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CONFIGURATIONS OF ENTREPRENEURIAL ECOSYSTEMS: AN ANALYSIS BASED ON GEM DATA

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1. INTRODUCTION

Entrepreneurial ecosystem (EE) is a phenomenon that is receiving growing attention both in the academic world and in the field of government action (Spigel, 2020; Velt, Torkkeli and Laine, 2020; De Brito and Leitão, 2021). The past five years have witnessed a surprising growth in studies that have applied the ecosystem approach to entrepreneurship research (Alvedalen and Boschma, 2017; Malecki, 2018; Roundy, Bradshaw and Brockman, 2018; Wurth, Stam and Spigel, 2021).

In the most recent texts, many efforts have been directed to operationalize the definition of an entrepreneurial ecosystem, identifying, and describing its components (Audretsch and Belitski, 2017; Brown and Mason, 2017), pointing out its relevance to guide the formulation and implementation of entrepreneurial public policies and debating the appropriate geographic level for its application (Kantis, Federico and Garcia, 2020; Wurth, Stam and Spigel, 2021). In addition, there are also contributions that focus on ways to diagnose or measure an entrepreneurial ecosystem (Liguori, Bendickson, Solomon and Mcdowell, 2019; Sternberg, Von Bloh and Coduras, 2019). Another highlight in recent literature is centred on the evolutionary dynamics of entrepreneurial ecosystems and their contribution to sustainable development in the regions in which they emerge (Mack and Mayer, 2016; Theodoraki, Messeghem and Rice, 2018).

All this growth is associated with the belief in the benefits that cooperation at multiple levels of action can bring to a region. Thus, a concerted action that involves different actors from governments, supporting organizations, and educational and research institutions can lead a region to develop in a more balanced and sustainable way, generating jobs, income, and wealth for its population. This is due to the possibility of the emergence of new companies and organizations that, based on technological innovations in products or processes, while competing in their markets, cooperate in a structured way for the consolidation of the regional entrepreneurial ecosystem. For Stam (2015), ambitious entrepreneurs explore opportunities for new goods and services aiming at maximum added value. This entails a greater probability of obtaining growth, innovation, and internationalization of their companies. Thus, an important ingredient of EEs is the ability to attract and encourage the performance of this type of entrepreneur.

Thus, EEs have been defined as a structure capable of fostering entrepreneurial activities, based on a holistic and systemic perspective, with the entrepreneur at its centre, having his/her actions regulated by the context (Acs, Autio and Szerb, 2014). Definitions of entrepreneurial ecosystems have, in this sense, stressed the combination and interaction of material, cultural and social dimensions that produce shared values that encourage ambitious entrepreneurship (Stam, 2015; Spigel, 2017; Malecki, 2018; Spigel, Kitagawa and Mason, 2020).

Recently, some studies have focused EEs applying a configurations perspective (Alves, Fischer, Vonortas, Queiroz, 2019; Vedula and Fitza, 2019; Xie, Wang, Xie and Duan, 2021). Focusing on how a set of attributes may configure archetypes or organizational gestalts, configurational approaches consider the possibility of equifinality, i.e., different combinations of the same attributes may achieve similar performance in a given period. Another salient feature of the configurational approach is that, although combinations of attributes may happen in a very large number of variations, there are only a few configurations that prove to be viable.

However, previous studies adopting the configurational approach have not specifically addressed whether different configurations of EEs could produce similar outcomes. Equifinality is a central tenet of configurational approaches. Our research, thus, tries and bring new knowledge related to the theme.

Public policies for entrepreneurship is a field that may benefit from the application of a configurational perspective in EEs research. If one assumes that different configurations may achieve similar results, entrepreneurship policy should consider this variety instead of trying to mimic successful EEs, i.e., the "follow the leader strategy". However, despite the increased attention to entrepreneurship public policy literature (Terjesen, Bosma and Stam, 2016; Leyden, 2016; Jackson, Dobson and Richter, 2018), the potential benefits of a configurational approach to policy formulation and implementation have seldom been discussed, especially regarding the implications of equifinality. In order to address this gap in the literature, we seek to answer the following research question: Can different EE configurations achieve similar results, and, if so, what are the implications of this for public policy?

Thus, in this paper, we suggest the use of a principal components and cluster analysis in order to verify how differing configurations of EEs can exist. Furthermore, our analysis gives evidence of the equifinality of EEs showing that different configutations may produce similar outcomes. This results supports, with empirical evidence, that public policy in the EE domain has to consider regional idossincrasies instead of following an EE recipe.

The purpose of this paper is to add knowledge in the discussion of EEs configurations, their outcomes, and possible implications for entrepreneurship public policies. We do so by examining a set of data from Global Entrepreneurship Monitor surveys conducted in 79 countries prior to 2020. Based on the extraction of five clusters of countries, we highlight the main distinguishing features of each group of countries. Then, we compare these clusters of countries on a set of performance indicators (Perceived Opportunities Rate, Entrepreneurial Intentions Rate, Total early-stage Entrepreneurial Activity, Motivational Index, High Job Creation Expectation Rate, and Innovation Rate) originated in the same GEM surveys aiming to discuss implications of equifinality and different combinations of EEs attributes to the process of formulating public policies for entrepreneurship.

The paper is structured into four additional sections, besides this introduction. The following section is devoted to presenting a brief review of the literature on EE, its elements and previous research on EEs' configurations. The research procedures are described in section 3, with a detailed description of the steps followed for building configurations of entrepreneurial ecosystems. Results and discussion are the focus of section 4, with a description of the EE configurations that were revealed and their relationship with chosen performance indicators. Finally, in conclusion, we comment on the contribution of the paper and present suggestions about the interplay between EE configurations and entrepreneurship policy.

2. ENTREPRENEURIAL ECOSYSTEM, ITS DIMENSIONS AND CONFIGURATIONS

One of the first authors to refer to the idea of an entrepreneurial ecosystem was Cohen (2006). Cohen discussed how a community could evolve into a "sustainable valley" in which a set of innovative and sustainable technologies could emerge in a geographic region through new ventures. Four years later, Isenberg (2010) suggested that a broader approach to EEs could help governments achieve economic growth if public efforts and policies focused on greater involvement of the private sector, modification of cultural norms, removal of regulatory barriers, among other issues.

After Boyd Cohen's first use and conceptualization of entrepreneurial ecosystems in 2006, numerous definitions, some simpler, others more elaborate, can be found in the academic literature. In general, the idea of an entrepreneurial ecosystem is related to the articulation of actors, public and private organizations, and the government to create a favourable environment for entrepreneurship, especially one with a high economic and social impact. Chart 1 lists some of them, demonstrating the diversity of definitions that have merged in the field.

