrepreneurs.
Problema de Pesquisa e Objetivo
Previous studies have signaled gaps and the need for research concerning the interplay between knowledge-intensive businesses, entrepreneurial ecosystems (EE), and the creation of additional values – beyond sole focus on economic value – by ventures. This research aims to answer the question: how can the EE's elements be configured to generate high levels of blended value creation in knowledge-intensive firms? More specifically, we aim to unravel how the EE's elements can be configured to generate a higher density of knowledge-intensive entrepreneurs dedicated to blended value creation.
Fundamentação Teórica
This study is anchored in three main concepts: Knowledge-Intensive Entrepreneurship (KIE), Entrepreneurial Ecosystem (EE) and Blended Value Creation (BVC). In a short definition, KIE refers to an entrepreneurial modality in which ventures can aggregate additional value, in their products and services, through the intensive use of knowledge [1]. EE, in turn, is a complex combination of elements that influences entrepreneurial activity in places and regions [2]. Finally, BVC relates to the combination of economic, social and environmental missions of a venture [3].
Metodologia
Our empirical setting comprehends 317 firms with projects approved between 2020 and 2023 for the PIPE Program in Brazil. Ecosystem indicators were obtained from the Entrepreneurial Cities Index and comprehended seven indicators. The Blended Value Creation (BVC) indicators were generated from the available description of the projects. Four researchers evaluated the projects and gave a score for the economic, social, and environmental dimensions. The analysis used the fuzzy-set Qualitative Comparative Analysis, considering the BVC as the outcome and the ecosystem indicators as causal conditions.
Análise dos Resultados
The configurational approach presented six paths with adequate consistency and coverage. Results showed no indicator as a necessary condition but highlighted the market in four paths (paths 2, 4, 5 and 6), being a core condition in three of them, and innovation as a core causal condition in three paths (paths 2, 5 and 6). Financial resources appear in four paths (paths 3, 4, 5 and 6), but as a contribution condition. Surprisingly, the absence of the regulatory environment and human capital also appeared as a core condition in four paths (paths 1, 2, 3 and 4).
Conclusão
Drawing on city-level data from the State of São Paulo, Brazil, we were able to offer an understanding of configurations that lead to higher levels of BVC within the relatively unexplored context of an emerging country. Analyses indicate that the social-environmental value creation, as economic value, is only loosely attached to several of the main pillars of EE. This evidence suggests that thriving ecosystems in Brazil may be more oriented towards fomenting new businesses that generate market impacts without much concern for social and environmental value.
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Palavras Chave
Entrepreneurial Ecosystem, Knowledge-Intensive Entrepreneurship, Blended Value Creation

Agradecimento a orgão de fomento
We thank the fund provided by São Paulo Research Foundation – FAPESP [award number: 2021/08267-2]; National Council for Scientific and Technological Development – CNPq [award number: 303924/2021-7]; Coordination for the Improvement of Higher Education Personnel [award number: 001]; Basic Research Program of the National Research University Higher School of Economics (HSE) and by the Russian Academic Excellence Project ‘5-100’. [1/2023].

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1. INTRODUCTION

The role of entrepreneurship as a key mechanism to stimulate economic growth in a nation has hardly been a matter of dispute (Lassen et al., 2018). Entrepreneurship allows the creation of jobs, impacts the growth of income, and, as a consequence, contributes to education, health (Royo-Vela & Cuevas Lizama, 2022), and innovation (Penco et al., 2021). Entrepreneurs represent a local and fundamental manifestation of the underlying processes of Evolutionary Economic Geography (Malecki, 2018). This means that the socioeconomic environment influences entrepreneurial activities. Hence, the notion of an Entrepreneurial Ecosystem (EE) has emerged.

EE, according to a broad interpretation, pertains to an intricate amalgamation of various components, such as culture, market, and capital, among other factors (Isenberg, 2010). This notion finds extensive application in elucidating the manner through which a network of economic and sociocultural factors impacts entrepreneurial endeavors (Trabskaia et al., 2023). In accordance with Alves et al. (2021), the localized impact of an EE exerts a compelling force in attracting and generating economic activity of a similar nature. Put differently, the spatial distribution of EEs engenders path-dependent trajectories, wherein proximity facilitates the exchange of knowledge, ideas, and capabilities. Consequently, knowledge-intensive entrepreneurial (KIE) firms emerge within this context.

KIE is an entrepreneurial modality in which knowledge is used, transformed, and generated to create innovation within a venture (Malerba & McKelvey, 2020). KIE is responsible for knowledge-based economic development in countries and regions (Fischer et al., 2022). As a result, knowledge-intensive entrepreneurs are being considered central actors in solving the grand challenges the world faces (Audretsch et al., 2023), as they act in a disruptive context related to carbon capture, renewable energy, agriculture, among a host of others (Juma et al., 2023).

Recently, there has been a growing emphasis on businesses seeking sustainable economic growth, leading to increased interest from academics, managers, and policymakers in the role of innovation in facilitating this transition toward sustainability (Adams et al., 2016). In line with this, the concept of EE, where partners collaborate to bring a value proposition to the market, is gaining prominence (Royo-Vela & Cuevas Lizama, 2022). Given its inherent holistic and multidisciplinary nature, EE stands as a productive structure that can benefit from incorporating economic, environmental, social, and governance dimensions (Theodoraki et al., 2022).

