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Unveiling Entrepreneurial Ecosystems' Transformation: A GEM Based Portrait

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Abstract: Entrepreneurial Ecosystems (EEs) have attracted the attention of academics, practitioners, and policymakers, that attempt to unlock 'a winning recipe' considering the different EEs pillars in order to ignite entrepreneurship at large. Therefore, understanding the degree of influence of each pillar on Entrepreneurial Initiative (EI) is helpful in framing more effective policies towards entrepreneurship. This study aims to bring a new facet to entrepreneurship research, specifically on decomposing the transformation of EEs and the influence of EEs pillars on EI. The transformation of EEs is shown by a balanced panel approach based on the Global Entrepreneurship Monitor (GEM) dataset over 8 years (2010–2017), comprising 18 countries. The study has several implications for entrepreneurship theory and practice as well as public policy since discusses three main issues, mainly supported by empirical results. First, the results show an unbalanced influence of EEs pillars on EI. Second, results also show the ineffectiveness of institutions in encouraging the desire to act entrepreneurially. Third, entrepreneurship needs to be part of the acculturation process evidencing the importance of collective normative. Therefore, providing the instruments and structures is not enough to encourage individuals to start an entrepreneurial journey. Generally, the results reveal that contextual determinants are significant in fostering entrepreneurial propensity to start a business. But the impact of the nine pillars is not equalized, revealing a fragmented influence with funding measures, R&D transfer, and cultural and social norms discouraging entrepreneurial initiative. Overall, the study contributes to the understanding of a multidimensional perspective on EEs and points future policy directions to overcome the lack of entrepreneurship and amend flawed entrepreneurship policies.

Keywords: entrepreneurial ecosystems; entrepreneurial initiative; entrepreneurial ecosystem quality; GEM

1. Introduction

Entrepreneurship emerged initially, linked to economic theories. In addition, it has been extensively discussed in recent decades, as its contribution to economic growth, job creation, and promotion of innovation is unquestionable (Block et al. 2017). Comprehension of the phenomenon was initially rooted in behavioural theories using individuals as focal points. More recently, recognition that external conditions stimulate entrepreneurship (Content et al. 2020) has contributed to unlocking the conceptual framework of Entrepreneurial Ecosystems (EEs), showing the multi-layered nature of the phenomenon. Therefore, the interplay between individual and context elements (Schmutzler et al. 2019; Stam and van de Ven 2021) has become essential to discover the determinants of Entrepreneurial Initiative (EI) for a given geography (Hechavarría and Ingram 2019), at a certain moment in time (Xu and Dobson 2019).

New business creation is a result of a number of interactive components and players, described as the entrepreneurial ecosystems (Mack and Mayer 2016). Composed of multiple forces, such as government institutions, academia, university-industry offices, industry players, business incubators, research centres, and venture capitalists (Xu and Dobson 2019), EEs are dynamic and evolutionary organisms where entrepreneurs operate (Bruns et al. 2017). The variability of new venture activity across regions is proved by successful entrepreneurship hubs, such as Silicon Valley, showing that entrepreneurship emerges from a set of interdependent actors and factors, enabling vibrant (Cohen 2006; Roundy 2020) communities. The complexity, diversity, and fragility of EEs (Feldman and Lowe 2018) have motivated several authors to formulate effective models that embolden entrepreneurship and consequently, contribute to building resilient economies (Spigel 2017).

The desire to achieve enhanced entrepreneurship benefits has motivated governments to develop specific, place-based policies to support EI, particularly in the last decade. Although entrepreneurship policies do not ensure better economic performance (Wong et al. 2005), particularly those directly 'imported' from other realities, governments have yielded to the temptation of making a major investment to stimulate entrepreneurship. Failed attempts to trigger EI have prompted the interest in grasping correlations between EEs and EI, using, for instance, geographical boundaries (Scott and Venkataraman 2000), since local context matters in order for entrepreneurship occur (Feldman and Lowe 2015). Understanding of the relationship between EEs and EI, in the long run, is still unclear, opening up the debate around the transformation of EEs through time and space. Cross-country empirical studies have produced insufficient insights into entrepreneurship determinants (Nikolaev et al. 2018; Hechavarría and Ingram 2019), turning the topic into a major issue for academics, practitioners, and policymakers.

The limited comparable data on entrepreneurship and its determinants, from a systematic perspective, have narrowed the analysis of EEs, as well as their strategic development. As a response, the Global Entrepreneurship Monitor (GEM) initiative, created in the 1990s, focused on: (1) measuring differences in entrepreneurial activity between countries; (2) exposing the roots of entrepreneurial activity at the country level; and (3) detecting policies to foster national entrepreneurial activity (Bosma 2013). The challenges of measuring entrepreneurship triggered the analysis through a multi-dimensional approach (Wong et al. 2005), encompassing two key measurements: the individual (entrepreneur) and the context (entrepreneurial ecosystem). Building upon the contributions of Reynolds et al. (2005) and Levie and Autio (2007), GEM adopted the Entrepreneurial Framework Conditions (EFCs), to assess the correlation between exogenous factors and business creation. The EFCs model encompasses nine conditions identified as relevant to deter or augment entrepreneurial initiative, namely: entrepreneurial finance; government policies–support and relevance, taxes and bureaucracy; government entrepreneurship programs; entrepreneurial education; R&D transfer; commercial and legal infrastructures; internal market dynamics; physical infrastructure; and lastly, cultural and social norms (GEM 2021). The purpose of EFCs is to understand the influence of structural conditions on individual's entrepreneurial initiative, disclose the most relevant parameters, and observe the heterogeneity among countries, using comparable, reliable, and traceable data, supporting entrepreneurship policy decision-making (Reynolds et al. 2005).