Chart 1. Definitions of entrepreneurial ecosystems

An interconnected group of actors in a local geographic community committed to sustainable development through the support and facilitation of new sustainable ventures (Cohen, 2006).
A set of actors and interdependent factors coordinated to enable productive entrepreneurship (Stam, 2015).
A dynamic community of interdependent actors (entrepreneurs, suppliers, buyers, government, etc.) and institutional, informational and socioeconomic contexts at the system level (Audretsch and Belitski, 2017).
An interconnected and collaborative network of stakeholders providing support, with a focus on sustainability, to entrepreneurs in order to foster entrepreneurial activities that simultaneously address the economic, ecological and social dimensions of sustainability and thus contribute to a sustainable regional economy (Bischoff and Volkmann, 2018).
A set of conventional and sustainable business models, different types of business ventures, and a demographically diverse set of entrepreneurs (eg, gender, race and ethnicity) and public and private support structures and initiatives (eg, incubators, small business loans) (Neumeyer and Santos, 2018).
A self-organizing, adaptive, and geographically limited community of complex agents operating at multiple, aggregated levels, whose non-linear interactions result in patterns of activities through which new ventures form and dissolve with the time (Roundy, Bradshaw and Brockman, 2018).
A complex regional agglomeration of entrepreneurial activities that provides two relevant classes of services: enhanced entrepreneurial activity that benefits its broader economic and social environment; and various forms of formal and informal support that generally increase the probability of success of the entrepreneurial activity (Kuckertz, 2019).
A regional collection of actors (such as entrepreneurs, advisers, workers and mentors) and factors (cultural perspectives, policies, R&D systems and networks) that contribute to the creation and survival of high-growth enterprises (Spigel *et al.*, 2020).
Evolving ecosystem consisting of entrepreneurs and key companies that govern, integrate and perform all the functions necessary for the development of entrepreneurship in a territory (Stam and Van de Ven, 2021).

Source: Elaborated by the authors.

As can be seen from the examples presented in chart 1, the simplest concepts such as Cohen (2006), Stam (2015), and Stam and Van de Ven (2021) mention the interaction and interdependence of different actors and contextual factors that result in entrepreneurial activities. On the other hand, other concepts converge with this idea, and add details about the types of actors and factors that make up an ecosystem. There is also a division between the propositions, with some restricting the effects of entrepreneurial ecosystems to productive and high-growth entrepreneurship, while others do not. Finally, in some definitions, broader effects emerge, such as economic growth, sustainable development, and the accumulation of various forms of capital.

Based on these different definitions, and since their inception, many authors have proposed descriptions of the components of an entrepreneurial ecosystem. For our study, we chose to apply the dimensions used in the Global Entrepreneurship Monitor (GEM) surveys. Although the term entrepreneurial ecosystem is not used in GEM's scope, one of the parts of the research is dedicated to the evaluation of conditions that affect, positively or negatively, entrepreneurship (Entrepreneurial Framework Conditions - EFCs) in each country. Some researchers have adopted assessments of these conditions in conducting studies of entrepreneurial ecosystems (Hechavarría and Ingram, 2014; Hechavarría and Ingram, 2019; Farinha, Lopes, Bagchi-Sen, Sebastião and Oliveira, 2020; Muñoz, Kibler, Mandakovic and Amorós, 2020).

These conditions are assessed by experts from each country who participate annually in the survey by answering a series of statements on a Likert scale with scores from 0 to 10 (0 = completely false; 10 = completely true). Data is available online at https://www.gemconsortium.org/data. Chart 2 shows the 12 dimensions and their definitions as presented on the GEM international website.

Chart 2. Description of the Entrepreneurship Framework Conditions (EFCs) indicators

Entrepreneurial Finance: The availability of financial resource - equity and debt - for small and medium enterprises (SMEs) (including grants and subsidies).
Governmental Policies: Support and Relevance: The extent to which public policies support entrepreneurship - entrepreneurship as a relevant economic issue.
Government Policies: Taxes and Bureaucracy: The extent to which public policies support entrepreneurship - taxes or regulations are either size-neutral or encourage new and SMEs.
Government Entrepreneurship Programs: The presence and quality of programs directly assisting SMEs at all levels of government (national, regional, municipal).
Entrepreneurial Education at School Stage: The extent to which training in creating or managing SMEs is incorporated within the education and training system at primary and secondary levels.
Entrepreneurial Education at Post School Stage: The extent to which training in creating or managing SMEs is incorporated within the education and training system in higher education such as vocational, college, business schools, etc.
Research and Development Transfers: The extent to which national research and development will lead to new commercial opportunities and is available to SMEs.
Commercial and Legal Infrastructure: The presence of property rights, commercial, accounting and other legal and assessment services and institutions that support or promote SMEs.
Internal Market Dynamics: The level of change in markets from year to year.
Internal Market Burdens or Entry Regulation: The extent to which new firms are free to enter existing markets.
Physical Infrastructure: Ease of access to physical resources - communication, utilities, transportation, land or space - at a price that does not discriminate against SMEs.
Cultural and Social Norms: The extent to which social and cultural norms encourage or allow actions leading to new business methods or activities that can potentially increase personal wealth and income.

Source: Global Entrepreneurship Monitor 2019/2020 Global Report (2020).
Available at: <https://www.gemconsortium.org/wiki/1154>.

2.1. Configurations of entrepreneurial ecosystems

Spigel's study (2017) seems to have been the first to draw attention to the issue of multiple configurations of entrepreneurial ecosystems. For the author, “an ecosystem’s attributes do not exist in isolation but rather develop in tandem, helping to influence and reproduce one another” (ibid., p. 55), which implies that “entrepreneurial ecosystems can have multiple possible configurations” (ibid., p. 56). Illustrative case studies of the Canadian cities of Calgary and Waterloo were used by Spigel (2017) to explore the different possible configurations of entrepreneurial ecosystems and how it affects the types of resources entrepreneurs can obtain to start and expand their businesses. The research results showed that Calgary's entrepreneurial ecosystem is driven by its strong local oil and gas market, which creates numerous opportunities for new ventures and attracts highly skilled workers and financial capital to the region. The Waterloo ecosystem, in turn, is driven by an underlying entrepreneurial culture that fosters strong networks of public and private actors. Despite the different configurations, both ecosystems confer significant benefits to new ventures.

Muñoz et al. (2020) advanced Spigel's (2017) work by examining how the attribute configurations of ecosystems in 71 regions of Chile support or hinder the emergence of new and innovative firms. The research used GEM data on the assessment of local experts on their ecosystems and was carried out using the Fuzzy-Set Qualitative Comparative Analysis (fsQCA). In short, the study developed an evaluative approach to entrepreneurial ecosystems as configurational narratives and revealed three distinct types of ecosystems that explain the different local levels of entrepreneurial activity: Active self-propelled, Indulged and Passive self-absorbed. The authors conclude, among other things, that “there are several distinct configurations of mostly necessary conditions and partially sufficient combinations of conditions that can support the development of a successful local entrepreneurial ecosystem” (Muñoz et al., 2020, p. 12).

In the same way, Schrijvers, Stam and Bosma (2021) developed a study in which a configurational approach is applied in an analysis of the entrepreneurial ecosystems of 273 regions in Europe. The central question explored by the authors is “how do the elements of the entrepreneurial ecosystem combine to enable productive entrepreneurship?”. Using the fsQCA method and based on Erik Stam's EE model (Stam, 2015; Stam and van de Ven, 2021), the study concluded that there are different configurations of successful entrepreneurial ecosystems, whether or not there is a perfect configuration that all these ecosystems exhibit. More specifically, the results of the fsQCA pointed to the existence of four different configurations of successful ecosystems in Europe. Two of these configurations are defined in talents combined with leadership or institutions; two other configurations present strong intermediary knowledge and services combined with strong leadership or institutions.

