DOCTORAL DISSERTATION

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Rural entrepreneurial ecosystems: How are they different?

Research on the determinants of rural entrepreneurship in Colombia and Ecuador

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List of abbreviations

ABT - Entrepreneurial abilities

ASP - Entrepreneurial aspirations

ATT - Entrepreneurial attitudes

CIMO - Context, Intervention, Mechanism, Outcome

EE – entrepreneurial ecosystem

EEINDEX - Entrepreneurial Ecosystem Index

EIP - Entrepreneurship Indicators Programme

fs/QCA - fuzzy-set Qualitative Comparative Analysis

GEM - Global Entrepreneurship Monitor

GEI - Global Entrepreneurship Index

GDP - Gross domestic product

GNI - Gross national income

GVA - Gross Value Added

IBGE - Brazilian Institute of Geography and Statistics

IDE - Index of Dynamic Entrepreneurship

MPI - Global Multidimensional Poverty Index

NECI - The National Entrepreneurship Context Index

OECD - Organisation for Economic Co-operation and Development

OPHI - Oxford Poverty and Human Development Initiative

PRISMA - Preferred Reporting Items for Systematic Reviews and Meta-Analyses

Q1, Q2 - Journal Quartile 1, Journal Quartile 2

QCA - Qualitative Comparative Analysis

RQ – Research question

SLR – Systematic Literature Review

UNDP - United Nations Development Programme

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Abstract

Literature recognises that entrepreneurship is a complex, multidimensional phenomenon whose success depends on a set of interrelated factors and actors in a place: an ecosystem. To date, several conceptual frameworks and measurement tools for entrepreneurial ecosystems (EE) have been developed. However, what remains questionable is whether every ecosystem, for example rural ecosystems, operate in the same way as ecosystems in urban regions. The present dissertation was designed to investigate whether rural EE are different from their urban counterparts and if so, in which ways. Three different research methods were employed to meet this aim: a systematic literature review, a regionalized adaptation of the Global Entrepreneurship Index (GEI) methodology and fuzzy-set Qualitative Comparative Analysis (fs/QCA). The systematic review of rural entrepreneurship and rural entrepreneurial ecosystems literature reveals that present well-known theoretical framework models of EE can only partially define and measure EEs in rural contexts as they do not consider place-sensitive factors such as: rural poverty, territorial capital: natural and human resources endowments in rural locations, and peripheral location. Results from the application of the regionalised GEI methodology provided initial evidence of differences between urban and rural ecosystems in terms of performance. On the one hand, rural ecosystems perform overall lower than their urban counterparts. On the other hand, ecosystem bottlenecks (weakest system's component) composition and severity is apparently different between urban and rural areas. Finally, fs/QCA study revealed substantial differences in the weights (levels of necessity) of each of the EE elements and on the ecosystems' configurations that result in high-level entrepreneurship in rural regions and in urban regions. The findings of these studies encourage researchers with an interest in measuring EE quality in rural regions to consider both, the role of rural specificities in entrepreneurship and the existence of different weights of rural EEs elements (as an alternative of assuming that all EEs elements are equally important) in their empirical investigations to provide more context sensitive research insights and policy recommendations.

Keywords: entrepreneurial ecosystems, rural entrepreneurship, fs/QCA, GEI, rurality

1. Chapter 1: Introduction

1.1. **Research problem and questions**

Entrepreneurship has been widely recognised as an important driver of economic growth. A large body of literature confirms a positive role of entrepreneurship in the economic performance of countries, regions, and cities (Ács et al., 2008; Audretsch et al., 2015; Glaeser et al., 2010; Naudé, 2013). Therefore, understanding entrepreneurship, from diverse perspectives, has become a major area of research interest in economics, management, and regional sciences (Audretsch, 2012b; Müller, 2016). Central to the entire field of entrepreneurship research is the concept of entrepreneurial ecosystems (EE) and their role in enabling entrepreneurship (Malecki, 2018; Qian et al., 2013; Stam & van de Ven, 2021). Essentially, the term entrepreneurial ecosystem refers in its broadest sense to "A dynamic, institutionally embedded *interaction* between entrepreneurial attitudes, abilities, and aspirations, by individuals which drives the allocation of resources through the creation and operation of new ventures" (Ács et al., 2014, p. 479). Efficient entrepreneurial ecosystems are said to produce entrepreneurship as an output (Stam & van de Ven, 2021). In the literature there are multiple definitions of entrepreneurship, on the one hand entrepreneurship refers to *quantity (Kirznerian) entrepreneurship*, on the other hand, it also implies *quality (Schumpeterian) entrepreneurship*. Quality entrepreneurship encompasses high-growth oriented, innovative business run by creative entrepreneurs, while quantity-based entrepreneurship refers to business formation and density (Szerb et al., 2019).

The concept of entrepreneurial ecosystems emerged in the 1990s with the publication of several influential works such as Spilling (1996) and Van de Ven (1993). In the early 2000s, the term began to gain traction in the academic and policy circles, with scholars and practitioners alike recognizing the importance of ecosystems in supporting entrepreneurship and innovation (Cohen, 2006; Neck et al., 2004; Shane, 2003). To date, the EE concept has emerged as one of the most comprehensive ways to understand and measure entrepreneurship (Autio et al., 2018) and it has been remarkably beneficial for scholars and policymakers as it has contributed to gaining a comprehensive understanding of how entrepreneurship is produced and can be sustained in a place. Furthermore, the concept of EE has attracted much attention from both policy and research, which can be seen in the rapid increase of publications over the last ten years (Cavallo et al., 2019; Malecki, 2018). However, while the study of entrepreneurial ecosystems has grown rapidly in recent years,

there are still several gaps in the conceptualisation and measurement of EEs that need to be addressed (Cavallo et al., 2019; Stam, 2015).

On the one hand, a crucial criticism of the literature regarding EE *conceptualisation* is the primary focus of entrepreneurial ecosystems research on advanced economies and the lack of – proper – attention to the effect of local contextual conditions for a broader entrepreneurship conceptualisation (Aldrich & Ruef, 2018; Audretsch, 2019). Typically, locations such as Silicon Valley in the U.S., and main cities in Canada or the United Kingdom were the first examples for studying the operation of entrepreneurial ecosystems because these regions have shown a well-developed and complex economic system that provides a favourable environment for entrepreneurship to thrive. Researchers, therefore, became interested in understanding what drives these prosperous regions' engines. how ecosystems emerged and functioned in these successful benchmark locations and more importantly how develop these types of ecosystems? (Hakala et al., 2020). Nevertheless, it is now well established that entrepreneurial ecosystems are highly localised, meaning that the local milieu is key to the functioning of the ecosystem: ″Entrepreneurship is understood to take place in localities or, at most, regions, drawing on local resources, institutions, and networks″ (Malecki, 2018, p.1, Welter, 2011). However, Welter, Baker, & Wirsching (2019) argues that current entrepreneurship measurement remains largely decontextualised mainly due to the use of "universal" measurement tools of entrepreneurship which have been designed and operationalised from and for successful, usually western contexts.

Despite the existing socioeconomic disparities between urban and rural settings, rural areas have shown an increasing capacity to host multiple forms of entrepreneurial activities fostered by combining innovation and tradition (Meccheri & Pelloni, 2006). Moreover, due to the availability of natural resources, human capital and localized knowledge entrepreneurship can also be a "rural event" (Müller & Korsgaard, 2018). Nevertheless, literature highlights that the specific socioeconomic and geographic features of urban and rural areas may give rise to urban - rural differences in entrepreneurial dynamics. While several positive effects of urbanisation on access to resources and to broader labour market and information for entrepreneurs have been acknowledged (Fotopoulos & Louri, 2000; Werker & Athreye, 2004) an increasing number of studies reveal that agglomeration, whether as localisation or urbanisation may also have some negative effects on regional entrepreneurship such as lower average survival rates in urban areas compared to rural ones and low firm's innovativeness in young firms in larger cities (Ács et al., 2007; Ben Letaifa

& Rabeau, 2013; Fritsch et al., 2006). Moreover, the negative effect of the digital gap between urban and rural regions for firm location might be decreasing due to better access to digital infrastructure (McCoy et al., 2018). In a similar vein, Roundy (2017, 2018, 2019) emphasises that, since studies of entrepreneurial ecosystems have focused almost exclusively on ecosystems in large, urbanised regions located primarily in developed economies, current EE models, and theoretical frameworks might remain insufficient for explaining the factors and mechanisms that affect *rural entrepreneurship*. Consistent with this, more studies comparing rural and urban entrepreneurship could help to explain these differences (Sternberg, 2022).