In this scenario, ventures focusing on Blended Value Creation (BVC) have gained prominence. These businesses have hybrid objectives (Ranabahu et al., 2022). They aim to combine both social and environmental, and commercial missions to enhance competitive behavior and efficiency (Kummitha, 2022). The BVC concept is aligned with Sustainable Development Goals (SDGs), defined by a framework of 17 goals and 169 sub-targets that the United Nations established as the cornerstone of the 2030 Agenda (Bianchi, 2021). Scholars point out that BVC requires research, especially regarding definition and theory (Zioło et al., 2023). At the same time, sustainability issues in EE remain understudied (Bischoff, 2021). Similarly, KIE literature has grown without explicit focus on sustainability (Alves et al., 2021; Bertello et al., 2022; Jütting, 2020). Relating to BVC, it is a complex phenomenon in which ventures need to experience both internal and external challenges in order to lead to hybrid missions (Kummitha, 2022).

Gaining a strategic understanding of the distinct interplay, characteristics, and trajectories of key drivers within EEs has become a crucial aspect of the ongoing discourse. As noted by Alves et al. (2021), cities are being urged to play a more active role in promoting knowledge-intensive businesses. Consequently, comprehending the driving dimensions of successful sustainable-oriented EEs has become increasingly important (Gomes et al., 2023; Juma et al., 2023; Stam & van de Ven, 2021), particularly within the context of developing nations (Fischer et al., 2022).

In this article, we build on the proposition that different ecosystem configurations lead to a higher density of knowledge-intensive entrepreneurs dedicated to BVC. Accordingly, our goal is to unravel how the EEs' elements can be configured to generate higher levels of BVC in KIE firms. The methodological approach is developed around classic approaches of EEs, such as Isenberg's (2010). The empirical analysis used longitudinal data from São Paulo State, Brazil. The study draws on fuzzy-set Qualitative Comparative Analysis (fsQCA) to assess the conditions leading to high levels of BVC. Our study involves a developing country where sustainable-oriented businesses are exponentially increasing. Also, most of these types of businesses in Brazil are associated with some innovation, which means that entrepreneurs take full advantage of knowledge to make their market opportunities (Barki & Comini, 2019).

The findings of this study present alternative approaches for establishing BVC. Through our analysis, we provide valuable insights into the spatial distribution of knowledge-intensive activities and entrepreneurship within an advanced region of an emerging economy. Consequently, this research addresses an existing research gap by contributing to the limited body of evidence regarding EE in developing contexts. Hence, our contribution brings forward a potential mismatch between the dominant logic of EEs and the challenges associated with SDGs. Additionally, we can contribute to policymaking processes that seek to further connect the promotion of KIE with environmentally sustainable transitions in EEs.

2. THEORETICAL FRAMEWORK

2.1 Knowledge-intensive entrepreneurship as a path to sustainability

KIE emerges as a significant socioeconomic phenomenon that exerts a transformative impact on innovation and economic growth. This is accomplished by establishing new ventures that introduce novel ideas and technologies while concurrently aggregating value through the intensive utilization of knowledge resources. (Sousa & Silva, 2019). From an economic standpoint, these ventures drive aggregate economic competitiveness and innovative capabilities (Fischer et al., 2022).

KIE articulates the relationships between the individual entrepreneur, the company, the knowledge, and the social and economic context (Alves et al., 2021; Malerba & McKelvey, 2020). Therefore, knowledge goes beyond the issue of information, novelty, and change. KIE does not only imply a focus on research and development and the emergence of high-tech industries. KIE encompasses the activities of selecting, interpreting, absorbing, and processing information. Consequently, it is closely linked to the expertise and knowledge possessed by founders and the capabilities of entrepreneurial organizations. The success of KIE ventures hinges upon the effective utilization and integration of these factors (Malerba & McKelvey, 2020).

Knowledge-intensive firms are generally formed after intensive investment in scientific and technological research (Sousa & Silva, 2019). It means that these types of firms are new learning organizations. They try to use, generate, and transform existing knowledge in order to innovate within innovation systems (Malerba & McKelvey, 2020). Thus, knowledge-intensive ventures can emerge from various organizations, as Malerba and McKelvey (2020) argue. The

authors mention, for example, universities, industries, non-governmental organizations, and the public sector, among others.

Recently, several studies have sought to understand the KIE phenomenon in order to better understand this entrepreneurial modality. For Fischer et al. (2022), for example, KIE is a concept that relates to small companies that are innovation-oriented and demonstrate positive impacts in the contexts in which they operate, given that they demonstrate interdependence with other elements of the socioeconomic scenario. Other scholars affirm that KIE include firms that use different types and levels of advanced knowledge and innovation to compete (Lassen et al., 2018). These firms operate in complex environments and sectors, like biotechnology and nanotechnology, including new sociocultural relations and digital interactions (Sousa & Silva, 2019).

Being a knowledge-intensive entrepreneur implies highly diverse advantages, as mentioned by Bertello et al. (2022). For these authors, knowledge-intensive ventures explore competitive advantages in the market they operate in due to knowledge exploration; legitimacy; finance sustainability derived from innovation solutions; agility based on the interaction between innovation systems; network capabilities; and long-term orientation referred to the co-evolution in the business mission.

From these interactions, it can be assumed that KIE is highly connected to the systems in which it is embedded (Alves et al., 2021). Further, knowledge-intensive companies demonstrate intense interdependence with other elements of the socioeconomic scene (Fischer et al., 2022). As a result, there is a special focus on the importance of the geographical location of these ventures. Hence, studies have pointed out the eminent role played by KIE regarding developed and mainly emerging economies (Sousa & Silva, 2019).