Also in this perspective, Xie et al (2021) explored the configurational effect of seven factors (innovation capacity, market potential, human capital, financial capital, physical infrastructure, Internet infrastructure and government size) related to the quality and quantity of entrepreneurial activity for 173 Chinese cities. Equally applying fsQCA, the study's findings suggest that both quantity and quality entrepreneurship depend on the interaction of these various factors – in other words, “multiple and equally effective pathways can lead to both high-quantity and high-quality entrepreneurship.” (ibid., p. 507). More specifically, the results indicate Internet infrastructure, innovation capacity and government size as important influences on the quantity and quality of entrepreneurship.

Finally, the study by Alves et al. (2019) should also be highlighted. The paper evaluated data from 299 municipalities in the state of São Paulo, Brazil, in order to identify different patterns behind knowledge-intensive entrepreneurship ecosystems. In fact, the authors suggest that ecosystems have regularities, but they can take on different configurations. Supported by an entrepreneurial ecosystem concept model with five dimensions (science and technology, human capital, market dynamics, business dynamics and infrastructure) and using fsQCA techniques, the authors identify a relatively heterogeneous nature of entrepreneurial ecosystems, in which research universities, the intensity of knowledge-intensive jobs and the availability of credit are fundamental conditions, while the proximity to the main economic centre emerges as an important differential between ecosystems. Finally, the authors state that the main message of the study is that entrepreneurial ecosystems have diverse configurations and, therefore, comprehensive models may not be able to address local idiosyncrasies and, therefore, are unable to satisfactorily guide the policy making process.

3. RESEARCH PROCEDURES: ROADMAP FOR BUILDING CONFIGURATIONS OF ENTREPRENEURIAL ECOSYSTEMS

In this section, we explain the methodological steps that resulted in the creation of an entrepreneurial ecosystem taxonomy. In the field of innovation, the use of taxonomies or typologies has its tradition since the seminal work on the typology of innovative patterns by Keith Pavitt (Pavitt, 1984). In the field of entrepreneurship, there are scarce studies that do so, and usually are based on the availability of indicators of international rankings (Kantis and Federico, 2020).

Although the development of the literature on entrepreneurial ecosystems seems to have been based on studies carried out at the level of cities or subnational regions (Velt, Torkkeli and Laine, 2020), this article adopts a geographic perspective of analysis at the level of countries. This methodological option is, in fact, an imposition resulting from the unavailability of data from the GEM's surveys at more geographically disaggregated levels. Villegas-Mateos and Amorós (2019) and Villegas-Mateos (2021), for example, used disaggregated data from GEM's surveys with national experts to analyze entrepreneurial ecosystems in subnational regions of Mexico and Chile, respectively. However, it is not in all countries that GEM's surveys are designed to capture, with statistical reliability, the entrepreneurial dynamics at the level of sub-national regions or cities. Nevertheless, considering that our main purpose is to reveal different configurations of EEs and ascertain if equifinality can be found amidst those configurations, we consider the Gem data, for its longitudinal approach and high quality to be adequate for our purposes.

After creating this taxonomy, we carried out the analyzes and discussions about the entrepreneurial ecosystem in the light of configuration theory. This, in our opinion, comprises a relevant methodological distinction with respect to previous works, as it develops the taxonomy from a set of indicators designed to measure entrepreneurial ecosystems and does not use pre-existing taxonomies elsewhere, such as classification of countries in stages of economic development (Schwab, 2018).

With this goal in mind, a specific number of statistical procedures were adopted and subsequently applied over the GEM dataset for 79 countries. For most of the countries (55), availabe data covered the period between 2013 and 2019. However, a small number of countries had not available data for this period, but had for earlier years. Thus, we chose countries with at least five years data, and took the average for each EFC considering the most recent 5 years period per country[i]. As our research interest focused on revealing patterns of EFCs conditions among countries, and since these patterns do not change abruptly in short periods, we think that considering different five years periods for some countries would not be a major issue that could impact our results.

3.1. Step 1: selection of variables or indicators

As informed and discussed in our literature review section on entrepreneurial ecosystems the conceptual framework that results in the GEM set of variables was our starting point and therefore, in this study, all 12 variables that measure Entrepreneurship Framework Conditions (EFCs), from the National Expert Survey were employed. As pointed out by Hair, Black, Babin and Anderson (2010), the solution generated by both exploratory factor analysis and cluster analysis is strongly dependent on the choice of variables used, which implies that the inclusion or exclusion of relevant or irrelevant variables has a great impact on the resulting taxonomy. As, a priori, it is not possible to assess, from a practical point of view, the suitability of a given variable for later use in the creation of the taxonomy, the ideal is to start from a reasonably large set of variables, which, from a theoretical point of view, have been identified as important variables of entrepreneurial ecosystems.

As can be seen in chart 3, GEM's variables have a strong correspondence with Isenberg's and Stam and coauthtors' EE models, widely referenced in the EE literature. Also, the study by Corrent, Greco, Nicotra, Romano and Schillaci (2019) clearly takes the EFC variables as factors of the EE. What is important is that, taken together, these variables can be considered representative of the dimensions of entrepreneurial efforts, as well as institutional and context variables.

Chart 3. Relationship between the EFC variables and the variables and elements of Isenberg and Stam and coauthors EE models

EFC Variables	Isenberg (2011)	Stam (2015), Stam e Van de Ven (2021) e Leendertse, Schrijvers e Stam (2021)
Entrepreneurial Finance	*Finance (financial capital):* micro-loans; angel investors, friends and family; zero-stage venture capital; venture capital funds; private equity; public capital markets; debt.	*Finance:* venture capital; access to credit
Governmental Policies: Support and Relevance	*Policy (leadership):* unequivocal support; social legitimacy; open door for advocate; entrepreneurship strategy; urgency, crisis and challenge.	*Formal institutions:* quality of government (corruption, accountability, and impartiality); ease of doing business.
Government Policies: Taxes and Bureaucracy	*Policy (government):* regulatory framework incentives (e.g. tax benefits); venture-friendly legislation.	
Government Entrepreneurship Programs	*Policy (government):* institutions (e.g. investment, support); financial support (e.g. for R&D, jump start funds).	
Entrepreneurial Education at School Stage	*Human capital (educational institutions):* general degrees (professional and academic); specific entrepreneurship training.	*Talent:* population with tertiary education; working population engaged in lifelong learning; population with an entrepreneurship education; population with e-skills.
Entrepreneurial Education at Post School Stage		
Research and Development Transfers	*Policy (government):* research institutes.	*New Knowledge:* R&D expenditure.