On the other hand, much academic debate still exists around the *measurement tools* for EE. It is now well established that certain EE elements and their interaction predominantly determine the ecosystem's success (Ács et al., 2014; Stam, 2015). However, the discussion of entrepreneurial ecosystems seems to remain focused on identifying the essential "ingredients" of an ecosystem and overlooks the importance of understanding the processes or "recipes" for their combination into a sustainable ecosystem (Malecki, 2018). Scholars highlight the need for an empirical investigation of the *complex* causal relationships among the ecosystem elements (Alvedalen & Boschma, 2017; Roundy et al., 2018; Wurth et al., 2022) Nevertheless, defining and designing tools that account for the EE systemic nature is not a simple task, and to date, there is no perfect approach for measuring EE (Autio et al., 2018). Within this context, one of the essential gaps of knowledge is understanding the possible differential relevance (weight) and role of each element to the EE output. Recent literature has provided evidence that EEs around the world follow different paths to success, and generally, the way how ecosystems' elements combine to "produce" entrepreneurship is substantially different among EEs (Alves et al., 2019; March-Chordá et al., 2021; Muñoz et al., 2020; Schrijvers et al., 2021). Therefore, opening the way for an important line of research for a better understanding of EE complexity. On this subject, researchers suggest that agent-based modelling, network analysis, interpretivist methods or qualitative comparative analysis (QCA) are promising research methods for examining entrepreneurial ecosystem elements' complex interrelatedness (Berger & Kuckertz, 2016; Douglas et al., 2020; Roundy et al., 2018).

Considering these knowledge gaps found in the literature, in this dissertation, I attempt to comprehensively explore the differences between urban and rural regional entrepreneurial ecosystems by employing three research methods: a systematic review of literature on rural

entrepreneurial ecosystems, an empirical study of the characteristics of regional urban and rural EEs in Colombia and Ecuador and an empirical study about the configurations of regional EEs within these two countries. Together these results form the basis to answering three main research questions, proving the corresponding hypotheses, and formulating the research theses.

Chapter 2 synthesises current research in entrepreneurial ecosystems and rural entrepreneurial ecosystems. This chapter aims to conceptualise rural EEs and identify the main theoretical framework models to define rural EEs and to examine the currently available EEs measurement tools. Literary data for developing chapter 2 comes from two sources: the results from my first systematic review paper entitled "Rural entrepreneurial ecosystems: A systematic literature review for advancing conceptualisation", performed in 2019 and published in Entrepreneurial Business and Economics Review journal in 2021 (Calispa-Aguilar, 2021) (70 journal articles) and additional 34 articles collected through an additional literature search in rural entrepreneurship performed in 2021. Findings from this chapter were used to define the theoretical background of the dissertation and also provided an answer to the following research questions and prove hypothesis 1:

RQ1. Are rural entrepreneurial ecosystems different?

RQ 1.1: Are rural entrepreneurial ecosystems elements different from those in urban ecosystems?

RQ 1.2: Are there any elements of rurality that should be incorporated in rural EE measurement?

RQ 1.3 Can "universal" EE frameworks (fully) describe rural EE?

H1: Rural EE elements are different from those in non-rural ecosystems since there are further elements of rurality that should be incorporated in rural EE measurement. Consequently, “universal" EE frameworks cannot (fully) describe rural EE.

Chapter 3 is descriptive in nature and aims to introduce and put in context the selected study countries to facilitate the interpretation of results from the upcoming empirical chapters. This chapter summarises the developmental and entrepreneurial context in South American countries emphasising Colombia and Ecuador, which are the geographical focus of this dissertation. The principal reason for setting this geographical boundary was data availability. My empirical studies are based on secondary data from two main sources: the Adult Population Survey from the Global Entrepreneurship Monitor and extensive secondary data from national-level and regional-level institutions in each country. However,

raw full datasets (those containing updated data and geographical identification variables) from the Global Entrepreneurship Monitor are confidential. Initially, I tried to collect these datasets for Peru, Argentina, Bolivia, Chile, Argentina, and Brazil, but the national teams of these countries denied access, limiting my data availability to Colombia, Ecuador and Uruguay, whose team leaders kindly provided me with the access to their raw databases from 2010-2018.

For my dissertation, I focused on Ecuador and Colombia because these two neighbouring countries share similar socio-economic characteristics (e.g., middle income economies, Andean geography, GDP composition, GDP per capita, poverty and inequality rates), and this makes data merging and results comparisons sounder. Uruguay, in contrast, is in a different stage of development and has a significantly different demographic, geographic and socio-economic context (i.e., Uruguay is a high-income, "transition from efficiency- to innovation-driven" economy, and its urbanisation rate is 96%) as compared to Colombia and Ecuador. Moreover, I have a personal interest in contributing to a better understanding of paths for regional development in rural contexts in developing countries. Due to the availability of unique natural and human resources, rural areas are fertile ground and has a potential for productive entrepreneurship. However, due to the socioeconomic differences between these two settings, the way how entrepreneurship is sustained in rural regions might be different. Importantly, despite the increasing global urbanisation trend, rural populations are still a big part of many economies, such as Ecuador, my homeland. In 2021, Ecuador held the bigger share of the rural population in South America, with 36% of the total population living in rural settings.

The first step to understand whether rural EEs are different was to conduct an empirical study to explore the characteristics of the regional EEs in Colombia, Ecuador, and Uruguay, employing an adapted version of the Global Entrepreneurship Index (GEI) methodology. The GEI is a comprehensive measurement tool that assesses the entrepreneurial ecosystems of countries around the world developed by Ács et al. (2014). The GEI has been selected for framing this research because, first of all the GEI conceptual foundation is well-developed as it is supported by findings from extensive literature review. Moreover, the GEI conceptual model has been validated by the academic community as it has been employed in a series of publications in high quality journals. Furthermore, one of the biggest merits of the GEI is that it assesses a country's entrepreneurial ecosystem across multiple dimensions, including individual characteristics and institutional environment. This holistic assessment

provides a more complete picture of a country's entrepreneurial environment. In this connection, the GEI is also superior to other available indices because it emphasises and accounts for the system nature of ecosystems trough the Penalty for Bottleneck methodology. Finally, the methodology and data used to calculate the GEI are transparent and publicly available. This transparency increases the credibility of the index and allowed me for independent verification and replication. Finally, it is necessary to highlight that although the GEI has a well-known regional version, the REDI, the REDI employs a quite complex set of variables and indicators for index calculation which are hardly available for South American countries.

In this first empirical study, I adapted the GEI methodology for measuring the ecosystems performance of ten great regions which are geographical units composed of various smaller administrative units, namely, departments or provinces in Colombia, Ecuador, and Uruguay. Data at the urban-rural level was available for six of these ten regions. Therefore, regional GEI scores were also calculated for the urban and rural settings within these six regions separately. The criteria for urban-rural classification were given by the GEM databases which, in turn, follow each country's own official urban-rural definitions. In Ecuador, Colombia and Uruguay official urban and rural areas are typically defined by the population size. By calculating regional GEI scores for this set of regions, I was able not only to gai an understanding of the quality of these selected ecosystems, but also to identify possible differences in the configuration of bottlenecks (i.e., the lowest performing factors which hold back the functioning of the whole system) of rural and urban EEs. The full process and results of this study are presented in *Chapter 4.* This chapter contains a great part of my second paper published in January 2022, entitled "Regional systems of entrepreneurship in 2017–2018: An empirical study in selected regions of South America" (Calispa-Aguilar, 2022). Findings from this chapter provide the basis to answer the second research question and prove hypothesis 2:

RQ2: Which EE components hinder rural and urban entrepreneurship?