The triumph of high growth entrepreneurship seems to be related to better EEs conditions (Stam 2015), as demonstrated by the entrepreneurial vibrancy of certain regions (Spigel 2017). However, the multiple configurations of EEs suggest the existence of national conditions that affects EI.

Although GEM accepts the positive influence of EFCs on EI, new theoretical and empirical contributions (Levie and Autio 2007) around the transformation of EEs are needed to bring new critical thinking on the policy strategy.

Therefore, this study aims to answer the following research questions: How do entrepreneurial ecosystems relate to the entrepreneurial initiative through time and space? What conditions of EEs prevail in countries with higher entrepreneurial initiative?

To address these questions, this study follows a multi-country comparative analysis based on GEM data, grounded on EFCs. The transformation of EEs over 8 years is examined through a balanced panel composed of 18 countries, from 2010 to 2017. The number of countries is limited, since only those 18 countries are simultaneously represented during the selected period. Nevertheless, the sample is heterogeneous as it includes countries at different stages of socioeconomic development.

Following the work of Stam (2014), who recognizes the EEs as a desirable approach to solve the shortcomings of the entrepreneur and the external business environment, the analysis considers the framework conditions through a combination of nine pillars. To assess EEs, a new measurement was operationalized—Entrepreneurial Ecosystem Quality—based on prior contributions (Levie and Autio 2008; Stam and van de Ven 2021), where all of nine pillars have identical weight.

As the essence of ecosystems needs to be deconstructed into its elements (Stam and van de Ven 2021), this paper initially offers a descriptive perspective and comparison between countries on the transformation of EE and EI through time and space. Afterwards, the empirical research assesses the effect of the antecedents of EEs on EI, showing the variables of interest in EEs, at the country and individual levels.

The study makes two main contributions. First, it provides an overview of the transformation of EEs over the years and gives the discussion around the relation between EEs and EI a new perspective. The heterogeneity of the phenomenon and contextual contingencies gain relevance, since EI is more prevalent in countries where EEs are less developed. Second, the concept of the quality of EE is explored, supporting macro and micro perspectives, namely around the ecosystems and their elements. The results prove that favouring EI is dependent on specific EEs that are designed and established according to individuals' and contextual idiosyncrasies. There is evidence that, in general, the transformation of EEs is not linear in time or space, with EI floating. To support the design of more effective measures to spur EI, an entrepreneurial ecosystem policy framework is proposed.

The study is structured as follows. Section 2 presents a review of the entrepreneurial ecosystems and the corresponding conceptual framework. Section 3 presents the empirical strategy (methods) followed by the empirical results, in Section 4. Section 5 offers the discussion and Section 6 concludes and points further research.

2. Entrepreneurial Ecosystems and Entrepreneurial Initiative

The importance of entrepreneurship is deeply rooted in its positive influence on economic growth and employment (European Commission 2008). The phenomenon is of a multidimensional nature with entrepreneurs and the entrepreneurship context as interconnected (Stam 2015). However, the empirical evidence remains mixed as the literature is not consensual on the measurement of entrepreneurship and its effects (Bruns et al. 2017).

The role of context in shaping the entrepreneurial initiative shows the '*individualistic-collectivistic*' character of entrepreneurship (Schmutzler et al. 2019). The interplay between individuals' and contextual aspects has brought to light an underexplored area, calling for novel theoretical and empirical studies to explain the entrepreneurial initiative as a measurable result (Acs et al. 2017). It is a challenge to understand what shapes entrepreneurs to act, since it does not depend on single characteristics or packed formulas. The multidimensional nature of entrepreneurship places entrepreneurs at the centre and acknowledges the importance of other external players and conditions (Roundy 2019).

EEs follow diverse transformation routes and result from years of continuous efforts (Mack and Mayer 2016) and dynamic changes. Although a strong knowledge base (Brown and Mason 2017) seems to support stronger EEs, their existence in multiple settings proves the diversity of EE models. Nevertheless, studies often rely on analysing established ecosystems with high growth (Xu and Dobson 2019), neglecting underperforming places (Rodríguez-Pose and Wilkie 2019).

Peripheral places often lack the resources and incentives for the development of EEs, restraining the effect of opportunity entrepreneurship, when faced with more sophisticated ecosystems (Brown and Mason 2017). As shown by Marič et al. (2013), a country's level of development affects EI negatively, making reasons of necessity a strong precursor of EI in certain contexts. Therefore, the role of formal institutions is of paramount importance when observing the phenomenon, as they can offer regulatory support to stimulate valuable entrepreneurship or leverage the fragility of the system to assist necessity entrepreneurship efforts (Amorós et al. 2019). The authors find support for the argument that the quality of institutions hampers opportunity-driven entrepreneurship, suggesting that poor countries need to strengthen the role of support institutions. On the contrary, more developed economies should focus on removing barriers and improving governance. Acting as game-rulers (Wright et al. 2017), institutions are responsible for supporting entrepreneurship in multiple ways (education, infrastructure, policies or specific programs) (Hechavarria and Ingram 2014). Therefore, the transformation of EEs is nonlinear and significant changes can occur due to the interference of government policies, economic strategies or social pressures, opening multiple trajectories of development. If, in some cases, EEs are deliberately designed using a top-down approach, in other situations, they naturally emerge from a bottom-up perspective (Wright et al. 2017).

The EE concept is observed by Brown and Mason (2017) using four distinctive elements: The actors; the resource suppliers; the connectors; and finally, the culture. The work of Brown and Mason (2017) contributes a dichotomous framework where two types of EEs are characterized: *Embryonic ecosystems* and *Scale-up ecosystems*. The model acknowledges that EEs differ mostly in their quality and cases of entrepreneurship, using a binary view of the phenomenon. Despite possible limitations, the model shows that more developed EEs generate more impact on EI, as a result of better conditions to support entrepreneurship.