Commercial and Legal Infrastructure	*Supports (support professions):* legal; accounting; investment bankers; technical experts, advisors. *Policy (government):* venture-friendly legislation (e.g. bankruptcy, contract enforcement, property rights and labor).	*Intermediate services:* employment in knowledge-intensive market services.
Internal Market Dynamics *Internal Market Burdens or Entry Regulation*	*Markets (early costumers):* early adopters for proof-of-concept; expertise in productizing; reference customer; first reviews; distribution channels. *Markets (networks):* entrepreneur's networks; diaspora networks; multinacional corporations.	*Demand:* disposable income per capita; potential market size expressed in GRP and in population. *Networks:* connectedness of businesses.
Physical Infrastructure	*Supports (infraestruture):* telecommunications; transportation & logistics; energy; zones, incubations centers, clusters.	*Physical infrastructure:* accessibility by road; accessibility by railway; number of passenger flights; digital infrastructure. *Intermediate services*: incubators/accelerators.
Cultural and Social Norms	*Culture (successes stories):* visible successes; wealth generation for founders; international reputation. *Culture (societal norms*): tolerance of risk, mistakes, failures; innovation, creativity, experimentation; social status of entrepreneur; wealth creation; ambition, drive, hunger.	*Entrepreneurship culture:* entrepreneurial motivation; cultural and social norms; importance to be innovative; trust in others. *Leadership:* actors that provides guidance for and direction of collective action.

Source: Elaborated by the authors.

3.2. Step 2: performing the exploratory factor analysis (EFA)

Several studies with the intention of creating taxonomies apply factor analysis as a means of reducing the number of dimensions and variables to be used in cluster analysis (Hollenstein, 2003; De Jong and Marsili, 2006). Factor analysis condenses the information contained in a number of original variables, into a smaller set of statistical variables, called factors, with minimal loss of information. It also reduces the risk that a given variable or factor (dimension) will dominate (influence) the result of the cluster analysis, and prevents the inclusion of non-relevant variables.

3.2.1. Adequacy of data for analysis

This first step consists of considerations regarding the nature of the variable, the sample size, the necessary statistical assumptions, and the relationships between the variables. Starting with the nature of the variables, according to Hair *et al.* (2010), in factor analyses, metric variables are generally preferred and dichotomous variables to a lesser extent. The 12 original variables used (Table 1) are metrics, arising from the average of questions measured on a Likert scale.

Regarding sample size, our sample has 79 observations (countries), corresponding to 6.58 cases for each variable, and is considere adequate (Hair *et al*, 2010). Assumptions of normality, homoscedasticity and linearity are less restrictive in factor analysis than in other multivariate techniques, and thus were not considered (Hair *et al*, 2010).

Finally, the question that remains is whether the variables have any relationship to each other, so that it is plausible to proceed with the factor analysis. The literature indicates four complementary ways to do this. The first is the simple visual inspection of the correlation matrix to identify how many are statistically significant. There must be a sufficiently large amount of statistically significant correlations (greater than .30) to move forward.

The second way is to analyze the partial correlation matrix, which is the unexplained amount of correlations between variables, when the effect of all other variables is taken into account. As pointed out by Hair *et al.* (2010, p.102-3) "*if the partial correlations are high, indicating in the underlying factors, then factor analysis is inappropriate*" and "*... the rule of thumb would be to consider partial correlations above .70 as high*".

The third and fourth ways to verify the adequacy of data to EFA is to check the value generated by statistics known as Kaiser's Measure of Sampling Adequacy - MSA and the Bartlett test of sphericity. The MSA varies between 0 (no correlation) and 1 (perfect prediction of the variable by all others). Kaiser, the creator of the measure, established the following interpretive ranges: MSA ≥ 0.80, meritorious; 0.70 ≤ MSA < 0.80, meddling; 0.60 ≤ MSA < 0.70, mediocre; 0.50 ≤ MSA < 0.60, miserable; MSA < 0.50, unacceptable (Hair *et al.*, 2010). This measure is provided for the entire set of variables and for each one separately. On the other hand, for the Bartlett test of sphericity, if the test result obtains statistical significance, it will indicate that there is the presence of correlations between the variables.

In the 1st round run, the variable IMD did not achieve the minimum value of MSA (greater than 0.50), so we exclude it and run a 2nd round. Table 1 shows that these reduced set of variables achieved the 4th criteria above described. There were 54 of the 66 (≈ 82%) of significant correlations at the level of .01, which suggests an adequate data set the EFA. Observing the total of significant correlations of each variable (values in the last column of Table 1), we have a range that goes from a maximum of 10 to a minimum of 8.

Table 1. Assessing Assumptions in Factor Analysis: Correlations, Measures of sampling adequacy (MSA), Partial correlations After exclusion of IMD variable

Code	Variable description	EF	GPSR	GPTB	GEP	EESS	EEPSS	RDT	CLI	IMBER	PI	CSN	Number of significant correlations[a]
EF	Entrepreneurial Finance	.860[b]	**.527**	**.478**	**.552**	**.573**	**.260**	**.676**	**.558**	**.655**	**.467**	**.440**	11
GPSR	Governmental Policies: Support and Relevance	-.180	.836[b]	**.626**	**.745**	**.431**	**.368**	**.633**	**.310**	**.492**	**.384**	**.367**	11
GPTB	Government Policies: Taxes and Bureaucracy	.083	-.260	.902[b]	**.685**	**.440**	**.376**	**.567**	**.468**	**.589**	**.547**	**.453**	10
GEP	Government Entrepreneurship Programs	.057	-.488	-.222	.877[b]	**.444**	**.494**	**.774**	**.545**	**.702**	**.538**	**.338**	10
EESS	Entrepreneurial Education at School Stage	-.223	-.128	-.048	.180	.894[b]	**.549**	**.563**	**.536**	**.579**	.253	**.535**	9
EEPSS	Entrepreneurial Education at Post School Stage	.373	.059	.030	-.162	-.273	.783[b]	**.551**	**.423**	**.468**	.174	**.481**	9
RDT	Research and Development Transfers	-.298	-.163	.124	-.250	-.054	-.330	.889[b]	**.586**	**.775**	**.562**	**.365**	10
CLI	Commercial and Legal Infrastructure	-.213	.263	-.099	-.174	-.196	-.123	.007	.903[b]	**.656**	**.432**	**.305**	10
IMBER	Internal Market Burdens or Entry Regulation	-.150	.191	-.118	-.210	-.149	.007	-.307	-.193	.926[b]	**.550**	**.397**	10
PI	Physical Infrastructure	-.061	.105	-.288	-.072	.132	.177	-.227	-.068	-.102	.897[b]	.216	7
CSN	Cultural and Social Norms	-.258	-.047	-.238	.096	-.202	-.339	.152	.106	-.034	-.007	.830[b]	9

Source: Elaborated by the authors.
Notes: a Bold value are correlations with least at the .01 significance level. b On the diagonal grey cells are the Measure of sampling adequacy (MSA). Off diagonal and above are Correlations among variables. Off diagonal and below are Partial correlations among variables. Overall Measure of sampling adequacy (MSA) = .876. Bartlett Test of Sphericity = 544.957, significance = .000.

Regarding the MSA and Bartlett test of sphericity statistics, both provides us with a positive indication of the adequacy to EFA. The general value of the MSA for the whole dataset was .876, in the range MSA ≥ 0.80, meritorious. Examining each of the MSA, only variable EEPSS have MSA values between 0.70 ≤ MSA < 0.80, meddling.