H2: Rural areas are affected by different bottlenecks (weakest components of the EE) than urban areas.

The next step to understand whether rural EEs are different was to explore the possible differences between urban and rural EEs from a configurational perspective. *Chapter 5* summarises the results of an empirical study examining how rural entrepreneurial

ecosystems differ from their urban counterparts by comparing their differences along seven pillars of entrepreneurial ecosystems among 42 regions in Colombia and Ecuador using the Qualitative Comparative Analysis (QCA) method. QCA is a research method that enables the analysis of causal complexity and has been widely applied to derive configurations of systems elements (Schneider & Wagemann, 2012). This method has been regarded as an alternative to multiple regression and related linear techniques as QCA is rather a mixture of a case-based (more qualitative) approach coupled with a more general statistical approach (Ragin, 2008). QCA is a powerful method to address complex causal dynamics of the entrepreneurial ecosystem concepts by analysing the causal contribution of different conditions (e.g., factors of an EE) to an outcome of interest (e.g., entrepreneurial activity). In this way, QCA helps researchers look for patterns across multiple cases to better understand why and how some outcomes happen and others don't. This QCA study supports the view that high regional entrepreneurship outputs are realised differently in urban and rural regions. That is to say, the number of conditions and the mechanisms needed to hold entrepreneurship in rural regions is given by a unique set of configurations, or ways, which are fundamentally different to those in urban regions. This chapter provides the empirical support to answer the following questions and to prove hypothesis 3:

RQ3: Do EE configurations differ in rural and urban regions regarding high-level entrepreneurship?

RQ 3.1: What EE configuration(s) drive quantity/quality entrepreneurship in *urban regions* in Colombia and Ecuador?

RQ 3.2: What EE configurations drive quantity/quality entrepreneurship in *rural regions* in Colombia and Ecuador?

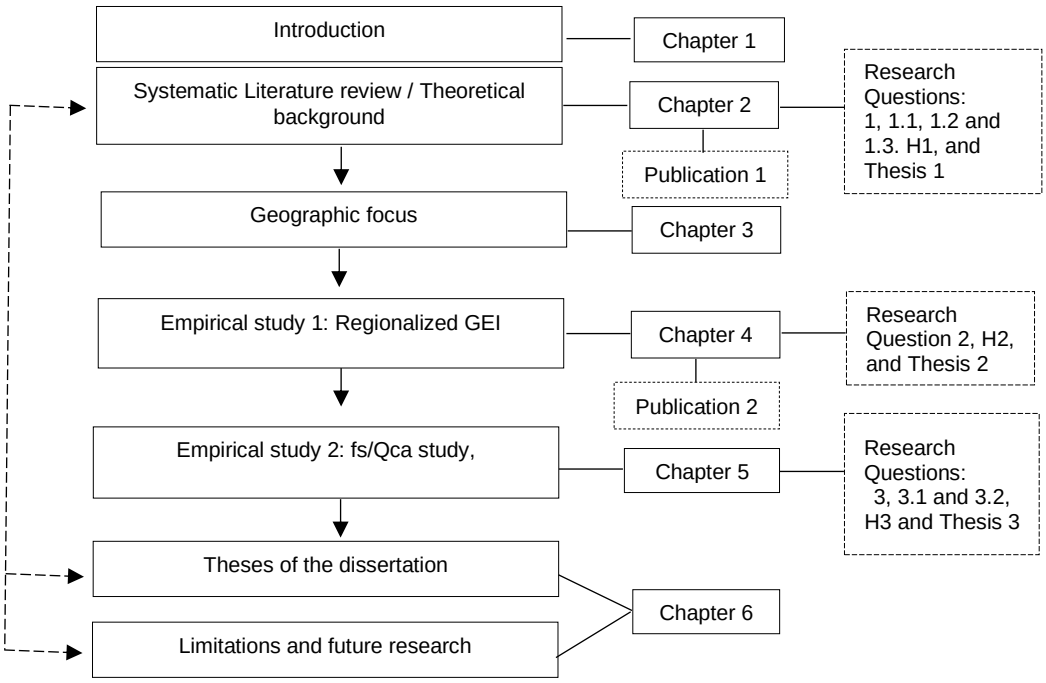
H3: Different EE configurations drive quantity/quality entrepreneurship in rural and urban regions in Colombia and Ecuador.

Chapter 6 synthesises the content of the dissertation and develops the Theses of my dissertation which are the original arguments or propositions that I could make supported with evidence from my research work together.

1.2. **Structure of the dissertation**

This dissertation constitutes a compendium of three main sources of data: systematic literature review, and two related empirical studies. When structuring the dissertation, I ensure that the individual chapters are connected to each other in an easy-to-follow logical structure. As presented in Figure 1, the formulation of this dissertation started with the development of a systematic literature review in rural entrepreneurial ecosystems. The results from literature review are summarized in chapter 2. The aim of this chapter was to conceptualise rural entrepreneurial ecosystems and identify EE measurement frameworks and the available EEs measurement tools. Chapter 3 introduces entrepreneurship development in South America, emphasizing on the key geographical, development and entrepreneurship related aspects of Colombia and Ecuador which are the areas of study in this dissertation. Chapter 4 contains the results from the first empirical study in which I developed a regionalized adaptation of the Global Entrepreneurship Index (GEI) methodology, and I measured the performance of 22 sub national regions within Colombia and Ecuador. Chapter 5 presents the second empirical study in which I employed fuzzy-set Qualitative Comparative Analysis (fs/QCA) to examine the determinants of entrepreneurship in 42 sub-national regions in Colombia and Ecuador. Finally, chapter 6 develops the theses of the dissertation.

Figure 1: Stages of research of the doctoral dissertation



Source: own elaboration

2. Chapter 2: Literature Review: rural entrepreneurial ecosystems conceptualisation

Introduction

This chapter provides a synthesis of current research in entrepreneurial ecosystems (EE) and *rural* entrepreneurial ecosystems and summarizes what do we know about tools and approaches to measure entrepreneurial ecosystems. The questions guiding the development of this chapter are the following: Are rural entrepreneurial ecosystems different? Are rural entrepreneurial ecosystems elements different from those in urban ecosystems? Are there any elements of rurality that should be incorporated in rural EE measurement? Can standard EE frameworks (fully) describe rural EE? To answer these questions, I exhaustively reviewed relevant literature in rural entrepreneurial ecosystems and rural entrepreneurship. The literature included in this chapter has been collected in two ways: one part of the literature comes from a systematic literature review about rural entrepreneurial ecosystems performed in May 2019 and which findings have been published in Entrepreneurial Business and Economics Review journal in 2021 (Calispa-Aguilar, 2021). Another section of the literature comes from an additional literature search about entrepreneurial ecosystems and rural entrepreneurship performed in May 2021. The second literature search was conducted to complement and update results from the systematic review conducted in 2019.

The first section of this chapter introduces the systematic literature review method and presents the basic methodological steps followed to collect and process literature. The second section synthesises existing theory in entrepreneurial ecosystems; its key definitions, structure (constituent elements) and operationalisation (measurement). The third section of this chapter examines the similarities, and differences between entrepreneurial ecosystems in large urban centres and rural entrepreneurial ecosystems. The fourth section discusses which are the elements of rurality that should be incorporated in rural EE measurement and the final section introduces the most well-known tools for measuring entrepreneurial ecosystems.