Connecting Entrepreneurial Ecosystems and Entrepreneurial Initiative Using the Gem Model

In the past decade, entrepreneurship has been used as a strategic force to achieve higher levels of innovation and economic growth (Ács and Varga 2005; Brown 2016), leading researchers to determine what favours entrepreneurship and the influence of macro-economic conditions (Barreneche García 2014), hoping to disclose what matters most. Entrepreneurship apparently results from a symbiotic relationship between the impetus of the entrepreneur and exogenous conditions, but studies have found a contradictory association between these dimensions (Pita et al. 2021), demanding further research.

Research into entrepreneurial ecosystems became more fine-grained, with studies using spatial and geographical perspectives (Reynolds et al. 2005; Sitaridis and Kitsios 2019; Szerb and Trumbull 2018; Elam and Terjesen 2010). Frequently, studies on EEs use qualitative approaches, using GEM data to analyse the EI and national conditions. GEM is one of the main international research databases providing reliable and comparable information from a wide range of countries (Braga et al. 2018; Guerrero et al. 2020). As GEM focuses both on individuals and contextual levels, with specific instruments to capture individuals' participation in new venture creation (Adult Population Survey—APS) and the national context (National Expert Survey—NES), its use allows comparability and supports reliability.

The entrepreneur is observed as someone with a proactive mind and entrepreneurial initiative is the attempt to create a new venture (Levie and Autio 2008). Entrepreneurs do not act in isolation. Therefore, EEs should empower their desired enterprises and offer the needed support (Hechavarria and Ingram 2014). To assess the context, Reynolds et al. (2005) and Levie and Autio (2007) were of paramount importance in obtaining Entrepreneurial Framework Conditions (EFCs). The EFC model includes nine structural dimensions to support entrepreneurship, and the assessment of the results of EEs from the global belief of experts in the field. The nine dimensions detached the national conditions, contextualizing the mechanisms that support entrepreneurship in each territory. Following Levie and Autio (2008), it is possible to portray all of the nine measures. For instance, government

programmes capture the support that helps operationalise entrepreneurial efforts. For the authors, government policies on entrepreneurship support programs and conditions to foster the entrepreneurial mindset generally. Therefore, it is expected that government entrepreneurship programs of higher quality will affect entrepreneurial activity positively (European Commission 2013).

Commercial services and other physical infrastructures are important resources to expand entrepreneurial projects, considered as "*input-completers*" (Levie and Autio 2007). Education and training make individuals more skilled and prepared to create new ventures. The authors argue that higher levels of education and training in entrepreneurship result in higher levels of entrepreneurial activity. This reiterates several studies examining the effect of entrepreneurship education on entrepreneurship propensity (Fayolle and Gailly 2015). Knowledge transfer activities and companies' absorptive capacity, along with R&D investment, are crucial in creating new ventures and scalable business opportunities (Audretsch et al. 2012). Financial support is a powerful instrument to stimulate entrepreneurship, although access to financial funds appears to be volatile, depending on entrepreneurs' characteristics (Ghosh et al. 2018). Moreover, the market's dynamics and its openness contribute to entrepreneurship. Barriers to entry and operational flexibility tend to limit the exploitation and expansion of new business opportunities (Atilla Öner and Kunday 2016). Furthermore, entrepreneurship is influenced by the normative values and beliefs in a given territory, with culture as a determinant of EI (Breazeale et al. 2016). Therefore, cultures that value innovation, creativity, and risk tend to generate more business creation than more conservative, normative cultures.

The context gains significance for these types of individuals when compared to established business owners, since they are less experienced, they have limited knowledge to conduct their businesses. Taking the earlier arguments (Stam 2015; Isenberg 2011; Stam and van de Ven 2021), it can be conjectured that the prevalence of EE antecedents encourages EI. Therefore:

Hypothesis 1. *The prevalence of entrepreneurial ecosystem antecedents is positively associated with individuals' entrepreneurial initiative.*

In sum, entrepreneurship transformation is influenced by individuals' entrepreneurial spirit and contextual conditions, impacting the creation of new ventures (Bosma and Kelley 2019). For Guerrero et al. (2020), the unbalanced effect of context conditions has implications for policymakers, demanding a dualistic analysis, based on time and space.

3. Materials and Methods

3.1. Data and Method

The sample is constructed from the main global entrepreneurship monitor database, including data from the Global Entrepreneurship Monitor (GEM) Adult Population Survey (APS) and National Expert Survey (NES). Since APS data reports at the individual level and NES correspond to the country level, following harmonisation procedures, the final database reports the phenomenon from a multidimensional perspective. The decision to conduct a static comparative analysis between 2010 and 2017 restricted the sample to 18 countries, encompassing 640.245 observations at the individual level and 5851 at the national level (see Tables 1 and 2). A balanced set of countries ensured comparability of EE antecedents and acknowledged its transformation over time by considering two specific time frames: 2010 and 2017. The sample is robust for empirical purposes, according to prior studies (Bruns et al. 2017), as it includes a diverse set of countries. Since the purpose of the research is to capture the transformation of EE antecedents and the relationship with EI in two moments, comparing changes between the periods, a logistic regression analysis is performed. The time gap corresponds to a structural change since institutional changes, included in EE antecedents, do not occur in the short run.

Table 1. Country observations (2010–2017).