Especially from the Brundtland conference in 1987, eco-innovations and sustainability-oriented innovations became a trending topic (Fischer et al., 2022). Since then, knowledge-intensive activities have been seen as relevant to address not only economic growth but also social and environmental issues. This is because KIE firms allow knowledge exchange between different organizational institutions (Bertello et al., 2022). Additionally, knowledge-intensive entrepreneurs have the ability to define new technological trajectories with social and environment-friendly business activities (Fischer et al., 2022; Juma et al., 2023). Next section, value creation based on social, environmental, and economic approaches will be discussed.

2.2 Blended value creation as a collective outcome

The term value has been discussed and debated for centuries, and there is still little consensus on its meaning and how to measure it (De Martino, 2021). In the business field, from 1980 onwards, the concept of value began to be associated with a competitive advantage in the market and the profitability of a company (Zioło et al., 2023). Since then, debates about shared value have been rising (De Martino, 2021). At the same time, the community, in general, has become increasingly concerned about the social, ethical, and environmental performance of companies (Royo-Vela & Cuevas Lizama, 2022), forcing them to a transition toward a more sustainable society and economy (Adams et al., 2016).

Nowadays, there is already a consensus that value creation is an essential factor for sustainability and extremely relevant to address the 2030 UN Agenda (Boruchowitch & Fritz, 2022; De Martino, 2021; Laukkanen & Tura, 2020). During the 1990s, there was a notable strengthening of the collaborative and relational perspective within the analysis of value creation. This shift in perspective gave rise to new conceptualizations, including value constellation, value network, shared value, blended value, mutual benefit, and sustainable value. These conceptual frameworks offered alternative approaches to understanding and

evaluating the multifaceted nature of value creation (De Martino, 2021), social value, environmental value, co-creation, among others (Audretsch et al., 2023; Zioło et al., 2023).

According to Elkington (1997), business models should generate social, environmental, and economic value, contribute to sustainable development, and provide sustainable value creation to the whole range of stakeholders. In Porter and Kramer (2011) perspective, shared value creation occurs from a formation of a cluster composed of customers, suppliers, and competitors, generating greater benefits for the company and society. In this context, ventures can create social and economic value through collaborative networks (Kramer & Pfitzer, 2016; Royo-Vela & Cuevas Lizama, 2022).

The blended value, in most cases, refers to the triple bottom line, coined by Elkington (1997), who described how organizations create value at multiple levels. The concept originated from social entrepreneurship. Social enterprises began to access stakeholder networks to derive strategic benefits, and instead of using social value as an umbrella term, the literature introduced the notion of blended value, which denotes that all returns generated by investments create, simultaneously, economic, social and environmental value that are intrinsically connected and complementary to each other (Ostertag et al., 2021; Ranabahu et al., 2022).

Laukkanen and Tura (2020) tried to conceptually define economic, environmental, and social value. Economic value refers to the value, or profits, of assets, like goods and services. Meanwhile, environmental value means the impacts of the business on the natural environment and natural capital. Finally, social value includes the well-being of the general society (Laukkanen & Tura, 2020). Due to the intangibility related to value creation in the social-environmental spheres, scholars argue that economic value is more tangible and easier to measure than environmental and social value (Boruchowitch & Fritz, 2022).

Hence, the blended value concept argues that companies should manage and optimize their relationships with their stakeholders in order to expand the creation of additional value (Ostertag et al., 2021). Therefore, this concept denotes the strengthening of partnerships and expansion of networks in favor of cooperation (Ostertag et al., 2021; Ranabahu et al., 2022). In Kummitha's (2022) words, ventures focus on BVC at the core of their organization in order to address social problems while creating value for marginalized populations. Similarly, Ranabahu et al. (2022) address that such business helps alleviate poverty, provide water or sanitation facilities, and address issues associated with gender empowerment or climate change.

Blended value also contributes to business efficiency through renewable energy and waste management (Boruchowitch & Fritz, 2022). It is important to note that, whatever theory exists between the intersection of the three pillars (social, economic, and environmental), researchers also seek to increase their level of transparency and responsiveness and good reputation (Boruchowitch & Fritz, 2022).

Nonetheless, the process of blended or shared value creation extends beyond the individual level. Research has demonstrated that the formation of clusters significantly contributes to regional and industrial economic growth. As highlighted by Royo-Vela & Lizama (2022), the agglomeration of firms within a cluster enables companies to generate shared value by enhancing the external environment of the firm, facilitating access to crucial knowledge, resources, innovation, and productivity. Against this backdrop, the subsequent section will delve into the concept of EE.

2.3 Entrepreneurial ecosystem supporting KIE generation of BVC

The fundamental ideas behind EEs emerged in the 1980s and 1990s. In accordance with Stam (2015), this approach contains a shift in traditional economic thinking about businesses, especially on markets and market failure, to a new economic view on networks, people, and institutions. Complementary, Wurth et al. (2022) affirm that EEs represent a renewed interest

in localized conditions for entrepreneurship aligned with a focus on the agency of entrepreneurial actors to create and transform their own contexts. In other words, EEs focus on a specific institutional context where entrepreneurs can create new value, organized by various governance modes (Penco et al., 2021; Stam, 2015). In this same line, Theodoraki and Catanzaro (2022) and Theodoraki et al. (2022) argue that EEs are being considered a fundamental tool to foster resilient economies based on entrepreneurial innovation.