2.1. **Systematic review: a reliable literature review method**

In a systematic literature review (SLR), as opposite to a traditional -or non-structured- review, the authors follow a transparent and reproducible methodology in searching, assessing the quality, and synthesizing the available literature that enables

possibilities of replication. Since, traditional reviews do not follow such specific process protocol, it is highly possible that the literature selection is affected by the subjectivity of the author (Kraus et al., 2020). One of the main reasons to conduct a SLR is its potential to provide unique contributions on theory testing, theory development, the identification of research gaps, and well-founded suggestions for future research (Rauch, 2020). Systematic reviews have become regarded as a highly reliable form of research review due to its several desirable methodological characteristics such as rigour, transparency, and replicability. Through the adoption of specific search strategies, predefined search strings and clear inclusion and exclusion criteria, systematic reviews effectively reduce implicit researcher bias. Systematic reviews follow a clear systematic review protocol that helps researchers to improve the methodological transparency and future replication of the review (Gough & Elbourne, 2002; Mallett, Hagen-Zanker, Slater, & Duvendack, 2012). Present systematic review aimed to identifying the specific contextual factors and mechanisms that are important for the functioning of entrepreneurial ecosystems in rural areas. The search was conducted with conditions presented in Table 1.

Table 1: Inclusion criteria for SLR in rural entrepreneurial ecosystems

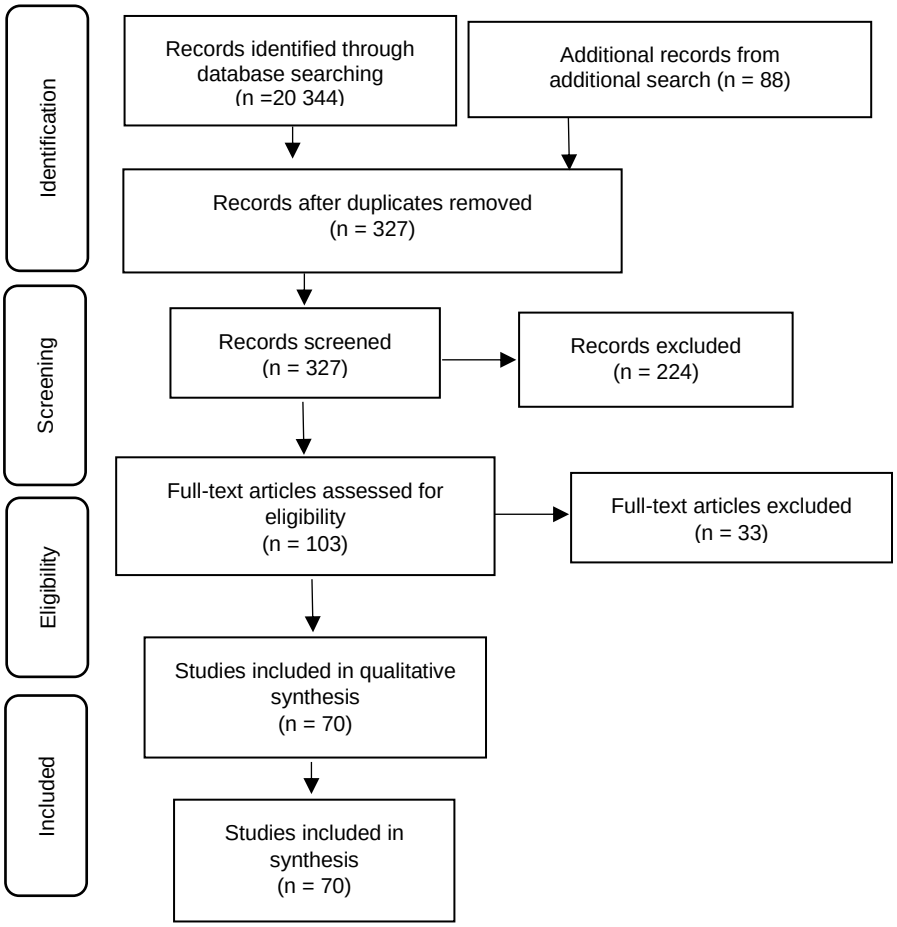
Keywords	a) 'rural AND entrepre*' b) 'actor' or 'elements' or 'components or 'determinant' or 'cause' or 'factor' c) 'entrep* context' or 'entrep* environment' 'entrep*area' or 'entrepr*ecosystem' or 'entrepr*setting' or 'entrep* system'
Inclusion criteria	Language: only English Yeas: 1975–2019 Methodology: Any type, no limitation Subject area: No limited Type of publication: only journal articles Citation number: +50; No minimum citation number for 'additional search' stage

Source: Calispa-Aguilar (2021)

For this review, I firstly formulated a clear research question following the CIMO logic (context, intervention, mechanism, outcome) developed by Denyer and Tranfield (2009). This logic serves to evaluate the inclusion or exclusion of studies. The PRISMA statement was used to design and document the overall process of this systematic review (Figure 2). I sought studies through the EBSCO electronic databases (Academic Search Complete, Business Source Premier, and Science Direct) and Web of Science. The initial search retrieved 20 344 articles. From these, 501 records were collected based on the inclusion criteria. The exclusion of duplicates reduced this number to 248. A total of 88 new articles were identified by manual search. An additional manual search was conducted on 32 high-quality journals (Q1 and Q2 according to SCImago Journal Rank) in the fields of economics, econometrics, finance, economic geography, and A-type journals in regional

sciences. Additional searches were conducted on 10 highly ranked journals selected from the reference list of Cavallo *et al.* (2019), which offered the most up-to-date review of research in EE by the time when I conducted literature review. The first search and additional search records were merged, and duplicates were removed, giving a total of 327 articles. Based on the title and abstract examination, 224 studies were discarded for not meeting the CIMO logic criteria. The final 103 articles were categorised into three types – not relevant, relevant, and highly relevant – based on a critical and detailed full-text reading. The goal of this step was to be as inclusive as possible, identifying all articles that a) contain the keywords either on the tittle or abstract and b) deal substantially with rural entrepreneurship. To avoid unintentional bias in the selection, the categorisation I made was evaluated and approved by an external expert. Finally, only those papers categorised as 'highly relevant' (*n* = 70) were employed for the synthesis. Mendeley was employed to merge and deduplicate records. After deduplication, no specialized software was employed to manage the bibliography. Rather the process was manually performed with the support of Microsoft Excel and Word to tabulate and synthetise results.

Figure 2: PRISMA flow diagram SLR in rural entrepreneurial ecosystems 2019



Furthermore, an additional literature review on rural entrepreneurship was performed in 2021 and it collected relevant literature from 2011 to 2021, following criteria from Table 2. In this case, Web of Science and EBSCO (Academic Search Complete, Business Source Premier and Science Direct) electronic databases were employed. The initial search retrieved 1002 articles. The exclusion of duplicates reduced this number to 756. Based on the title and abstract examination, 712 studies were discarded for not meeting the selection criteria. The final 44 articles were categorised into three types – not relevant, relevant, and highly relevant – based on a critical and detailed full-text reading. Finally, only those papers categorised as 'highly relevant' (n = 34) were added to the original literature corpus.

Table 2: Inclusion criteria for additional literature review

Keywords	TS= ((entrepreneur OR "rural entrepreneur" OR entrepreneurs) AND (entrepreneurship OR entrepreneurism OR entrepreneurialism OR startup OR start-up OR "business startup" OR "business start-up" OR enterprising OR "productive entrepreneurship" "business creation" OR "entrepreneurial activity") AND (rural OR peripheral OR "small town" OR "village" OR "small city")
Inclusion criteria	Language: only English Years: 2011-2021 Methodology: Any type, no limitation Subject area: No limited Type of publication: only journal articles

Note: TS=*Topic. Searches for topic terms in Titles, Abstracts, Keywords and Indexing fields within a record.*
Source: own elaboration

2.2. **Entrepreneurial ecosystems: conceptualisation**

Recent years have witnessed a growing academic interest in understanding the functioning of entrepreneurial (eco) systems. During the last decades, a strong emphasis has been placed on understanding the relationships between individual actors and their local socio-economic contexts, giving rise to a new concept that laid the foundations for a systemic view of entrepreneurship, known as the entrepreneurial ecosystem (EE). Spilling, (1996) and Shane (2003) pioneered a new approach to examining entrepreneurship systematically. They were among the first investigators who suggested that entrepreneurial performance of a region or locality is determined not only by the characteristics and behaviours of individual entrepreneurs, but also by the interaction of various social, economic, and political factors. They looked at entrepreneurship within a comprehensive framework to examine how these diverse actors interact to facilitate or inhibit

entrepreneurial performance within a region or country. Since then, the concept of EE has become increasingly popular among researchers in the entrepreneurship field and a rapid rise in the number of academic articles about EE published in influential journals has been observed (Alvedalen & Boschma, 2017; Cavallo et al., 2018; Malecki, 2018). Consequently, having recognized that entrepreneurship is a multidimensional phenomenon, several approaches aiming to comprehensively measure entrepreneurship have proposed.