Taking these into account, without the IDM variable, the eleven retained variables met the criteria needed to proceed with the EFA and, therefore, we proceeded to the next steps. Anyway, the IMD scores were preserved for the comparison of EEs' performance.

3.2.2. Number of factors to retain

The number of factors to retain is one of the most important tasks of a factor analysis (Kline, 1994). There are several criteria that help to determine the number of factors that, invariably, when used in the same set of data, lead to different results (Artes, 1998). Among the best known are the criteria developed by Kaiser in 1958 (Kline, 1994): the latent root criterion, the percentage of variance criterion and the scree test criterion. Table 2 and Figure 1 below contain the information needed to analyze the factors to retain. Its data consist of the presentation of the eleven possible factors to be extracted with the respective explanatory power value contained in their eigenvalues.

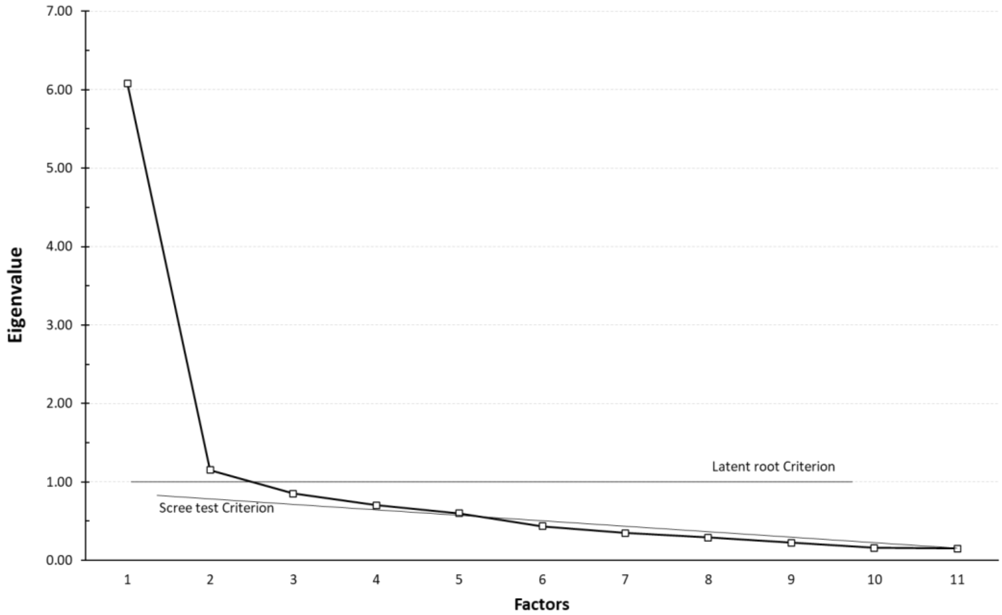
Table 2. Eigenvalues

Component	Eigenvalues[1]		
	Total	% of variance	% Cumulative
1	6.083	55,301	55.301
2	1.151	10.460	65.761
3	.852	7.748	73.509
4	.704	6.398	79.907
5	.600	5.455	85.362
6	.434	3.950	89.312
7	.350	3.179	92.491
8	.291	2.642	95.133
9	.225	2.047	97.179
10	.158	1.435	98.614
11	.152	1.386	100.000

Source: Elaborated by the authors.

Note: (1) Eigenvalue is the measure of how much of the total variance of the variables is explained by the factor. It is obtained by summing the squares of the factor loadings of all variables in the respective factor. Indicates the relative importance of each factor in explaining the variance associated with the analyzed set of variables (Lebart, Morineau and Piron, 1995).

Figure 1. Scree test and Latent root criterions for factors to retain



Source: Elaborated by the authors.

By the criteria described above, we would have two or three factors to retain. As a starting point, solutions with 2 and 3 factors were performed and the most parsimonious results were obtained with the solution of three factors. One of the reasons that led to this decision was that the two-factor solution, generated a factor represented by variables with high loads in more than one factor.

3.2.3. Factor analysis solution

The generation of the solution matrix employed the principal component analysis method that represents a linear combination of the original variables and are called factors, where the explained variation does not concern an objective (dependent) variable but rather the data set as a whole. The method proceeds step-by-step, so that the first factor extracted is the best linear combination of variables, the second is the second-best linear combination of variables, which explains the variance not explained by the predecessor, and so on, until all possible factors are extracted or the researcher decides, by some of the rules discussed above, a specific number of factors to be extracted.

After extracting the factorial matrix, we applied the Orthogonal Varimax rotation method in order to clarify the interpretation of the factors. An ideal solution condition would be one in which a pattern is found in which some subgroups of variables are highly loaded (correlated) in one and only one of the factors, so that each of the subgroup's forms each of the factors retained in the analysis. Table 3 reports the results.

Table 3. Final solution of factor matrix to be used in Cluster analysis

Extraction method = Principal components; Rotation = Varimax; n= 79				
Variables[2]	Factor loading[1]			Comuna-lidade
	1	2	3	
CLI - Commercial and Legal Infrastructure	**.820**			.764
IMBER - Internal Market Burdens or Entry Regulation	**.732**	.403	.304	.791
EF - Entrepreneurial Finance	**.674**	.345		.647
RDT - Research and Development Transfers	**.617**	.550	.322	.786
PI - Physical Infrastructure	**.598**	.541		.677
GPSR - Governmental Policies: Support and Relevance	.117	**.847**		.817
GEP - Government Entrepreneurship Programs	.424	**.763**		.822
GPTB - Government Policies: Taxes and Bureaucracy	.303	**.737**		.705
EEPSS - Entrepreneurial Education at Post School Stage			**.766**	.671
CSN - Cultural and Social Norms			**.766**	.655
EESS- Entrepreneurial Education at School Stage	.483		**.708**	.749
Explained variance				
Eigenvalues	2,966	2,849	2,270	
Percentual of trace	26.968	25.902	20.639	73.509

Source: Elaborated by authors.

Notes: (1) Factor loadings less than ± 0,30 were omitted. (2) Variables were arranged in descending order of factor loading in each factor.

Looking at the columns of factors in Table 3, labeled 1 to 3, each of them has a clear set of variables with which they are significantly correlated. As a rule of thumb, factor loadings equal to or greater than ± 0.30 are considered valid, with loads above ± 0.50 having both statistical and practical significance. All eleven variables had a factor loading greater than ± 0.50.

Seven variables (IMBER, EF, RDT, PI, GEP, GPTB and EESS) had a factor loading greater than ± 0.30 in more than one factor. However, six of them (except for PI) have practically twice the load in one factor in relation to the other, so it is clear that they are designated by only one factor. Thus, only the PI variable had some ambiguity about the relevance of a single factor.

Two aspects regarding the information contained in Table 3 are also worth mentioning. The first concerns the values under the last column, entitled "Communalities". They reveal that the factorial solution explains more than 50% of the variance of about half of the original variables. Going from one extreme, the variable GEP with about 82% of its variance, being explained by these three factors, and, at the other extreme, the variable EF, with 64% of its variance explained by these same factors.

The second aspect concerns the amount of variance extracted by the factors. As can be seen in the last line of Table 3, the percentage of the mix is evenly distributed among the three factors, ranging from approximately 20.6% to 27.0%. This reveals that no single factor dominated the solution.