Observations	APS	NES
South Africa	25,987	322
Greece	16,000	257
Spain	185,088	296
Switzerland	18,979	290
United Kingdom	48,430	291
Sweden	28,207	322
Germany	36,655	394
Peru	16,580	345
Mexico	27,895	293
Argentina	17,750	309
Brazil	40,000	561
Chile	54,356	342
Colombia	42,818	313
Malaysia	16,107	294
Ireland	16,015	297
Croatia	16,000	333
Slovenia	17,052	288
Uruguay	16,326	304

Table 2. Observations of individuals and entrepreneurial ecosystem experts (2010–2017).

Observations	2010	2011	2012	2013	2014	2015	2016	2017	Total
Individual	82,707	70,267	73,159	88,765	79,119	81,938	82,312	81,978	640,245
EE Experts	693	708	764	707	761	708	768	742	5851

To address the research questions, the study involved several phases. First, a descriptive analysis characterises the transformation of the antecedents of EEs and EI in different territories, over a period of 8 years. Second, a binary logistic regression assesses the effect of EE antecedents on EI, for 2010 and 2017. The analysis measured the effect of each dimension on EI, bringing to light the unbalanced relevance of entrepreneurship conditions.

3.2. Variables

The variables considered for the purpose of the study are described in Table 3. Entrepreneurial initiative is the dependent variable considered. Measuring entrepreneurial initiative using a single variable is widely accepted, as proven by the other studies, using GEM (Schmutzler et al. 2019; Hechavarría and Ingram 2019; Nahm 2019; Pita et al. 2021). The binary nature of the variable allowed a logistic regression model. Nine key explanatory variables characterise the entrepreneurial ecosystem, namely: Finance, government policies, governmental programs, education and training, R&D transfer, commercial and services infrastructure, market openness, physical infrastructure, and cultural and social norms. Considering the changes from the NES survey, namely the item-scale number, following the harmonisation procedures, the scale is transformed from a nine-point to a five-point Likert scale, to ensure the comparability and integration of data.

The control variables refer to individuals' related characteristics, including gender, age, social context, opportunity recognition, skills perception, fear of failure, desirability of entrepreneurship as a career, and exposure to entrepreneurship media.

Table 3. Variable description.

	Variable	Description	Type
Dependent variable	Entrepreneurial Initiative (EI)	1 = individuals currently trying to set up a business. 0 = otherwise.	Binary
Key explanatory variables	Finance (FME)	In my country there is sufficient finance.	Scale
	Government Policies (GPO)	The government policies in my country are appropriate.	Scale
	Governmental Programs (GPR)	The governmental programs in my country are appropriate.	Scale
	Education and Training (ETR)	The education and training in my country are appropriate.	Scale
	R&D Transfer (RDT)	The R&D transfer in my country is appropriate.	Scale
	Commercial and Services Infrastructures (CSI)	The Commercial and Services Infrastructures in my country are appropriate.	Scale
	Market Openness (MOP)	The Market Openness in my country is appropriate.	Scale
	Physical Infrastructure (PIN)	The Physical Infrastructure in my country is appropriate.	Scale
	Cultural and Social Norms (CSN)	The Cultural and Social Norms in my country are appropriate.	Scale
Control variables	Gender (GEN)	1 = female individuals. 0 = otherwise.	Binary
	Age (AGE)	L1 = under 18 years; L2 = 18–24 years; L3 = 25–34 years; L4 = 35–44 years; L5 = 45–54 years; L6 = 55–64 years; L7 = more than 65 years.	Multinomial
	Education (EDU)	L0 = no education; L1 = pre-primary education; L2 = primary; L3 = secondary; L4 = practical courses; L5 = degree; L6 = master or upper.	Multinomial
	Social Context (SOC)	1 = individuals that personally know someone who started a business. 0 = otherwise.	Binary
	Opportunity Recognition (POR)	1 = individuals that recognize future business opportunities. 0 = otherwise.	Binary
	Skills Perception (SKP)	1 = individuals that perceive having the skills and knowledge to enterprise. 0 = otherwise.	Binary
	Fear of Failure (FOF)	1 = individuals that fear failure. 0 = otherwise.	Binary
	Entrepreneurship Desirability (END)	1 = individuals that consider entrepreneurship a desirable career choice. 0 = otherwise.	Binary
	Entrepreneurship Status (ENS)	1 = individuals that consider entrepreneurship to have a high level of status. 0 = otherwise.	Binary
	Entrepreneurship Media (ENM)	1 = individuals that are exposed to public media about entrepreneurship. 0 = otherwise.	Binary

4. Results

4.1. Antecedents of Entrepreneurial Ecosystems' Transformation: A General Analysis

The transformation of EEs is captured over the 8 years. The comparison of the antecedents of EEs shows the greater performance of PIN and exposes the fragility of GPO, ETR, and RDT (see Table 4). The result is unexpected as institutions—government and education—are the least successful elements.

Observing the transformation of EEs between 2010 and 2017, none of the dimensions evolved positively, suggesting a wide-ranging decline.

4.2. Entrepreneurial Initiative: A General Analysis

Entrepreneurial initiative between 2010 and 2017 is surprisingly low (see Table 5). Countries, such as Peru and Malaysia, are unexpectedly more entrepreneurial than others (such as the European ones). Switzerland is a positive reference in every EE antecedent. However, the creation of new ventures is almost non-existent.

Table 4. Entrepreneurial ecosystem dimensions (2010–2017) for 18 countries.