Autio et al. (2018) identified five distinct approaches to measuring entrepreneurship: (1) output (count) measures; (2) attitude measures; (3) framework measures; (4) mixed (weighted) measures; and (5) entrepreneurial ecosystem measures. In early 2000s, approaches measuring entrepreneurship employing unidimensional output indicators such as the number of firms in a country, business density, new business registration, self-employment rates, or counts for specific type of entrepreneurial firms such as "gazelles" or "unicorns" gained popularity. Key examples of output count measurements are the GEM Total Entrepreneurial Activity (TEA), the World Bank's "total business density", "new business density" and "entry rate" survey-based indicators (Marcotte, 2013). Later, mostly around 2010, researchers focused on measuring entrepreneurial attitudes as a powerful proxy for the cultural and social norms that are thought to regulate entrepreneurial career choice (Autio et al., 2013). Under this perspective, the 'entrepreneurial culture' could serve as a reflection of the entrepreneurial potential that exists in a given population. Attitudes measurement included indicators such as individuals' preference for self-employment, attitudes toward entrepreneurs and entrepreneurial careers, perceptions of entrepreneurial skills, and individuals' fear of failure. One of the most well know attitudes measurement are the Eurobarometer and GEM Adult Population survey. However, little evidence on the predictive power of entrepreneurial attitudes on actual entrepreneurial actions. Unlike attitudes measurements, framework measures focus on capturing more the formal institutions and tangible structural conditions that influence the entrepreneurial development. These indicators evaluate aspects such as education level of the population, quality of regulations and entrepreneurship policy interventions, and the availability of resources for entrepreneurship. Key examples of framework measurement are the GEM surveys national experts, the World Bank's "Ease of Doing Business" index or the OECD-Eurostat Entrepreneurship Indicators Programme (EIP). Although framework measures provide a more comprehensive and multidimensional view of the several elements influencing entrepreneurship, the logic of selection and the rationales for the links between

such framework conditions and actual entrepreneurial activity is limited and generally based on assumptions rather than on empirical evidence (Autio et al., 2018).

Conversely, weighted measures combine contextual conditions and entrepreneurial outcomes, thereby providing a reflection of the quality of the entrepreneurial dynamic in the economy. The GEI is an example of this approach since it measures entrepreneurship using measures of individual-level entrepreneurial attitudes, abilities, and activity as weights to adjust the magnitude of contextual factors in regulating the quality of the entrepreneurial dynamic. In this way, framework conditions are not seen as direct drivers of entrepreneurial action, but rather, as contextual regulators of the potential economic impact of individual-level entrepreneurial attitudes, ability, and aspirations. Finally, entrepreneurial ecosystem measures have emerged as the latest evolution in the measurement of entrepreneurship. Kauffman Foundation's entrepreneurial ecosystem initiative (Stangler & Bell-Masterson, 2015) and the model developed by Stam (2018) are examples of these type of measurements. However, although EE measurements are theoretically superior due to its explicit focus on contexts of entrepreneurial action, and given that it responds to current trends in entrepreneurship, the theoretical grounding to support the measurement of the characteristic structural elements of entrepreneurial ecosystems, the systemic mechanisms itself, remain under-theorised (Autio et al., 2018).

Building on the concept of entrepreneurial ecosystems, several conceptual frameworks and subsequent indexes aiming to diagnose the state and quantify the performance of entrepreneurial ecosystems at the national or regional level have been developed. Table 3 provides a synthesis of the most well-known definitions and conceptual frameworks for EEs which has been validated in several academic publications.

Table 3: Definitions, and models of entrepreneurial ecosystems.

Definition of EE	Constituent elements		Measurement tool	Systemic mechanism
Isenberg (**2011**) "The entrepreneurship ecosystem consists of six domains. The entrepreneurship ecosystem consists of hundreds of specific elements that, for convenience, we group into six general domains: a conducive culture, enabling policies and leadership, availability of appropriate finance, quality human capital, venture-friendly markets for products, and a range of institutional and infrastructural supports" (p.1)	Policy -Leadership -Government Finance Financial capital Culture - Success stories Support - Infrastructures	- Support professions - Non-Government institutions Human Capital - Networks - Labour - Educational institutions Markets - Markets	Not defined	"…our diagram of the ecosystem lacks causal paths; there are no arrows indicating what causes what. This is related to what Harvard economist Ricardo Hausmann calls "high bandwidth" nature of policy, namely that effective policy has to deal with a large number of variables interacting in highly complex and specific ways." "… holistically and specifically, by impacting the entire ecosystem and stimulating virtuous circles among all elements." (Isenberg, 2011, p.8)
Kauffman Foundation ecosystem model[1] **"**The essence of an entrepreneurial ecosystem is its people and the culture of trust and collaboration that allows them to interact successfully. An ecosystem that allows for the fast flow of talent, information, and resources helps entrepreneurs quickly find what they need at each stage of growth. As a result, the whole is greater than the sum of its separate parts". (Entrepreneurial Ecosystem Playbook 3.0, 2019)	- Entrepreneurs - Talent - People and institutions with knowledge and resources - Champions and conveners - Onramps	- Intersections - Stories - Culture	Not defined	Not clear explanation about the systemic mechanism within an entrepreneurial ecosystem.

[1] Source: https://www.kauffman.org/ecosystem-playbook-draft-3/ecosystems/

Stam's model of entrepreneurial ecosystems "The entrepreneurial ecosystem as a set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship within a particular territory" (Stam, 2015, p.1765).	10 operational constructs: Institutional arrangements - Formal institutions - Culture - Networks Resource endowment - Physical infrastructure - Demand	- Intermediaries - Talent - Knowledge - Leadership - Finance Output and outcome Entrepreneurship and value; productive entrepreneurship	Entrepreneurial Ecosystem Index	"The essence of ecosystems is the interaction among its elements. This interaction is not adequately covered when an index is constructed as a sum of its elements. If we take the interactive nature of the system seriously, and the resulting nonlinear relations, the index should be constructed differently. For this, we compute an index that is not additive (E1 + E2 + …En) but multiplicative (E1*E2*…En). This leads to index values with much larger variation, as the effect of deviations of the average is now much more substantial" (Stam & van de Ven, 2019, p.826).
National Systems of Entrepreneurship, Ács et al. (2014) A dynamic, institutionally embedded interaction between entrepreneurial attitudes, abilities, and aspirations, by individuals which drives the allocation of resources through the creation and operation of new ventures^ (p.479)	14 pillars of a National System of entrepreneurship Entrepreneurial attitudes - Opportunity perception - Startup skills - Risk acceptance - Networking - Cultural Support Entrepreneurial abilities	-Opportunity startup - Technology sector - Quality of Human resources -Competition Entrepreneurial aspirations - Product innovation - Process innovation - High growth - Internationalisation - Risk Capital	The Global Entrepreneurship Index (GEI) and The Regional Entrepreneurship and Development Index (REDI)	Penalty for Bottleneck feature "System components are thought to 'co-produce' system-level outcomes" All pillars contribute equally to the outcomes of the entrepreneurial dynamic and only partially substitutable, equal weight to each pillar.
GEM- National Entrepreneurship Context [2]	12 entrepreneurial environment conditions - Financial environment related with entrepreneurship	- Entrepreneurial level of education at Vocational, Professional, College and University - R&D level of transference	GEM - National Entrepreneurship Context Index (NECI)	Not extensive explanation about the systemic mechanism within an entrepreneurial ecosystem.