The recent literature points out several factors that lead to establishing an EE (Juma et al., 2023; Muldoon et al., 2018) in the same analytical framework (Zhao et al., 2023). All of this literature argues that entrepreneurial activities are shaped and conducted by a particular geography that supports the launching of innovative companies (Gomes et al., 2023). In this scenario, there are, indeed, numerous studies related to KIE arguing the interplay between ecosystems, including local, regional, and national contexts, and the stimulation of resources for the creation of knowledge-intensive ventures (Alves et al., 2021).

The first entrepreneurship ecosystem model was proposed by Isenberg (2010), who considered six domains and twelve subdomains. They are policy (leadership, government); finance financial capital; culture (success stories, societal norms); support (infrastructure, support professions, nongovernmental institutions); human capital (educational institutions, laboratories); and markets (networks, first customers). It is essential to mention that these domains perform crucial roles in developing and sustaining an EE (Stam & van de Ven, 2021). However, any ecosystem is mainly unpredictable and can have multiple possible configurations (Spigel, 2017). Consequently, different ecosystem configurations can lead to similar or different outcomes (Wurth et al., 2022). According to existing literature, combined with the order of entrepreneurship, the EE is divided, in this research, into seven main steps: Regulatory Environment, Infrastructure, Market, Financial Resources, Innovation, Human Capital, and Culture.

The first pillar, the regulatory environment, refers to the legal and political forces acting in order to change regulations (Zhao et al., 2023). Academics and political decision-makers have recognized the importance of EEs to economic growth. Therefore, to build and develop EEs, regulations are essential, as stated by Gomes et al. (2023). These regulations affect the marketing effort. Hence, regulatory environment changes can pose threats or present opportunities to entrepreneurs.

Infrastructure, within entrepreneurship, basically refers to transportation, water, electricity, and the internet as important elements in providing recognition and creating new business opportunities (Stam & van de Ven, 2021). Scholars also mention medical treatment and entertainment as being part of a good infrastructure (Zhao et al., 2023). However, in the digital age, hardware and software facilities, including big data and cloud computing, are pivotal to entrepreneurial existence (Audretsch et al., 2023; Zhao et al., 2023). Infrastructure, thus, goes beyond physical conditions. It also encompasses communication and amenities, like green spaces, coffee shops, and museums, among others (Audretsch & Belitski, 2017).

New market opportunities produce positive correlations and direct effects on entrepreneurial activity (Kuratko et al., 2017). For Stam (2015), markets are an essential mode of governance in economic systems. Nevertheless, in the context of entrepreneurship, the market mainly refers to the potential demand for products, goods, or services provided by new businesses (Zhao et al., 2023). In such a manner, choosing a suitable market direction is critical to the success of entrepreneurial activity (Zhao et al., 2023).

Innovation is a driving force in the entrepreneurial process (Drucker, 1985). For some scholars, innovation refers to the generation and implementation of new ideas, processes, goods, or services (Kuratko et al., 2017). In the context of sustainable ecosystems, innovation combines a holistic view of sustainability with a focus on the immediate solution level (Jütting,

2020). Regarding KIE, innovation is a relevant resource to nurture these kinds of firms in their first stages of development and connections with other ecosystem agents (Fischer et al., 2022).

In the EE scenario, capital is an umbrella term for human, social, and financial assets that can be strongly, positively, or negatively influenced by the entrepreneur's actions and decisions (Madsen et al., 2008). In this research, capital includes both human and financial capital. Financial capital (or resource) provides physical capital required for entrepreneurship (Zhao et al., 2023). Existent literature demonstrates that entrepreneurs and small ventures tend to rely on personal sources of finance (Madsen et al., 2008). However, developing new products and potential markets for startup companies requires sufficient financial support. In other words, if the financial resource is broken, the company will likely go bankrupt, leading to the failure of entrepreneurship (Zhao et al., 2023). Human capital, on the other hand, provides intellectual support for entrepreneurial activities (Zhao et al., 2023). This pillar is often related to "entrepreneurial knowledge". Previous literature reveals that the higher the level of knowledge, the greater the possibility of participating in entrepreneurship (Zhao et al., 2023). Meanwhile, the close relationship between knowledge and innovation has been universally recognized (Stam & van de Ven, 2021).

Finally, culture, within EEs' theory, displays an enormous influence on the capacity to launch a new business (Audretsch & Belitski, 2017), as well as on entrepreneurship-related intentions (Gomes et al., 2023), and perceptions (Bischoff, 2021). Culture can be conceptually defined as beliefs and outlooks about regional entrepreneurship (Spigel, 2017). Culture also can be associated with the degree to which self-employment is seen as a viable career choice and the degree to which successful entrepreneurs are valued (Stam & van de Ven, 2021). In accordance with Spigel (2017), culture influences and supports entrepreneurs' motivation, innovativeness, and risk-taking. By the way, an entrepreneurial culture is a key factor in a successful EE.

Based on these seven ecosystem pillars, we propose that with different combinations of these elements, knowledge-intensive entrepreneurs can create higher levels of blended values. We suppose that an EE is able to allow companies to share resources and capabilities operating in synergy, where they can grow as one whole while also generating benefits to the environment and society (Ostertag et al., 2021; Royo-Vela & Cuevas Lizama, 2022). Next section, we will discuss our methodological approach.

3 RESEARCH METHOD

This article used fsQCA to study how the EEs' elements can be configured to generate a higher density of knowledge-intensive entrepreneurs dedicated to BVC. The use of the configurations approach is adequate because the study is not interested in isolated individual conditions but in understanding complex combinations necessary to explain the context, considering that some conditions will only have effects together with other conditions (Woodside, 2014).