Country	FME (2010)	FME (2017)	GPO (2010)	GPO (2017)	GPR (2010)	GPR (2017)	ETR (2010)	ETR (2017)	RDT (2010)	RDT (2017)	CSI (2010)	CSI (2017)	MOP (2010)	MOP (2017)	PIN (2010)	PIN (2017)	CSN 2010)	CSN (2017)
South Africa	2.46	2.34	2.38	2.09	2.11	1.96	2.08	2.04	2.12	1.68	2.97	2.62	2.59	2.16	3.04	3.15	2.50	2.73
Greece	1.84	1.95	1.66	1.71	1.98	1.85	2.25	2.05	2.18	2.19	2.80	2.75	2.33	2.42	3.13	3.49	2.57	2.49
Spain	2.09	2.48	2.31	2.03	2.56	2.95	1.96	2.25	2.28	2.26	2.85	2.76	2.40	2.22	3.62	3.46	2.29	2.33
Switzerland	3.02	2.91	3.20	3.10	3.33	3.12	2.77	2.78	3.40	2.99	3.41	3.18	2.70	2.53	4.43	4.33	3.05	2.91
United Kingdom	2.51	2.57	2.52	2.63	2.62	2.55	2.34	2.02	2.50	2.41	3.15	2.91	2.87	2.22	4.00	3.25	2.72	3.11
Sweden	2.55	2.66	2.29	2.11	2.64	2.56	2.25	2.22	2.25	2.24	2.88	2.75	2.82	2.51	3.98	3.94	2.39	2.99
Germany	2.95	2.74	2.91	2.53	3.70	3.38	2.46	2.00	2.85	2.42	3.21	3.33	2.82	2.58	3.99	3.71	2.69	2.61
Peru	2.56	2.10	2.29	2.35	2.31	2.73	2.48	2.61	2.05	2.15	2.81	2.58	2.72	2.56	3.48	3.51	3.08	3.30
Mexico	2.73	2.48	2.64	2.65	3.10	3.09	2.86	2.51	2.64	2.63	2.95	2.88	2.62	2.49	3.71	3.83	3.30	2.95
Argentina	2.14	2.02	1.83	2.62	2.35	3.09	2.68	2.29	2.40	2.49	2.86	2.79	2.67	2.49	3.56	3.13	2.78	3.10
Brazil	2.48	2.43	1.75	1.67	2.35	1.93	1.93	1.87	2.27	1.77	2.61	2.56	2.71	2.54	3.35	2.90	2.65	2.21
Chile	2.52	2.17	2.59	2.63	2.63	2.93	2.22	2.04	2.15	1.94	2.70	2.23	2.43	2.12	3.89	3.63	2.58	2.63
Colombia	2.32	2.19	2.70	2.14	2.99	2.62	2.80	2.76	2.31	2.33	2.88	2.33	2.66	2.53	3.61	3.61	3.17	3.38
Malaysia	3.42	3.31	2.74	2.55	3.04	2.63	2.64	2.40	2.72	2.32	3.21	3.01	2.93	2.92	3.97	4.06	3.20	3.00
Ireland	2.27	2.43	2.66	2.44	3.26	3.37	2.56	2.07	2.60	2.46	3.24	2.81	2.84	2.42	3.36	2.42	3.05	2.99
Croatia	2.47	2.38	2.15	1.70	2.52	2.13	2.44	1.81	2.28	1.87	2.87	2.70	2.57	2.41	3.59	3.37	2.42	1.77
Slovenia	2.49	2.56	2.44	2.11	2.67	2.59	2.57	2.44	2.34	2.55	3.20	2.82	2.75	2.65	3.95	3.82	2.14	2.24
Uruguay	2.12	2.06	2.48	2.32	3.13	2.88	2.49	2.24	2.75	2.39	3.13	2.83	2.35	1.79	4.14	3.37	2.18	1.74
	2.50	2.43	2.42	2.30	2.74	2.69	2.43	2.24	2.45	2.28	2.99	2.77	2.65	2.42	3.71	3.50	2.71	2.69

Table 5. Entrepreneurial initiative (2010–2017) for 18 countries.

Country (Code)	2010	2017
South Africa (27)	0.11	0.15
Greece (30)	0.04	0.05
Spain (34)	0.02	0.04
Switzerland (41)	0.03	0.08
United Kingdom (44)	0.03	0.07
Sweden (46)	0.02	0.04
Germany (49)	0.05	0.07
Peru (51)	0.36	0.37
Mexico (52)	0.18	0.19
Argentina (54)	0.10	0.11
Brazil (55)	0.12	0.13
Chile (56)	0.16	0.26
Colombia (57)	0.15	0.26
Malasya (60)	0.06	0.25
Ireland (353)	0.08	0.12
Croatia (385)	0.06	0.15
Slovenia (386)	0.03	0.08
Uruguay (598)	0.10	0.15
Total	0.09	0.14

4.3. Entrepreneurial Ecosystem Antecedents: What Matters Most?

Table 6 presents the descriptive and bivariate statistics. Collinearity diagnosis for the regression equation is calculated using the Variance Inflation Factor (VIF). As VIF values do not exceed 10, in general, there are no multicollinearity concerns (Hechavarría and Ingram 2019; Jimenez et al. 2017; Hair et al. 1998). Therefore, although the variables are moderately correlated, the tests validate the binary logistic model.

The results of Model 1 are presented in Table 7. Overall, the results recognize the transformation of EEs within a period of 8 years, revealing that EEs are dynamic and volatile.

Table 7 reports the odds ratio or the exponential function of the estimated beta coefficients, for all of the variables described in Section 3.2. The model predicts the likelihood for an individual to start an entrepreneurial venture for both 2010 and 2017. Therefore, (context and individual) predictors with an odds ratio larger than 1 indicate an increase on the propensity of entrepreneurial initiative.

The analysis of the antecedents of EEs reveals that seven variables of external dimensions of EEs influence entrepreneurial initiative, in 2010. Government policies did not support EI (OR = 0.6351). The likelihood of starting a business is 1.391 higher when governmental programs support entrepreneurship (at the 10% level of significance). Education and training increases the likelihood of becoming an entrepreneur by 2.395 times. The probability to start a new entrepreneurial venture is reduced by 0.158 times when R&D transfers are disposed to individuals in order to enter the business environment. The lack of market openness and physical infrastructures decreases the likelihood to start a new business (OR < 1). The probability of starting a new business is 1.863 higher when cultural and social norms support new businesses. Finally, C&S infrastructures are not a statistically significant variable influencing entrepreneurial initiative.