[2] Source: https://www.gemconsortium.org/news/global-entrepreneurship-monitor-releases-ranking-of-countries-for-conditions-to-start-a-business

Entrepreneurship doesn't take place in a vacuum — a whole host of factors determine how easy (or difficult) it is to start up	- Government concrete policies, priority, and support - Government policies bureaucracy, taxes - Government programs - Entrepreneurial level of education at Primary and Secondary	- Professional and commercial infrastructure access - Internal market dynamics - Internal market burdens - General physical infrastructures and services access - Cultural, social norms and society support		Authors indicate that NECI index is calculated as the arithmetic mean of the scores obtained on the status of the 12 entrepreneurial environment conditions.
Kantis et al. (2021) The creation and development of a new company is the result of a process that, throughout its different stages and milestones, is affected by diverse social, cultural, political, and economic factors.	- Social Conditions - Entrepreneurial Human Capital - Culture - Educational System - Demand Conditions	- STI platforms - Business Structure - Social Capital - Policies and Regulations - Financing	Index of Dynamic Entrepreneurship, (IDE)	The authors employ geometric mean as an aggregation method. They argue that "… employing multiplication of indicators, instead of addition, allows us to consider the interactions between them. The calculation thus reflects the systemic nature of a particular phenomenon, where each of the constituent factors relates to one another. On the contrary, the arithmetic mean supposes that the aggregated variables are independent from one another by employing addition, which fails to reflect the interaction among the factors that make up the entrepreneurial development system" (Prodem, 2020, p.7). Moreover, the authors acknowledge that this approach is akin to the idea underlying the bottleneck method proposed by (Ács et al., 2014).

Since 2010, the term entrepreneurial ecosystem has rapidly become a central part of the entrepreneurship and economic development discussion and since then the definition and characteristics of entrepreneurial ecosystem have been discussed extensively by scholars from different approaches. First, what we can see from the Table 3 above is that several definitions of EE have been proposed. Each of the definitions highlight a different decisive set of components needed to form an ecosystem. However, and although differences in the number and type of ecosystem elements exist among the selected EE models, what all these models have in common is that these advocate for an holistic approach to understanding entrepreneurship, recognizing that it is influenced by a wide range of factors, including people, a population with entrepreneurial attitudes, abilities and aspirations coupled with a supportive set of policies and regulations, finance, culture, infrastructure, human capital, networks, educational systems, market, and innovation platforms. Moreover, these models, and subsequent indices, are action oriented as they also aim to provide a roadmap for policymakers and researchers to identify concrete actions that can support entrepreneurship in their communities (particularly Ács et al., 2014 model trough the GEI and REDI indices). This can help to guide policy and investment decisions that can have a tangible impact on entrepreneurship.

The Table also summarises how the different authors see the characteristic structural elements of entrepreneurial ecosystems, and how they define and measure the interrelatedness of the EE elements. What can be observed is that earliest EEs models, Isenberg and Kauffman Foundation models are conceptually powerful, and these certainly set the foundations for visualizing EEs structure and properties, but these models lacked a clear definition and explanation for the systemic nature of ecosystems leaving the question of how these proposed elements interact and influence each other unanswered. Conversely, the later models acknowledged in a more elaborated manner the way how they conceptualise and measure the systemic nature of EEs within their models and subsequent indices. In this respect, although not yet a perfect method for measuring complex systemic relationships of EE elements (Autio et al., 2018) several approaches can be observed. While Stam's model of entrepreneurial ecosystems and GEM- National Entrepreneurship Context employ multiplication and arithmetic mean to account for EEs interrelation, Ács et al, 2014 and Kantis et al. (2021) provide a relatively superior solution as they employ a more complex method called the Penalty for Bottleneck.

2.2.1. "Decontextualised" EEs models

There is controversy and contested claims that studies of EEs have focused almost exclusively on ecosystems in large, urbanized regions and well-working metropolitan areas, generally located in developed economies (Roundy, 2017). Moreover, scholars have argued that most of the theoretical frameworks for understanding and measuring EE are not context-sensitive as these are defined by a "standard" set of elements and thus diminishing the possible relevance and differentiated role of other, context-specific elements. Therefore, what is known about EEs might lack of contextualisation and might be insufficient for explaining the factors and mechanisms that affect for example rural entrepreneurship (Miles & Morrison, 2018; Muñoz & Kimmitt, 2019). A frequent criticism of the research on entrepreneurial ecosystems concerns a general lack of „contextualisation" of current ecosystem's framework models. Most studies in EE focus primarily on western, world-leading entrepreneurial ecosystems in the European Union or the United States (Audretsch, 2019; Stam, 2015) while there is much less information about EE in developing economies (Cao & Shi, 2021; Guerrero et al., 2021). Despite this, researchers and policymakers have handled these cases as successful recipes, and had tried unsuccessfully to emulate such system structures elsewhere (be the next Silicon Valley) (Isenberg, 2010; Welter et al., 2019). Therefore, one causing issue for decontextualisation is that assuming that "standard" EE framework models (a certain set of predefined factors) can be used to examine every kind of ecosystem. This approach have diminished the importance of local context and the role of specificities of location that are likely to influence entrepreneurial dynamics and this standard EE's theoretical framework models probably cannot accurately pinpoint the relevant aspects of entrepreneurship when employed in other contexts, for example in rural locations (Miles & Morrison, 2018; Muñoz & Kimmitt, 2019).

Another issue leading to decontextualisation of EE framework models concerns the assumptions that all ecosystems function in the same way (i.e., the ecosystem elements have the same importance for every ecosystem's outcome). EE are conceptualised as unique, heterogeneous, complex adaptive systems (Adner, 2017; Alvedalen & Boschma, 2017; Daniel et al., 2022; Jacobides et al., 2018; Roundy et al., 2018) and hence, efficient EE models should be able to capture and measure such mechanisms in order to offer truly contextualised insights and policy recommendations. However, finding the adequate research method to investigate the complex systemic nature of EE remain a challenge.

2.3. **Entrepreneurial ecosystems: measurement tools**

This section provides descriptive details about three well-known analytical tools for measuring entrepreneurship: The National Entrepreneurship Context Index - NECI, a framework measure recently developed by The Global Entrepreneurship Monitor (GEM), the Entrepreneurial Ecosystem Index: EEINDEX developed by Leendertse et al. (2021) and the Global Entrepreneurship Index (GEI). The aim of this section is to offer an overview of these available analytical tools and explain why the GEI stands out as a context-sensitive EE weighted measure.

2.3.1. The National Entrepreneurship Context Index - GEM NECI.

The GEM is a consortium of national country teams, generally involved with top academic institutions, that carries out continuous survey-based research on entrepreneurship and entrepreneurship ecosystems around the world. The NECI is a composite index created by the GEM to measure the ease of starting and developing a business in a country based on the assessment of 12 Entrepreneurship Framework Conditions (shown in Table 3 within the Global Entrepreneurship Monitor's framework section). GEM - NECI is essentially calculated as the arithmetic mean of the scores obtained on the status of the 12 entrepreneurial environment conditions. The scale of measurement on which these averages are given is from 0 to 10 points, where a score of zero means completely insufficient and a score of ten means completely sufficient. Thus, the higher the index score, the better the average state of the environment conditions. GEM NECI was created to provide policymakers with insights on how to uphold the environmental conditions for individuals to start and grow a business. According to GEM NECI, in 2019, Switzerland tops the rankings, followed by the Netherlands and Qatar while Iran scored lowest overall. Since 2018, GEM offers a ranking and scores for 54 economies (Bosma et al., 2020).