Finally, the analysis of the solution as a whole show that the factorial solution with three factors accounts for 73.5% of the total variation of the original variables (percentage of the total trace), which is considered a satisfactory solution.

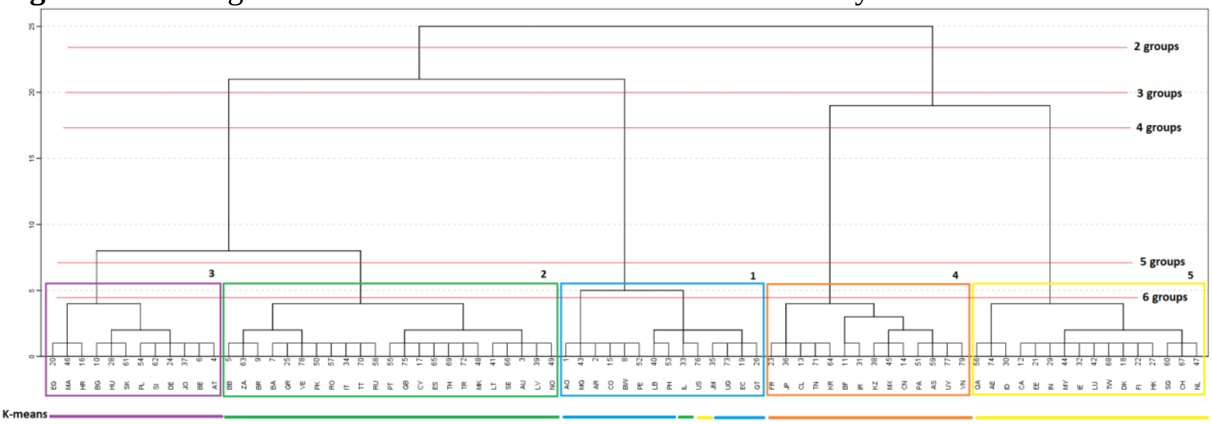
3.3. Step 3: performing cluster analysis

According to Hair *et al.* (2010), the main characteristic of this multivariate technique is to group objects according to their characteristics. In this step, hierarchical and non-hierarchical methods were used to obtain a final number of clusters as parsimonious as possible. To decide the final number of clusters, three criteria were taken into account, namely: (i) the statistical properties of the relationship within the group and between groups; (ii) the plausibility with which the clusters can actually be considered as patterns of entrepreneurial ecosystems; (iii) the number of countries per grouping.

We used the factor scores calculated for each of the factors presented in the previous step. In this way, the problem of multicollinearity is avoided, because each of the three factors represents a distinct dimension. We used the combination of hierarchical methods, followed by non-hierarchical. In this sense, at first, hierarchical analysis was applied, enabling the visual analysis of the dendrogram to decide on the number of clusters to extract. From there, we use the non-hierarchical method, in order to obtain a final solution.

Hierarchical analysis was performed to analyze the dendrogram. We used the Ward method and the Euclidean squared distance, which is known to produce clusters with approximately the same number of observations. As can be seen in Figure 2, potential solutions of 2 to 6 clusters can be extracted. To initially find out whether these clusters could be interpreted as patterns of distinct entrepreneurial ecosystems, a visual analysis of potential solutions was performed together with analysis of variance (ANOVA) tests as a way to assess the differences between the means obtained by the clusters in the three factors used for its creation.

Figure 2. Dendrogram from hierarchical and K-means cluster analysis



Source: Elaborated by authors.

Notes: Legend of axis x: numbers are the order of registries (economies) in the spreadsheet. Two letters are the ISO 3166-1 alpha-2 code of countries. The coloured boxes are the pertinence of the economies to the groups coming from the cluster analysis by the hierarchical and k-means methods.

Inspections of this information led us to discard the solutions with 2 to 4 groups, as there were few groups with large intragroup dissimilarities (see dissimilarity value on the y axis in Figure 2. The solutions with 5 and 6 groups were well characterized, that is, low intragroup dispersion and a clear intergroup separation. However, we also decided to discard the solution with 6 groups or more because groups with very few countries would emerge, making them very peculiar. Therefore, the final solution chosen was that of 5 groups.

After that, with the chosen solution of 5 clusters, the non-hierarchical procedure (k-means) was performed taking two precautions: i) using as seed the means obtained from the hierarchical analysis of the five groups in the three factors; ii) leaving to calculate the centroid mean only after the conclusion of the grouping and not at each iteration, that is, at each insertion of a new member in the group. This makes the K-means method less sensitive to the order of elements in the database. As can be seen in Figure 2, the two methods converged to practically the same solution of membership of the economies in the same respective groupings, with the exception of Israel (IL) and the United States (US), which left group 1 and went to the groups 2 and 5, respectively.

Finally, as shown in Table 4, ANOVA test was applied as a mean to assess the significance of the solution. As can be seen, all clusters have statistically significant differences in all three score factors used in the clustering process.

Table 4. Assessing significance of final cluster solution by ANOVA analysis

	Total	Cluster(1)					Significance(2,3)	
		1	2	3	4	5	F-value	Post Hoc test: Scheffe
Total (n)	*79*	*14*	*23*	*12*	*14*	*16*		
Factor 1	.000	-.787	.184	.709	-1.036	.800	20,261***	[1-4; 2-4, 2-5, 3-5]+
Factor 2	.000	-.752	-.698	-.269	1.048	.946	34,412***	[1-2; 1-3, 2-3, 4-5]+
Factor 3	.000	1.065	-.167	-1.384	-.500	.783	38,730***	[1-5; 2-4]+

Source: Elaborated by authors.

Notes: (1) Our sample comprises only countries with five or more years of data. (2) For Levene test of homogeneity of varianceis significant was used Welch Anova. (3) Significance: p < .05 = *; p < .01 = **; p < .001 = ***, non-significant = +. Pairs not mentioned post-hoc test means it has significance at least p < 0.05.

4. RESULTS AND DISCUSSION OF CONFIGURATIONS OF ENTREPRENEURIAL ECOSYSTEMS

The results indicated the formation of five clusters with different numbers of countries. The largest cluster is CL2 with 23 countries. The others had an average of 14 countries each, with CL3 composed by 12 and CL5 by 16, as can be seen in charter 4.

Chart 4. List of countries distributed by clusters

1	2	3	4	5
Angola	Australia	Austria	Saudi Arabia	United Arab Emirates
Argentina	Bosnia and Herzegovina	Belgium	Burkina Faso	Canada
Botswana	Barbados	Bulgaria	Chile	Switzerland
Colombia	Brazil	Germany	China	Denmark
Ecuador	Cyprus	Egypt	France	Estonia
Guatemala	Spain	Croatia	Iran	Finland
Israel	United Kingdom	Hungary	Japan	Hong Kong
Jamaica	Greece	Jordan	South Korea	Indonesia
Lebanon	Italy	Morocco	Kazakhstan	Ireland
Madagascar	Lithuania	Poland	Mexico	India
Peru	Latvia	Slovenia	Panama	Luxembourg
Philippines	North Macedonia	Slovakia	Tunisia	Malaysia
Uganda	Norway		Uruguay	Netherlands
United States	Pakistan		Vietnam	Qatar
	Portugal			Singapore

Romania	Taiwan
Russia	
Sweden	
Thailand	
Turkey	
Trinidad and Tobago	
Venezuela	
South Africa	

Source: Elaborated by authors.