Table 6. Descriptive and bivariate statistics.

	N	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	VIFs
1. Entrepreneurial initiative	81,540	0.12	0.319	1																				
2. Gender	81,978	0.51	0.500	−0.054 **	1																			1.023
3. Age	70,744	4.34	1.468	−0.069 **	0.026 **	1																		1.055
4. Education	81,252	3.12	1.402	0.048 **	−0.033 **	−0.114 **	1																	1.162
5. Social context	81,007	0.34	0.472	0.193 **	−0.065 **	−0.088 **	0.120 **	1																1.101
6. Opportunity Recognition	67,683	0.40	0.491	0.163 **	−0.058 **	−0.056 **	0.116 **	0.195 **	1															1.118
7. Skills perception	79,334	0.48	0.499	0.241 **	−0.114 **	0.010 **	0.115 **	0.243 **	0.162 **	1														1.118
8. Fear of failure	79,145	0.40	0.490	−0.091 **	0.069 **	−0.028 **	−0.036 **	−0.050 **	−0.095 **	−0.162 **	1													1.059
9. Ent. Desirability	72,787	0.59	0.492	0.054 **	−0.005	0.005	−0.073 **	0.007	0.110 **	0.016 **	−0.008*	1												1.090
10. Ent. Status	73,888	0.62	0.485	0.025 **	−0.017 **	0.003	0.024 **	−0.008*	0.105 **	−0.008*	0.042 **	0.182 **	1											1.096
11. Ent. Status	74,425	0.58	0.494	0.061 **	−0.008*	0.051 **	0.005	0.040 **	0.141 **	0.050 **	−0.011 **	0.151 **	0.158 **	1										1.072
12. Finance	81,978	2.4515	0.25056	−0.100 **	−0.010	0.052 **	0.079 **	−0.026 **	0.006	−0.093 **	0.013 **	−0.064 **	0.058 **	0.041 **	1									2.642
13. Government Policies	81,978	2.3000	0.33393	0.108 **	0.008*	0.085 **	0.135 **	0.006	0.094 **	0.022 **	−0.093 **	0.040 **	0.111 **	0.067 **	0.191 **	1								6.524
14. Government Programs	81,978	2.7892	0.36835	−0.009 **	−0.005	0.017 **	0.051 **	0.001	0.027 **	−0.004	−0.033 **	−0.056 **	−0.041 **	−0.029 **	0.163 **	0.458 **	1							2.260
15. Education and Training	81,978	2.2137	0.22075	0.046 **	0.010 **	0.002	−0.114 **	0.024 **	0.007	0.017 **	−0.030 **	−0.013 **	−0.040 **	0.028 **	0.151 **	0.194 **	0.310 **	1						3.965
16. R&D Transfer	81,978	2.2701	0.25991	−0.085 **	0.008 *	0.058 **	0.019 **	−0.044 **	−0.049 **	−0.056 **	−0.012 **	−0.103 **	0.020 **	−0.025 **	0.434 **	0.470 **	0.526 **	0.596 **	1					8.025
17. C&S Infrastructures	81,978	2.7496	0.25956	−0.157 **	−0.006	0.023 **	0.036 **	−0.078 **	−0.083 **	−0.111 **	0.040 **	−0.133 **	0.042 **	−0.042 **	0.670 **	0.163 **	0.254 **	0.120 **	0.680 **	1				5.921
18. Market Openess	81,978	2.3316	0.20507	0.033 **	−0.006	−0.038 **	0.044 **	0.003	0.048 **	−0.016 **	0.016 **	−0.017 **	0.079 **	0.051 **	0.515 **	0.069 **	−0.019 **	0.353 **	0.345 **	0.418 **	1			2.653
19. Physical Infrastructures	81,978	3.5127	0.32734	0.037 **	−0.001	0.044 **	0.025 **	0.020 **	0.073 **	0.001	−0.014 **	0.019 **	0.004	0.030 **	0.404 **	0.298 **	0.202 **	0.520 **	0.351 **	0.160 **	0.378 **	1		3.034
20. Cultural and Social Norms	81,978	2.6492	0.38941	0.093 **	0.005	0.032 **	0.100 **	0.003	0.105 **	0.005	−0.055 **	0.032 **	0.145 **	0.079 **	0.150 **	0.589 **	0.016 **	0.292 **	0.297 **	0.055 **	0.399 **	0.113 **	1	5.092

* Correlation is significant at the 0.05 level (2-tailed); ** Correlation is significant at the 0.01 level (2-tailed).

Table 7. Results of the logistic regressions for 2010 and 2017.