Previous studies have used fsQCA to analyze EEs (Torres & Godinho, 2022), and KIE firms (Navarro Sanfelix & Puig, 2023). Authors defend using fsQCA because of the complexity of the relationships regarding these themes. Mainly in entrepreneurship research, fsQCA is becoming a more widely used methodology (Moraes et al., 2023; Nikou et al., 2022).

3.1 Sample description and data collection

Our empirical scenario involves 317 firms that had projects approved between 2020 and 2023 for the Innovative Research in Small Businesses (PIPE) Program in Brazil. This initiative is managed by the São Paulo Research Foundation (FAPESP), originated in 1997, and adopts

a structure akin to the Small Business Innovation Research (SBIR) program in the United States. Its primary objective is to support entrepreneurial endeavors characterized by a significant degree of knowledge intensity and innovative capacity (Fischer et al., 2022). The application procedure encompasses the following criteria: participating companies must not exceed a staff size of 250 individuals; projects must exhibit sufficient human capital for successful implementation; and market potential for innovation-oriented value (in terms of products, processes, or services) necessitating research and development endeavors must be explicitly identified.

Furthermore, the State of São Paulo, Brazil, with a population of 43 million inhabitants, accounts for approximately one-third of the country's Gross Domestic Product (GDP). This particular region encompasses the majority of the Brazilian megalopolis, thereby granting access to significant agglomeration economies, including market access, business prospects, connections with established entities, and supportive infrastructure (Schaeffer et al., 2021). Moreover, the State of São Paulo is home to several prestigious universities and research institutes in Brazil, along with exceptional levels of technological activity.

Additionally, it is important to mention that, in Brazil, a country that faces serious socio-environmental challenges, the sustainable business ecosystem has grown in recent years, and impact-oriented entrepreneurship is advancing rapidly (Barki & Comini, 2019). Through Barki et al. (2019), companies with a socio-environmental impact are increasing the possibility of financial loans, as they are taking advantage of large market gaps. Consequently, thriving EEs have flourished in this area (Alves et al., 2018). These factors also make the State of São Paulo an intriguing case study for examining the behavior of knowledge-intensive entrepreneurial firms within the context of a developing country.

Ecosystem indicators were obtained from the Entrepreneurial Cities Index, a dataset made available by the Brazilian government in partnership with Endeavor, a global NGO. Data comprehends indicators of the regulatory environment, infrastructure, market, financial resources, human capital, culture, and innovation. We used longitudinal data to consistently assess the ecosystem's dynamics, thus considering the four-year indicators' averages (2020-2023).

BVC indicators were generated from the available detailed description of the PIPE projects. Four researchers specializing in the subject evaluated the projects and gave a score for the economic, social, and environmental dimensions. The center of area defuzzification method was used to group the scores and form the BVC score. In the Area Center (CoA) defuzzification method, to estimate the spreads of fuzzy numbers, we use information about the mean deviation of a fuzzy number (Wang & Durugbo, 2013). We employ the following equation to determine the mean (or) deviation of a triangular fuzzy number:

$$CoA_i = \frac{(U_i - L_i) + (M_i - L_i)}{3 + L_i}$$

Where L_i = minimum, U_i = maximum, and M_i = geometric mean.

Finally, we used the BVC score generated for each of the 317 firms and calculated the average BVC for each city in the sample so that the unit of analysis would be the same. Thus, the analysis used the fsQCA, considering the BVC as an outcome and the ecosystem indicators as causal conditions.

The description of the indicators used in the analysis is shown in Table I, and the information on ecosystems and KIEs projects by city is shown in Table II.

Table I. Analytical Variables

Variable	Description	Source
Blended Value Creation	Density of Blended Value Creation-oriented KIE	PIPE Fapesp
Regulatory Environment	Process time, taxation and bureaucratic complexity	Entrepreneurial Cities Index
Infrastructure	Intercity transport and urban conditions	
Market	Economic development and potential customers	
Financial Resources	Capital availability	
Innovation	Patents, sizes of the innovative industry, the creative economy, and ICT companies	
Human Capital	Access and quality of basic and qualified labor	
Culture	Initiative and institutions	

Table II. Information on ecosystems and KIEs projects by city

Cities	BVC	REG	INF	MKT	FIN	IN	HC	CUL	KIE Projects
Bauru	3.48	6.00	6.07	6.29	5.96	6.33	7.13	5.50	3.00
Campinas	2.93	5.32	7.16	6.79	6.37	8.05	6.93	6.30	42.00
Diadema	2.74	5.58	6.22	7.15	5.65	7.06	5.56	6.64	1.00
Franca	2.71	5.93	6.63	5.66	5.92	5.73	6.73	5.48	2.00
Jundiaí	2.43	6.07	6.80	8.47	6.07	6.60	7.15	6.44	5.00
Limeira	2.31	5.56	7.83	6.60	5.77	7.53	7.17	5.25	1.00
Mogi das Cruzes	1.78	6.30	7.38	6.40	5.71	5.82	6.73	5.65	1.00
Osasco	3.54	6.49	6.77	7.75	10.12	7.58	5.98	6.40	2.00
Piracicaba	2.97	5.41	7.15	6.89	6.04	6.85	6.54	5.81	39.00
Ribeirão Preto	2.78	5.86	6.53	6.28	6.42	6.72	6.53	6.43	36.00
Santo André	2.43	6.53	7.10	6.60	5.90	6.56	7.09	6.55	6.00
São Bernardo do Campo	4.33	6.29	7.41	7.50	6.06	7.23	6.65	6.49	1.00
São José do Rio Preto	2.31	5.89	6.10	6.51	6.07	6.92	7.02	4.82	7.00
São José dos Campos	2.66	6.46	6.55	6.46	5.95	7.35	7.07	6.58	28.00
São Paulo	2.65	7.58	9.78	7.29	11.78	7.89	5.90	6.41	133.00
Sorocaba	3.11	5.32	7.16	6.83	5.85	7.12	6.66	6.46	7.00
Suzano	2.07	6.18	7.14	6.36	5.54	5.39	6.16	5.36	1.00
Taubaté	2.83	5.08	6.01	6.83	5.70	5.90	5.59	5.44	2.00