4.1. Relationship between entrepreneurial framework conditions and performance indicators

In order to identify similarities and differences among the five clusters, the EFC conditions' means for each cluster were compared using the Scheffe Post Hoc test as shown in Table 5. The Scheffe Post Hoc test showed that the clusters had significant differences in each of the EFCs, except for Internal Market Dynamics (IMD) where the averages were not significantly different, with all clusters averaging close to 3.0 in this EFC.

Table 5. EFCs indicators by cluster, selected countries[1], GEM 2014-2019

	Total	Cluster (mean values)					Significance(2,3)	
		1	2	3	4	5	F-value	Post Hoc test: Scheffe
Total (n)	*79*	*14*	*23*	*12*	*14*	*16*		
EF(4)	2.63	2.42	2.53	2.68	2.46	3.04	33.737***	1-5, 2-5, 4-5
GPSR(4)	2.62	2.39	2.36	2.40	2.86	3.13	31.949***	1-4, 1-5, 2-4, 2-5, 3-4, 3-5
GPTB	2.47	2.13	2.21	2.19	2.66	3.17	23.615***	1-4, 1-5, 2-4, 2-5, 3-4, 3-5, 4-5
GEP	2.65	2.38	2.41	2.58	2.74	3.21	13.797***	1-5, 2-5, 3-5, 4-5
EESS(4)	2.05	2.08	2.06	1.70	1.70	2.57	22.944***	1-3, 1-4, 1-5, 2-3, 2-4, 2-5, 3-5, 4-5
EEPSS	2.86	3.04	2.76	2.56	2.76	3.14	10.938***	1-3, 2-5, 3-5, 4-5
RDT	2.40	2.19	2.31	2.30	2.32	2.88	12.794***	1-5, 2-5, 3-5, 4-5
CLI	3.02	2.89	3.05	3.08	2.72	3.31	9.765***	1-5, 2-4, 3-4, 4-5
IMD(4)	3.06	2.89	3.05	3.05	3.15	3.14	33.143^{+}	
IMBR	2.59	2.42	2.50	2.62	2.39	3.01	16.506***	1-5, 2-5, 3-5, 4-5
PI	3.78	3.34	3.63	3.96	3.87	4.17	10.517**	1-3, 1-4, 1-5, 2-5,
CSN	2.90	3.25	2.70	2.38	2.86	3.30	16.180***	1-2, 1-3, 2-5, 3-4, 3-5, 4-5

Source: Elaborated by authors.
Notes: (1) Our sample comprises only countries with five or more years of data. (2) Significance: p < .05 = *; p < .01 = **; p < .001 = ***, non-significant = $^{+}$. For Levene test of homogeneity of varianceis significant was used Welch Anova. (3) Only pairs significant at least p .05 was reported. (4) Applied Welch Anova because the Levene test of homogeneity of variances was p = .05.

Visual inspection of the clusters positioning, combined with figures in Table 5, indicates that Cluster 5 is the most distinct among them, presenting six EFCs that are significantly different (EF; GPTB; GEP; EESS; RDT; IMBR). Thus, the differing features of cluster 5 are higher evaluation of entrepreneurs financing and existing government policies in terms of taxes and bureaucracy, and government entrepreneurship programs. This configuration is also strong at entrepreneurial education at school stage, research and development transfers and, possesses less internal market burdens or entry regulation in comparison with the others.

The second configuration represented by cluster 4, shared two high results with cluster 5, i. e., level of support and relevance of government policies and physical infrastructure.

Government policies relating to taxes and bureaucracy, with an average evaluation, is the distinguishing dimension of cluster 4. Cultural and social norms was also an average indicator for this cluster. In the other EFCs, cluster 4 presented lower results.

The third configuration, cluster 3, presented higher results in commercial and legal infrastructure and physical infrastructure, features shared with cluster 5. Its distinguishing feature is an average result in entrepreneurial finance. The remaining EFCs for this cluster were evaluated with lower scores.

Cluster 2 best results were in commercial and legal infrastructure in the higher end of the scale, and four average positions in entrepreneurial education at school stage, physical infrastructure, and cultural and social norms. The remaining EFCs were evaluated with lower scores.

Finally, cluster 1 had a high score in entrepreneurial education at post school stage and average results for entrepreneurial education at school stage and physical infrastructure. The other EfCs for this cluster presented lower evaluations.

Aiming to assess the entrepreneurial outcomes of each cluster of economies, we selected a set of six indicators that we considered to be most appropriate as proxies for EEs' performance indicators. Their description is presented in Chart 5.

Chart 5. Entrepreneurial ecosystems' performance indicators

POR - *Perceived Opportunities Rate*: Percentage of 18-64 population (individuals involved in any stage of entrepreneurial activity excluded) who see good opportunities to start a firm in the area where they live
EIR - *Entrepreneurial Intentions Rate*: Percentage of 18-64 population (individuals involved in any stage of entrepreneurial activity excluded) who are latent entrepreneurs and who intend to start a business within three years
TEAR - *Total early-stage Entrepreneurial Activity (TEA) Rate*: Percentage of 18-64 population who are either a nascent entrepreneur or owner-manager of a new business
MI - *Motivational Index*: Percentage of those involved in TEA that are improvement-driven opportunity motivated, divided by the percentage of TEA that is necessity-motivated
HJCER - *High Job Creation Expectation Rate*: Percentage of those involved in TEA who expect to create 6 or more jobs in 5 years
IR - *Innovation Rate:* Percentage of those involved in TEA who indicate that their product or service is new to at least some customers AND that few/no businesses offer the same product

Source: https://www.gemconsortium.org/wiki/1154

The performance indicators are also measures obtained from the GEM consortium database. There are 15 variables used in GEM surveys to describe entrepreneurial behavior and attitudes. This information is gathered via GEM's Adult Population Survey that collect data from samples of 2,000 adults in each country with ages between 18 and 64 years old. These indicators have been used in previous studies as proxies for EEs' performance ((Muñoz, Kibler, Mandakovic, and Amorós, 2020; Ács, Autio, and Szerb, 2014; Yan and Guan, 2019; Bosma and Schutjens, 2011).

In doing so, we considered that performance at systems levels presents a time lag and an accumulative effect. The rationale for this procedure is related to well know and previous literature of technological change (Dosi, 1982; Freeman and Soete, 2007; Nelson and Winter, 1977) and also advocated by recent ones (Griliches, 1979; Méndez-Morales and Muñoz, 2019; Savona and Steinmueller, 2013). Many pieces of research have pointed out that innovation (here we can say entrepreneurial) process takes time and the interaction of many current inputs normally considered in such process (research and development, STEM under/graduate workforce, climate/cultural aspects of entrepreneurial action, and so on) may not have an effect on measured outputs that come from these until several years have elapsed.