2.3.2. *Entrepreneurial Ecosystem Index: EEINDEX*

The Entrepreneurial Ecosystem Index: EEINDEX is an index that approximates the quality of regional entrepreneurial ecosystems. This index measures the ten key entrepreneurial ecosystems elements of Stam (2015) with data from a large variety of datasets and taking the number of firms founded less than five years ago that are registered in Crunchbase as a measure for productive entrepreneurship (system's entrepreneurial output) (Leendertse et al., 2021) following the index building method applied in Stam & van de Ven (2021). Interestingly, the

EEINDEX is calculated and thus, index values are provided in three ways: in an additive way, in a multiplicative manner and in a logarithmic way. This index has been calculated once in 2021 for twelve Netherlands regions for the 3 years (2009, 2012 and 2015) and once for 273 NUTS 2 regions divided over the 27 EU member states and the United Kingdom.

2.3.3. The Global Entrepreneurship Index

The Global Entrepreneurship Index (GEI) has been designed based on the concept of National Systems of Entrepreneurship which refers to the "dynamic, institutionally embedded interaction between entrepreneurial attitudes, ability, and aspirations, by individuals, which drives the allocation of resources through the creation and operation of new ventures" (Ács et al., 2014, p.479). The GEI is a four-level composite indicator that consist of 28 variables, 14 pillars, three sub-indices and one super index (Table 4).

Table 4: The structure of the GEI

	Sub-indexes	Pillars	Variables (ind./inst.)
GLOBAL ENTREPRENEURSHIP INDEX	ATTITUDES SUB-INDEX	OPPORTUNITY PERCEPTION	Opportunity recognition
			Freedom
		STARTUP SKILLS	Skill perception
			Education
		RISK ACCEPTANCE	Risk perception
			Country risk
		NETWORKING	Know entrepreneur
			Agglomeration
		CULTURAL SUPPORT	Career status
			Corruption
	ABILITIES SUB-INDEX	OPPORTUNITY STARTUP	Opportunity motivation
			Governance
		TECHNOLOGY ADOPTION	Technology level
			Technology absorption
		HUMAN CAPITAL	Educational level
			Labour market
		COMPETITION	Competitors
			Competitiveness
	ASPIRATION SUB-INDEX	PRODUCT INNOVATION	New product
			Technology transfer
		PROCESS INNOVATION	New technology
			Science
		HIGH GROWTH	Gazelle
			Finance
		INTERNATIONALISATION	Export
			Economic complexity
		RISK CAPITAL	Informal investment
			Depth of capital market

Note. Individual variables are marked in white while institutional ones are marked in grey background.
Source : Ács et al., 2019

The GEI recognizes that entrepreneurship is a phenomenon driven by both individual-level entrepreneurial behaviour and contextual (e.g., physical, socio-economic, and political environment) factors. For this reason, the GEI employs individual and institutional data for variable calculation. Entrepreneurial attitudes (ATT) sub-index measures the perception of a country or region's population about entrepreneurship. That is to say, this sub index shows the

extent to which entrepreneurship is a socially accepted and desirable occupation. Entrepreneurial abilities (ABT) measure the capacity and skills of the entrepreneurs to start up and how the institutional context enables these startup opportunities. Finally, entrepreneurial aspirations (ASP) capture the potential of entrepreneurs to innovate and grow and how the institutional context supports such high grow possibilities (Ács et al. 2014). Moreover, to capture the complex characteristics of the National Systems of entrepreneurship concept, the GEI is built following the guidelines of the OECD Handbook on constructing composite indicators (Giovannini et al., 2008).

The GEI has been calculated for more than one decade and it provides solid data about national level entrepreneurial ecosystems for more than 130 countries, including most of South American countries. GEI scores range from 1 to 100, being 100 the best (i.e., he most supportive entrepreneurial system). In 2019, United States and Switzerland were the best performing ecosystems in the world with a GEI score of 86.8 and 82.2 respectively while Chad and Madagascar were identified as the least favourable ecosystems in the world with a score of 8.8 and 9.1 respectively. The Regional entrepreneurship and Development Index (REDI) is a is a tool that measures and compares regional level EEs and provides policy suggestions on how to improve EEs is based on the GEI. The REDI employs the GEI conceptual framework, but it employs a more complex set of variables and indicators for index calculation. So far, the REDI has been computed twice (Szerb et al., 2013, 2017). Since publication, both the GEI and REDI have been widely accepted by the academic community. GEI and REDI have been cited in numerous high quality studies (see., Audretsch & Belitski, 2017; Capello & Lenzi, 2016; Szerb, Ortega-Argilés, Acs, & Komlósi, 2020) while the results of the REDI first report have been also used in the EU's 6th Cohesion Report.

In the GEI theory, both the individual (entrepreneurial traits, skills, aspirations) and the institutional (contextual framework) conditions are important. However, the framework conditions are seen as the *contextual regulators (weights)* for of individual-level entrepreneurial attitudes, ability, and aspirations. Importantly, unlike, other available tools, the GEI is the only available measure that operationalises, more or less, the effect of the systemic-character trough the penalty for bottleneck (PfB) algorithm which 'penalises' strong pillars for gaps – or bottlenecks – in pillar-level performance. (Autio et al., 2018). The PfB method to account for the interconnectedness of the pillars. This method implies that the highest performance enhancement will be achieved when additional resources are allocated to alleviate the most constraining bottleneck in the system. The key idea is to account for the relationships

and complementarity across the systems and subsystems and highlight the importance of the bottleneck factors. The concept of complementarity simply refers to the interaction of two variables. Traditional index methods, based on the cumulative addition of independent index components, effectively assume the full substitution of elements, and, therefore, cannot recognize or handle bottleneck effects. By including this methodology in the calculation of the index, the GEI overcomes the shortcomings regarding the lack of consideration of the systemic nature of the entrepreneurial activity and the interconnectedness of elements of EEs that have been noted in the current literature (Alvedalen & Boschma, 2017; Cavallo et al., 2019).

Although GEI offers a structured and comprehensive approach to handle the systemic character of EEs, the GEI methodology is not perfectly context sensitive as it has some simplifying assumption regarding the interrelatedness of the EE elements. Moreover, since the GEI was designed to measure national level ecosystems, it is not able to capture regional aspects of entrepreneurship like the impact of agglomeration economies (as the REDI does). In this way I define GEI as a useful, *"quasi-contextualized"* framework to entrepreneurial ecosystem measurement. The pillar-set used in GEI framework is a "universal" set based on the available entrepreneurship literature, therefore it does not consider any context-specific components. As claimed in chapter 2, there are rural context-specific aspects in the literature that are not yet embeddedd into current EEs frameworks including the GEI and REDI models.

2.4. **Rural EE literature: Are rural entrepreneurial ecosystems unique?**

This section aims to theoretically determine the extent to which the spatial specificities from rurality, can cause EEs to function fundamentally differently from those in urban areas. The motivation of this search is to reveal, based on a comprehensive literature review, whether beyond the elements of the decontextualized EE models presented in the previous section, there are any additional aspects of rurality which affect rural EE. If yes, what are these aspects of rurality and how they influence entrepreneurship?

The first stage of the procedure for examination of literature on rural ecosystems and rural entrepreneurship was to identify whether there was literature defining "rural entrepreneurial ecosystems" and extract information about the the differences between these two setups. However, no paper that directly defines "rural EEs" neither there is literature that compares urban and rural EE environments was found. Rather, the selected literature focused in understanding how one, two or a set of elements influence entrepreneurship in rural areas

but none of the studies was explicitly framed within EE theory. This was the reason why I the approach to synthesise the results to find out the differences between urban and rural EEs was redefined. Taking this into account, the themes from literature in rural entrepreneurship are novel to current EE conceptualisation or not. More specifically, I identified, categorized, and organized the factors deemed most relevant to understanding entrepreneurial ecosystems according to Ács, Autio, & Szerb (2014), Isenberg (2011) and Stam & van de Ven (2019). Employing three frameworks and not only one, I aimed to set the essential elements for an EE model more comprehensively. Moreover, given that there are no available EEs model that, in theory, reflects or suits better rural entrepreneurship (i.e., a rural entrepreneurial ecosystem model), these well-known framework models of have been selected as a representation of the "standard" within literature in entrepreneurship.