Note: REG: regulatory environment; INF: infrastructure; MKT: market; FIN: financial resources; IN: innovation; HC: human capital; CUL: culture; BVC: blended value creation.

4 RESULTS AND ANALYSIS

4.1 Calibration procedures

In the context of fsQCA, the original data encompassing the conditions and outcomes must transform to obtain fuzzy membership scores. To perform the calibration, we used the percentile method. Percentiles allow the calibration of any measure independent of its original values. As the data are asymmetric, we used values of 80%, 50%, and 20% as thresholds for full membership, crossover point, and non-membership, respectively (Pappas & Woodside, 2021). Table III presents the calibration information of the indicators.

Table III. fsQCA calibration

Indicators	Max	Min	Mean	Standard Deviation	Fuzzy scores		
					0.80	0.5	0.20
BVC. Blended Value Creation	4.33	1.78	2.84	0.64	3.45	2.74	2.40
REG. Regulatory Environment	7.58	5.08	5.99	0.59	6.40	6.00	5.45
INF. Infrastructure	9.75	6.01	6.99	0.86	7.35	7.10	6.30
MKT. Market	8.47	5.66	6.81	0.64	7.20	6.75	6.40
FIN. Financial Resources	11.78	5.54	6.49	1.66	6.35	6.00	5.75
IN. Innovation	8.05	5.39	6.81	0.76	7.50	6.90	5.95

HC. Human Capital	7.17	5.56	6.64	0.47	7.00	6.75	6.20
CUL. Culture	6.64	4.82	6.00	0.58	6.45	6.40	5.45

Note: REG: regulatory environment; INF: infrastructure; MKT: market; FIN: financial resources; IN: innovation; HC: human capital; CUL: culture; BVC: blended value creation.

4.2 Analysis of necessary and sufficient conditions

Subsequently, the necessary conditions are tested for the sample before analyzing the sufficient conditions that can lead to high or low levels of BVC. Findings indicate that no condition can be considered necessary for achieving high performance, as none of the conditions exhibited consistency and coverage levels exceeding 0.9 (Schneider & Wagemann, 2012). A truth table algorithm based on the calibrated fuzzy scores is employed to organize the sufficient configurations for the outcome and eliminate the remaining configurations. A minimum consistency cut-off point of 0.8 (Cheng et al., 2013) is followed, and cases that do not meet the criteria are excluded (Fiss, 2011). The results of the truth table algorithm for BVC are presented in Table IV.

Table IV. Truth table

REG	INF	MKT	FIN	IN	HC	CUL	Number	BVC	Raw consist.	PRI consist.	SYM consist.
0	1	1	0	1	0	1	1	1	0.963	0.933	0.933
0	1	1	1	0	0	0	1	1	0.957	0.903	0.903
0	0	1	0	0	0	0	1	1	0.930	0.897	0.897
0	1	1	1	1	1	0	1	1	0.918	0.750	0.750
0	0	0	1	0	0	1	1	1	0.881	0.458	0.785
0	0	1	0	1	0	1	1	1	0.833	0.477	0.840
1	1	1	1	1	0	1	2	1	0.786	0.689	0.689
0	0	0	0	0	0	0	1	1	0.764	0.506	0.506
0	0	0	1	1	1	0	1	0	0.641	0.208	0.208
1	0	0	0	1	1	1	1	0	0.525	0.051	0.051
0	1	0	0	1	1	0	1	0	0.354	0.012	0.012
1	0	1	1	0	1	1	1	0	0.315	0.025	0.025
1	1	0	0	0	0	0	2	0	0.201	0.000	0.000

Note: REG: regulatory environment; INF: infrastructure; MKT: market; FIN: financial resources; IN: innovation; HC: human capital; CUL: culture; BVC: blended value creation.

4.3 Configurational analysis

Table V displays the intermediate solution, identifying the central and contributing causal conditions for each path. The categorization of conditions as central or contributing is determined through a counterfactual analysis facilitated by the three different solutions generated, namely the complex, parsimonious, and intermediate solutions (Fiss, 2011; Ragin, 2009). Conditions present in the parsimonious solution are designated as central conditions, while those appearing exclusively in the intermediate solution are considered contributing conditions (Misangyi & Acharya, 2014).

Table V. Configurational paths for high level of BVC

Condition	Path1	Path2	Path 3	Path4	Path5	Path6
REG	◯	◯	◯	◯	○	●
INF	○		○	●	●	●
MKT		⬤	○	●	⬤	⬤
FIN	○	○	●	●	●	●
IN	○	⬤	○	○	⬤	⬤
HC	◯	◯	◯	◯	●	○
CUL	○	●	●	○	○	●
Raw coverage	0.188	0.181	0.115	0.081	0.120	0.161
Unique coverage	0.124	0.115	0.060	0.023	0.071	0.123
Consistency	0.815	0.869	0.882	0.958	0.918	0.786
Solution coverage	0.620					
Solution consistency	0.833					
Cities	Taubate (0.71,0.99), Franca (0.53,0.43)	Diadema (0.69,0.5), Sorocaba (0.62,0.83)	Ribeirão Preto (0.64,0.54)	Piracicaba (0.54,0.73)	Campinas (0.57,0.69)	São Paulo (0.65,0.31), São B. Campo (0.63,1)

Note 1: REG: regulatory environment; INF: infrastructure; MKT: market; FIN: financial resources; IN: innovation; HC: human capital; CUL: culture.