Thus, the average indicators for the last two years were considered to best represent the outcomes of EFCs over the last five years. Then, an average performance indicator for the cluster was calculated. These data were used in Scheffe post hoc tests trying to locate performance similarities and differences among clusters. The results are shown in Table 6.

Table 6. Performance indicators by cluster, selected countries[1], GEM 2014-2019

	Total	Cluster (mean values)					Significance[(2,3)]	
		1	2	3	4	5	F-value	Post Hoc test: Scheffe
(n)	*79*	*14*	*23*	*12*	*14*	*16*		
POR	47.1	55.6	44.1	43.2	45.4	48.5	1.790^{+}	
EIR	23.3	38.5	17.8	19.1	28.2	16.9	7.847^{***}	1-2, 1-3, 1-5
TEAR[(4)]	13.0	21.6	11.0	8.0	14.6	10.5	9.817^{***}	1-2, 1-3, 1-4, 1-5
HJCER	22.0	16.1	22.7	19.9	24.3	25.7	1.756^{+}	
MI[(4)]	2.9	2.2	2.8	2.2	2.3	4.7	2.651^{*}	1-5, 3-5, 4-5
IR	25.0	24.8	22.3	23.8	26.3	28.7	1.144^{+}	

Source: Elaborated by authors.

Notes: (1) Our sample comprises only countries with five or more years of data. (2) Significance: $p < .05$ = *; $p < .01$ = **; $p < .001$ = ***, non-significant = $^{+}$. (3) Pairs mention has significance at least at level $p < .05$. (4) Applied Welch Anova because the Levene test of homogeneity of variances was $p = .026$.

As expected, the five clusters presented similar and differing outcomes depending on the chosen performance indicator. For instance, there were no significant differences among clusters regarding perceived opportunities rate, high job creation expectation rate and innovation rate. This result is very consistent with the configurations approach since one of its main tenets is the idea of different configurations being capable of producing similar outputs or presenting equal performance.

On the other hand, there were also significant differences in some of the chosen performance indicators. For instance, cluster 1 presented the highest value for total early-stage entrepreneurial activity rate, 21.6, that is significantly different from all other clusters that presented results for this indicator averaging 11.0.

Another significant difference is in Entrepreneurial Intentions rate. Cluster 1 and 4 had higher entrepreneurial intention rates that are not significantly different (38.5 and 28.2, respectively), but cluster 1 result is significantly different from the results for clusters 2, 3 and 5. On the other hand, clusters 2 and 5 presented similar results in the Motivation Index, but cluster 5 is significantly different from clusters 1, 3 and 4 in this indicator.

5. CONCLUSION

The most surprising result that our study has shown is the lack of significant differences among clusters in three outcome indicators that may be considered as most relevant for EEs scholars that consider the main purpose of EEs being generating productive or innovative entrepreneurship (Stam, 2015; Spigel *et al.*, 2020; Stam and Van de Ven, 2021). Perceived opportunities rate, high job creation expectation rate and innovation rate are indicators that are mostly related to what other researchers have called productive or high impact entrepreneurship (Nicotra *et al.*, 2018; Corrente *et al.*, 2019). It would be expected that EEs with lower evaluations in EFCs would present lower results in these three indicators. However, as our results have shown, this was not the case. In spite of differing EFC evaluations, the five clusters' configurations present a global overall state of conditions that seem to balance strengths and weaknesses leading to similar levels of productive entrepreneurship. A similar result was obtained by Schrijvers, Stam and Bosma (2021) that compared clusters of European EEs clusters at regional level and their outcomes in terms of number of innovative startups.

On the other hand, as the results have shown, the clusters have had different outcomes in three performance indicators: entrepreneurial intentions rate; total early-stage entrepreneurial activity rate; and motivation index.

Thus, when looked through a configurational approach lens, different configurations of EEs may produce similar and different outcomes. The question that remains to be answered is what lessons can be learned for entrepreneurship policies when there is an understanding of EEs as configurations?

First, we consider that our study added knowledge to understand that there is not only one type of successful EEs. In other words, equifinality of EEs was empirically evidenced by our analisis. Thus, public policy agents in the field of entrepreneurship should avoid trying to emulate successful EEs as a standard to be achieved in the long term. Thus, EE's conditions should be carefully considered when formulating entrepreneurship public policies.

Second, differing goals can be set for EEs. If the overall goal is to foster any kind of entrepreneurial activities, that can be measured by the traditional TEA rate from GEM, it seems that consistent and continued efforts in educational programmes at school and post school levels can be one of the priorities. This can be seen in the results of cluster 1, that had as its mains strengths, these EFCs. On the other hand, if the policy goal is related to increasing the presence of opportunity-based entrepreneurship compared to necessity-driven, the configuration of cluster 5 may inspire policymakers. Thus, entrepreneurship public policy may produce better results if access to finance, low levels of taxes, market regulations and bureaucracy, coupled with government entrepreneurship programs, education and less cumbersome research and development transfer are the focus of attention.

Finally, the lack of difference in the three performance indicators more adherent to productive or innovative entrepreneurship may be an indicator that, perhaps, there are other EEs' conditions that have not been addressed in GEM surveys. This suggests that further studies should focus on what type of elements in an EE are more inclined to generate favorable conditions for the emergence of productive entrepreneurship. This knowledge would further support formulation of public policies mainly focused on productive entrepreneurship.

For instance, one can expect that the governance mode of EEs may be inclined towards innovation-based entrepreneurship or towards more traditional entrepreneurship. According to Colombo, Dagnino, Lehmann and Salmador (2019), efficient governance structures in EEs deal with the provision, allocation and distribution of resources and critical incentives. They have suggested two distinct governance modes: the bottom-up approach and the top-down approach. The latter is more hierarchical and presents a formalized structure, while the first is more self-regulated or relational (Colombelli, Paolucci and Ughetto, 2019). This condition is not present in GEM's EFC and, we think that a relational governance mode may be more favourable towards productive entrepreneurship. In a relational governance mode, flows of knowledge and information are more intense, leading to a denser network of various stakeholders that might be amenable to innovation-based entrepreneurship.

Another possible dimension that may be more clearly included in configurational studies is related to Spigel and Harrison's (2018) argument that both the resources available in an entrepreneurial ecosystem and the strength of the networks through which these resources flow are fundamental to understanding its functionality. Thus, the munificence of resources (financial, entrepreneurial knowledge, skilled workers, and experienced mentors) combined with strong network ties among an EE's actors may be, as well, related with more innovative entrepreneurial activities.

Thus, further studies applying the configurational perspective are encouraged. They could replicate this study with more countries and also include other EE's conditions not covered by GEM surveys. Other types of EE's performance indicators might as well be tested. For instance, at a country level, the Global Competitiveness Index may be a suitable candidate for EE's configurations comparisons. Also, yet at a macro perspective, the average income level of each country may be used. Thus, richer and more complex sets of data could help in understanding the interplay between EE's configurations and entrepreneurship public policies.

Finally, our sample is limited by a look at EEs in a country level. Thus, our results did not consider potential differences in EEs that might be related to country geographical expansions. Other configurational studies could investigate EEs in smaller geographic areas applying Gem results.

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[i] Data and details of the analysis of each of the variables used can be provided upon request to the first author.