	2010				2017			
	Exp(B)	**S.E.**	**B**	**Sig.**	**Exp(B)**	**S.E.**	**B**	**Sig.**
1. Gender	0.906	0.031	−0.098	0.002	0.798	0.031	−0.225	0.000
2. Age	0.944	0.012	−0.058	0.000	0.863	0.011	−0.147	0.000
3. Education	1.012	0.015	0.012	0.436	0.991	0.012	−0.009	0.423
4. Social context	1.781	0.033	0.577	0.000	2.212	0.031	0.794	0.000
5. Opportunity Recognition	2.176	0.036	0.777	0.000	1.625	0.032	0.486	0.000
6. Skills perception	3.650	0.043	1.295	0.000	3.842	0.037	1.346	0.000
7. Fear of failure	0.701	0.036	−0.355	0.000	0.734	0.034	−0.310	0.000
8. Desirability	0.930	0.040	−0.072	0.069	1.037	0.033	0.037	0.272
9. Status	1.122	0.036	0.115	0.001	1.030	0.033	0.029	0.376
10. Media Exposure	1.008	0.034	0.008	0.815	1.132	0.033	0.124	0.000
11. Finance	4.564	0.108	1.518	0.000	0.296	0.116	−1.217	0.000
12. Government Policies	0.635	0.197	−0.454	0.021	17.264	0.126	2.849	0.000
13. Government Programs	1.391	0.169	0.330	0.051	0.562	0.065	−0.577	0.000
14. Education and Training	2.395	0.145	0.873	0.000	3.052	0.155	1.116	0.000
15. R&D Transfer	0.158	0.292	−1.848	0.000	0.218	0.158	−1.523	0.000
16. C&S Infrastructures	0.665	0.369	−0.408	0.268	0.844	0.129	−0.170	0.188
17. Market Openness	0.273	0.278	−1.298	0.000	7.639	0.142	2.033	0.000
18. Physical Infrastructures	0.589	0.128	−0.529	0.000	0.523	0.092	−0.649	0.000
19. Cultural and Social Norms	1.863	0.165	0.622	0.000	0.284	0.099	−1.258	0.000
20. Constant	0.979	0.619	−0.021	0.972	0.075	0.334	−2.593	0.000

For the same year, an analysis of the control variables provides interesting insights. The entrepreneurial initiative among men prevailed (OR = 0.906), showing the significance of gender as a condition to start a new business venture. The analysis of education shows that the variable is not significant to foster entrepreneurial initiative ($p = 0.436$). Consistent with prior studies, social context, opportunity recognition, and skills perception are significant and raises by 1.781, 2.176, and 3.650 times, respectively the likelihood of becoming an entrepreneur. On the contrary, the fear of failure and entrepreneurship as a desirable career choice (with a 10% level of significance) decreases the interest of becoming an entrepreneur (OR < 1). Entrepreneurship status is seen positively as influencing entrepreneurial initiative. Finally, the exposure of successful stories on entrepreneurship through media is not statistically significant as a driver of starting entrepreneurial ventures.

In 2017, the analysis of the antecedents of EEs reveals that the C&S infrastructures variable is the only one with no effect on entrepreneurial initiative. The results show that the government policies variable is the most relevant one, since it increases 17.264 times the likelihood of starting a business followed by market openness, which raises 7.639 times the probability of starting a new business. Moreover, the education and training variable is significant towards entrepreneurial initiative, raising 3.052 times the likelihood of starting a new venture. The antecedents government programs, R&D transfer, physical infrastructures, and cultural and social norms although significant, decrease the interest on entrepreneurial initiative as demonstrated by the odds ratio lower than 1.

In 2017, the model indicates that there were four control variables significantly contributing to entrepreneurial initiative. The analysis shows that the social context (OR = 2.212), opportunity recognition (OR = 1.625), skills perception (OR = 3.842), and media exposure (OR = 1.132) positively influence entrepreneurial initiative. Education and exposure to successful stories on entrepreneurship proved to be not significant.

When comparing the changes that occurred between 2010 and 2017, it is possible to conclude that education and training played a positive role over time influencing entrepreneurial initiative. On the other hand, R&D transfer, C&S infrastructures, and physical infrastructures do not influence entrepreneurial initiative. It is clear that the formal education and training variable increases the willingness of individuals to be

entrepreneurs, regardless of the conditions of the entrepreneurial ecosystem. On the contrary, R&D transfer, C&S infrastructures, and physical infrastructures that apparently are important variables of the entrepreneurial ecosystem hardly change over time, as they are part of the infrastructural base of the entrepreneurial ecosystem.

Moreover, it is possible to conclude that financial issues, government policies, and cultural and social norms change over time, as they are much more prevalent in 2010 and less prevalent in 2017. In 2010, the economic and financial crises that affected the world economy made financial support and government programs not the first option for many governments. However, they were mandatory for entrepreneurs to embrace entrepreneurial venturing activities. In 2017, financial support and government programs are not very essential as other variables, such as market openness and government policies, override the difficulties posed by the economic and financial burden of life in 2010.

Market openness and government policies are the two variables of the entrepreneurial ecosystem that change positively from 2010 to 2017. This means that market opportunities are wider in 2017 when compared to 2010. In addition, government policies are clearly underpinning the creation of new ventures, which was not the case in 2010, most likely as a result of the financial and economic crises that most of the analysed economies went through.

In conclusion, and based on the hypothesis defined, it is possible to conclude that Hypothesis 1 is partially supported (Table 8).

Table 8. Hypothesis in the test and validation.

Hypothesis 1	Validation
The prevalence of entrepreneurial ecosystem antecedents is positively associated with individuals' entrepreneurial initiative	Partially Supported

5. Discussion

The attention given to the topic has been fueled by the desire of a large community of academics, practitioners, and policymakers to discover a 'recipe' that can shape EE more accurately, thereby amplifying entrepreneurial initiative.

This study investigates the transformation of EEs through the lens of nine antecedents, aiming to discover the individual impact of each determinant on entrepreneurial initiative. As demonstrated in the literature, entrepreneurial ecosystems are a phenomenon involving two perspectives: The individual and the context (Lux et al. 2020). Setting out from the contributions of Mack and Mayer (2016), Cantner et al. (2020), and Brown and Mason (2017), for the purposes of the study, EEs were considered to evolve over time and their transformation depends on the combination of EE attributes and individuals' entrepreneurial initiative.

Overall, the results highlight the dynamism and volatility of EEs, and prove that external conditions support or undermine entrepreneurs. Surprisingly, the empirical findings indicate that some antecedents of EEs are not significant in either period. Other antecedents are perceived as deterring factors of entrepreneurial initiative. The results are controversial and thus, do not allow generalisations.