Note 2: ⬤ = core causal contributing condition (present); ◯ = core causal contributing condition (absent); ● = contributing causal conditions (present); ○ = contributing causal conditions (absent).

The configurational approach presented six paths with adequate solution consistency and coverage. The first path presents absent core or contributing conditions for all ecosystem elements except the market. The second path has the presence of market, innovation, and culture. The third path has the presence of financial resources and culture. The fourth path has the presence of infrastructure, market, and financial resources. The fifth path has the presence of all elements, with the absence of only the regulatory environment and culture. Finally, the sixth path has the presence of all elements, with the absence of only human capital and the absence of infrastructure.

Paths 5 and 6 present cities with more developed EEs. São Paulo is the state capital and the largest city in the country, and São Bernardo do Campo is very close – in the same metropolitan region. Campinas is the state's third-largest city and the second-most significant metro region. Paths 2, 3 and 4 present the towns of Diadema, Sorocaba, Ribeirão Preto and Piracicaba, which are similar cities in terms of size (all with more than 400,000 inhabitants) and development of the EE. Finally, path 1 presents the cities of Taubaté and Franca, which are smaller cities with less developed EE.

4.4 Robustness test

After creating the truth table algorithm to test for robustness, we changed the minimum consistency cutoff to 0.60 from 0.80 and removed cases that did not qualify for the configurations (Fiss, 2011). We then compute a standard analysis based on the remaining scores and identify configurational combinations with high scores for the result. The results show no difference from the original fsQCA results, demonstrating robustness in the obtained configurations.

5 DISCUSSIONS AND CONTRIBUTIONS

Our empirical assessment has dedicated efforts to shed additional light on the EEs' elements that can be configured to generate higher levels of BVC in KIE firms in the economic

context of a developing country. According to the results of the configurational approach of EE's elements, six paths with adequate solution consistency and coverage emerge. Results showed no indicator as a necessary condition but highlighted the market in four paths (paths 2, 4, 5, and 6), being a core condition in three of them, and innovation as a core causal condition in three paths (paths 2, 5, and 6). Financial resources appear in four paths (paths 3, 4, 5, and 6), but as a contribution condition.

The market is responsible for creating demands, especially social and environmental demands, to be attended by entrepreneurs (Kuratko et al., 2017; Stam, 2015; Zhao et al., 2023). In this same way, Fischer et al. (2022) found that facilitated access to international markets in the context of green entrepreneurship can offer them substantial benefits from ecosystem-level connections to global value chains. However, it is critical to consider that entrepreneurs involved in sustainable contexts can respond to environmental market failures and commit to sustainability orientation (Audretsch et al., 2023), as well as they can fill voids not previously covered and promote significant market structural shifts (Fischer et al., 2022).

Innovation appeared as a driving force in the EE for BVC by knowledge-intensive firms. This is in line with past evidence (Drucker, 1985). In other words, our results confirm that innovation is a relevant resource for the KIE modality (Fischer et al., 2022). Innovation is responsible for creating sustainable solutions to generate blended value (Jütting, 2020). This can be interpreted as innovation being responsible for contributing to new technologies and solutions in which the ecosystem operates (Fischer et al., 2022). Similarly, innovation can help ecosystems connect the location to sustainable transitions from a bottom-up approach (Fischer et al., 2022).

Results indicate that financial resources also play a crucial role in encouraging knowledge-intensive entrepreneurs to generate economic, social and environmental value creation by providing the necessary physical capital for entrepreneurship. In particular, startup companies, including small businesses, require resources to foster the development of new products and enter new markets (Zhao et al., 2023).

Surprisingly, the absence of the regulatory environment and human capital also appeared as a core condition in four paths (paths 1, 2, 3, and 4). The regulatory environment also appears as an absent contribution condition in path 5 and human capital also appears as an absent contribution condition in path 6. These results bring some novel elements to the debate on the association between EE, KIE and BVC. It means that the regulatory environment is not determinant in an ecosystem to generate BVC, unlike evidence from prior assessments (Gomes et al., 2023; Zhao et al., 2023). Possibly, the regulatory environment does not imply high levels of blended value because entrepreneurs are more expected to reward systems and incentives in shifting sustainability from a programmatic phenomenon to a social mindset (Adams et al., 2016).

Likewise, human capital could be a better determinant of the generation of BVC by knowledge-intensive entrepreneurs, as it just appeared in one path. It is contrary to the literature that considers human capital as a key element to entrepreneurial success, as it implies high levels of individual knowledge (Stam & van de Ven, 2021; Zhao et al., 2023). This result was not expected in the context of KIE firms, where knowledge is at the core of a business strategy (Fischer et al., 2022). Thus, regarding the BVC, human capital availability in that ecosystem is optional in accomplishing social and environmental goals through offering goods and services (Madsen et al., 2008). This result may be due to the possibility of remote work, mainly because most companies are linked to the pandemic. The need for more qualified labor in the region can be compensated by hiring from other areas that perform the online service.

Finally, the results of our analysis reveal, like previous studies, EEs oriented to the creation of blended value are context-specific (Bischoff, 2021). It means that heterogeneous combinations of elements and mechanisms appear to be able to create thriving environments

for BVC in the context of KIE firms (Alves et al., 2021). The results point to a substantial limitation in the association between ecosystems and the generation of CVS by entrepreneurs. There are many conditions whose absence is associated with the generation of BVC, which is contrary to the literature that indicated EEs as a catalyst for entrepreneurial activity and, subsequently, regional economic development (Audretsch et al., 2023).

Contributions include theoretical, practical, and social implications. Theoretically, this research contributes to the discussion involving the EE and the BVC in KIE in a developing economy. It can be considered an important matter, backgrounding on the dominant body of research on the theme that usually derives from the experience of developed economies (Fischer et al., 2018). We also advanced in a gap in the literature on how knowledge-intensive entrepreneurs create blended value with their ventures. Additionally, we worked in a literature not clearly defined, the BVC (Zioło et al., 2023). Analyses with an asymmetric technique (fsQCA) allowed a more nuanced view on how KIE can use different combinations of ecosystem elements to generate BVC and also on what are the main elements of the EE that cut across the configurations and represent the main pillars for the creation of blended value.

Regarding managerial contributions, what is particularly intriguing is the possibility that KIEs can result in high levels of BVC without the need for various elements of the EE, especially in the absence of a regulatory environment and human capital. Concerning the regulatory framework, while it may not be imperative for BVC, managers can capitalize on governmental initiatives, programs, and projects that favor small enterprises with environmental and social significance, a trend that has recently gained momentum. Surprisingly, the scarcity of human capital presents an unforeseen outcome, highlighting the potential for managers to establish more adaptable work arrangements. Given the spatial concentration of talent, knowledge-intensive entrepreneurial (KIE) firms can readily assemble highly skilled teams by leveraging the positive externalities associated with these agglomerations (Acs et al., 2018).

Findings also indicate market and innovation as core causal conditions in most EE configurations that favors BVC in knowledge-intensive firms. A warm market is pivotal to entrepreneurs establishing new ventures and competitive advantages to obtain profit. As a result, managers should make decisions in the short, medium and long term, as well as be able to identify scenarios and tendencies that help their ventures decide performance strategies. Understanding the market also makes it possible to understand the stakeholder's expectations better. Regarding innovation, KIEs play a fundamental role in triggering innovation dynamics and structural changes in markets (Malerba & McKelvey, 2020), in the same way, that more innovative EEs favor the generation of BVC by KIEs. This result demonstrates the importance of establishing companies of this type in an EE that is still in consolidation.

From the perspective of social implications, understanding different EE configurations that influence the development of local entrepreneurship, which generates social and environmental value, becomes essential to learn how public policymakers can encourage the growth of EEs and stimulate the creation and success of new companies, resulting in economic growth and job creation, but also the creation of social and environmental value. Regarding KIE, policymakers can understand the importance of stimulating knowledge and innovation in order to promote this entrepreneurial modality (Malerba & McKelvey, 2020). The results also demonstrate the clear disconnection of some EE pillars in the generation of BVC (e.g., regulatory environment, human capital, and culture). Such conditions highlight the inadequacy of traditional EE structures to foster BVC in KIE firms as per our sample. This calls for attention from policymakers and other EE orchestrators in order to steer configurations towards sustainable transitions. This is a non-negotiable agenda for socioeconomic development worldwide. From our results, it seems that EE still have a lot of ground to cover when it comes to enabling impact-oriented entrepreneurship.

6 CONCLUSIONS

This study explores how the EEs' elements can be configured to generate a higher density of knowledge-intensive entrepreneurs dedicated to BVC. Drawing on city-level data from the State of São Paulo, Brazil, we were able to offer an understanding of configurations that lead to higher levels of BVC within the relatively unexplored context of an emerging country. Our analytical approach supplies six paths with adequate solution, consistency, coverage, and robustness, as well as unveils core indicators in the analyzed context. Mainly market and innovation provide important support for BVC in KIE firms.

Our study addressed the interplay between KIE, EE, and BVC concepts in a sample of 317 Brazilian firms. Analyses indicate that the creation of social and environmental value, as well as economic value, are only loosely attached to several of the main pillars of EEs. This evidence suggests that thriving ecosystems may be more oriented towards fomenting new businesses that generate market impacts without much concern for social and environmental value. Hence, our contribution brings forward a potential mismatch between the dominant logic of EEs and the challenges associated with SDGs. Findings contribute to policymaking processes that seek to further connect the promotion of KIE with environmentally sustainable transitions in EEs.

Our study does not go without limitations. First, we limited our ecosystem framework to seven pillars, thus offering only a fragmented view on the complexity of EE dynamics. Second, we studied a specific funding initiative in which our results can suffer some sample-selection bias. Finally, our research was set in the context of Brazil, and whether the research conclusions apply to cities in other countries remains to be discussed. Hence, further inquiries in this field are necessary to advance our comprehension of the topic of BVC in the context of KIE firms. We call for empirical exercises that can deal with other ecosystem elements. Also, the study of personal characteristics of knowledge-intensive entrepreneurs that aims to create blended value once can be an interesting complement to this contextual perspective (Hechavarría et al., 2017). Further studies can also apply other qualitative approaches, such as case studies and interviews, to deepen the entrepreneurs' perception of the importance of EE in stimulating the generation of BVC.

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