First, it becomes evident that EI is not dependent on all of the EE antecedents. As indicated by the descriptive analysis, and later proved by the tests, some antecedents fail to spur entrepreneurial initiative. Only three antecedents reveal a positive transformation-government policies, education and training, market openness—during the 8-year period. This appears to suggest the need to design long-term entrepreneurship policies, rather than fast, short-term actions, since changes, particularly at the institutional level, occur progressively. The variability of finance, government programs, and culture also sheds light on the perceived fragility of the system. The insufficient support of these dimensions may reveal knowledge asymmetries related to inconsistent policies. Nevertheless, the results show that FME and GPR are not enough to stimulate entrepreneurs, in contrast

with the prior literature. In addition, the inadequate use of resources can contribute to the misguided policy and cause a biased perception of the phenomenon. The effect of R&D transfers pinpoints the inefficacy of knowledge transfer mechanisms and knowledge-based research practices. In particular, the results draw attention to the relevance of placing research at the center of the entrepreneurial process. One possible explanation is the fact that research responds to an elitist pathway, neglecting entrepreneurship as a choice for further exploitation. Moreover, PIN fails to support entrepreneurship and, surprisingly, CSI is not significant, indicating that the entrepreneur has other sources of motivation to initiate a business. The norm of culture appears very fragile concerning entrepreneurship, acting as a deterring factor. However, the dissimilarities of countries can contribute to a negative perception of this antecedent, in general.

Second, the analysis showed that EE transformation does not follow a linear trajectory. The findings illustrate fluctuations among antecedents, revealing the inconsistency of policy perception. As previously mentioned, despite the fact that entrepreneurship is a global tendency, the present study reinforces EE heterogeneity, indicating that there is no "one size fits all" policy, and revealing the need to examine this complex phenomenon empirically to avoid flawed policy directions. More importantly than taking EE as a group of antecedents, reinforcement should act partially on specific aspects.

Third, the study introduces the importance of perceiving EE as a reliable and stable set of conditions, in the long-term. Therefore, entrepreneurship design policy should be focused on the long run to support individuals planning and engaging in entrepreneurial journeys. Additionally, the perception of all the players engaged in the EE should be strengthened, raising awareness on entrepreneurship support dimensions. Otherwise, the lack of communication turns entrepreneurship into a fuzzy phenomenon.

If entrepreneurship is considered a powerful tool to overcome economic and social challenges, it cannot be dependent on conjectural conditions, as this will weaken the creation of an entrepreneurial culture and turn entrepreneurship into a volatile phenomenon. To achieve more advanced and self-sustained ecosystems, academics, practitioners, and policymakers need to understand EEs and their quality more thoroughly, addressing dissimilarities among territories, and acknowledge the importance of a support system in building entrepreneurs' confidence.

Moreover, the results allow the understanding of the phenomenon using a SWOT perspective, where dimensions are rooted according to their effect (Table 9). The classification of measures follows their strength or weakness, revealing opportunities and threats for public policies on entrepreneurship.

Table 9. Entrepreneurial ecosystem policy framework.

Strengths	Weaknesses
Culture and social norms are relevant drivers to stimulate entrepreneurship, and must be stimulated at the country level.	The mechanism of transferring knowledge still does not support entrepreneurial initiative. University-industry linkages must avoid practices based on economic benefits.
Opportunity	**Threat**
Despite the lower performance of education, the entrepreneurial mindset in general, respects individual determinants and country singularities.	A major investment in infrastructure will have a negative impact in the long term. First, the existence of underutilised infrastructure will lead the equipment to rapidly be obsolete. Second, funds are transferred to dimensions without a significant impact on EI, compromising other entrepreneurial policies.

At present, studies approach EE assessment from the common understanding that it is a valid concept for all of the countries. Nevertheless, EE needs to be deconstructed

and examined according to countries' business activity and supporting the entrepreneurial system. Otherwise, the EE concept could be inaccurately measured (Malecki 2018).

6. Conclusions

Little research has examined the transformation of EEs and assessed the role of each pillar on entrepreneurial initiative. This study aims to bring a new facet to entrepreneurship research, specifically by decomposing the influence of the antecedents of EEs on business creation.

The negative effect of funding measures and R&D transfer emphasizes the inefficacy of institutions and their policies. Unexpectedly, funding measures hinder the prevalence of business initiative. This is likely to occur due to difficulties in accessing funds, opening the discussion around the availability of money and financial incentives. One explanation could be the misuse of funds by individuals who are more prepared to exploit these instruments, leaving behind other entrepreneurs who are less prepared. Therefore, should funds be reduced or should funds be subject to stricter regulations? The other dimension requiring discussion is R&D transfer. This is closely connected to knowledge dissemination and transfer activities from universities to the industry, highlighting the role of the third mission of universities. The results show that R&D transfer is failing, suggesting that entrepreneurial initiative is discouraged since the mechanisms to access new knowledge are not properly designed. Finally, cultural and social norms do not provide the stimulating environment to foster an individual's initiative to start a new venture, despite all of the investment in funding or physical infrastructure.

This study points out three main issues for further discussion, mainly supported by empirical results. First, the results show an unbalanced influence of the antecedents of EEs on EI. Second, the ineffectiveness of institutions in encouraging the desire to act entrepreneurially. Third, entrepreneurship needs to be part of the acculturation process, since instruments and structures are not enough to encourage individuals to be entrepreneurs. In sum, the antecedents of EEs should be analysed individually, to maximize their impact on EI. However, they must respond to a consistent and long-term entrepreneurship policy package, without neglecting the context and individual factors.

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