As shown in Table 5, based on a critical and detailed full-text reading of each of the papers, the topics (themes) from each paper were classified as "covered" or "uncovered" by these three selected EEs models. In this way, I could distinguish a set of "universal" and the novel rural "context-sensitive" elements. Universal elements are then those factors that are mentioned both as a part of standard EE frameworks and in the rural entrepreneurship literature. Conversely, context-sensitive EE elements are defined as those factors which are investigated in the rural entrepreneurship literature but are not covered by the selected standard conceptual models of EEs.

Table 5: Correspondence of rural literature with constructs of EE elements

Themes from rural literature	(Isenberg, 2011)	(Stam, 2015; Stam & van de Ven, 2019)	(Ács, Autio, & Szerb, 2014)
	Factors/pillars of standard EEs		
Perceptions of the status of entrepreneurship (Basson & Erdiaw-kwasie, 2019).	Culture	Culture	Cultural Support
Risk aversion (Cieslik & Aoust, 2017).			Risk acceptance
Trust in officials and public servants and corruption perception (Amorós & Mandakovic, 2017; Gorbuntsova et al., 2018; Lanjouw et al., 2001; Traikova et al., 2017).	Policy		
The local policy approach and entrepreneurial development (Nguyen et al., 2014).	Policy	Formal institutions	
Political and administrative framework (Langenbach & Tuppen, 2017; Muñoz et al., 2020)	Government	Formal institutions	Opportunity startup
Public institutions, policymakers (Musolino et al., 2018).	Government	Formal institutions	Opportunity startup
Agricultural competitiveness (Pindado & Sánchez, 2019).		Talent	
Better developed non-farm economy (Brünjes & Diez, 2012).		Knowledge	
Relationships within rural entrepreneurs (Aarstad et al., 2010; Ring et al., 2010; Roundy, 2019).	Networks	Networks	Networking
Social capital and cooperation (McKeever et al., 2014; Meccheri & Pelloni, 2006).	Networks	Networks	Networking
Social relationships (Zhao et al., 2011).	Networks	Networks	Networking
Ability to collaborate with local and non-local stakeholders (Milone & Ventura, 2018).	Networks	Networks	Networking
Participating in networks (Cieslik & Aoust, 2017; Freire-Gibb & Nielsen, 2014).	Networks	Networks	Networking
Embeddedness in the social structure (Jack & Anderson, 2002; Martynovich, 2017).	Networks	Networks	Networking
'Placial embeddedness' (Korsgaard et al., 2015).	Networks	Networks	Networking
Kin and personal relationships (Alsos et al., 2013; George et al., 2016; Peng, 2004; Venkatesh et al., 2017; L. Yu & Artz, 2018).	Networks	Networks	Networking
Regional levels of urbanisation (Radicic et al., 2017)			Networking
Entrepreneurial role models (Lafuente et al., 2007)	Culture	Leadership	Networking
Leading role models (Bakas et al., 2018; Musolino et al., 2018).	Culture		Networking
The role of visionary entrepreneurs (Brooker & Joppe, 2014).	Culture		Networking
The effect of legitimized 'high profile entrepreneurs' (Anderson et al., 2018).	Culture		Networking
Entrepreneurial examples -role models (Basson & Erdiaw-kwasie, 2019).	Culture		Networking
Educational level (Folmer et al., 2010).	Human capital	Talent	Startup skills
Higher education and training (Nguyen et al., 2014)		Talent	Startup skills

Language proficiency (Wei et al., 2018).	Human capital	Talent	
Entrepreneurial behaviour, professional background, and networks (Hassink et al., 2016).			
Entrepreneur's characteristics: gender, race, age, main occupation (Barbieri & Mshenga, 2008; Folmer et al., 2010; Huggins et al., 2017; Kalantaridis, 2006; Radicic et al., 2017; Williams & Nadin, 2013).	Human capital		
Innovative behaviour (Pindado & Sánchez, 2019).			High growth
Business competencies (Kasabov, 2016; Phelan & Sharpley, 2011).	Human capital	Talent	
Entrepreneurial skills (Dias et al., 2018).	Human capital	Talent	Startup skills
Access to new technologies: the Internet (Cumming & Johan, 2010).	Supports		Tech. Adoption
Knowledge about the available entrepreneurial support (Malebana, 2017).	Supports		
Market demand consumers' requests (Roundy, 2018; Yachin, 2017).	Markets	Demand	
Web access, telecommunication and e-infrastructure (Krakowiak-bal et al., 2017).	Supports	Physical infrastructure	Tech. Adoption
Venture capital, access to microcredit (Bhuiyan & Ivlevs, 2018; Chakravarty & Shahriar, 2015; Chliova et al., 2015; A. Dutta & Banerjee, 2018; Robert et al., 2021).	Finance	Finance	Finance
System outcome/output measurements			
Productive entrepreneurship			
Creation of new ventures			
Entrepreneurship			
Contextualised factors: Aspects from rural entrepreneurship literature			
• ***Rural EE factors not mentioned in the decontextualised EE literature***			
Rural poverty			
Natural and human resources endowment in rural locations			
Peripheral location			
• **Rural EE factors mentioned by the rural EE literature emphasizing their local community building/strengthening role**			
Rural cultural values: *foundation for local community building*			
Local ties: community building mechanism at the local level			
System outcome/output measurements			
Farm diversification			

It can be seen from the data presented in Table 5 that there are *no* distinguishing features of a completely unique "rural" type of entrepreneurial ecosystem. Most of the themes from literature on rural entrepreneurship relates to the already known "universal" EE constituent elements. From the data in Table 5, it is apparent that culture, policy, formal institutions, government, opportunity startup, talent, knowledge, networks, leadership, human capital, startup skills, high growth aspirations, startup skill, technology adoption capacity, supports, markets and demand, physical infrastructure and finance are of universal relevance for entrepreneurship both in urban and rural contexts. Furthermore, as shown in Table 5, there are some "context-sensitive" elements which seem to be distinctive for rural entrepreneurship (i.e., are not covered by current models of EEs), these are the following: rural poverty, territorial capital: natural and human resources endowments in rural locations, and peripheral location. Moreover, literature highlight those rural (non-tradable) cultural values and local ties play a strengthening role that might influence differently the development of rural entrepreneurship. Finally, I found that farm diversification emerged as a particular output measurement. Several articles employ this indicator as a proxy for entrepreneurship in rural studies. The following section offers a detailed discussion about this set of specificities of rurality and their effect on entrepreneurship.

2.4.1. Context-sensitive EE factors of rural entrepreneurship

Rural poverty

First of all, it is important to note that the literature in developing economies and resource-constrained communities indicates that one of the overarching impacts of poverty in entrepreneurship is that under poverty more people are motivated into entrepreneurship by necessity than opportunity (Hui et al., 2018; Imanipour et al., 2020). Consequently, entrepreneurship, in the shape of new business creation or economic activities diversification, has been mainly approached and pursued as a tool to alleviate poverty.

Almost every paper reviewed in this literature review in developing economies includes a section relating to rural poverty as a generalised concern for rural entrepreneurship. This specific motivation has led to policymakers' pro-entrepreneurship initiatives such as government projects to focus entrepreneurship policy on the poorest. Therefore, the outcome of rural areas' EEs in developing contexts (rural livelihoods' sustainability and poverty reduction) can be different from the generally expected outcome of the systems in other contexts (value creation, job, and wealth creation). However, entrepreneurial activity, including necessity-motivated entrepreneurs still have a positive effect on countries' poverty

reduction trends, especially in developing countries (Amorós et al., 2021). Therefore, although the ideal policy approach should rather be trying to shift from necessity based entrepreneurial activity to a more opportunity motivated entrepreneurship, under the current scenario, understanding of the effects of poverty remains relevant in the context of developing economies.

In this setting, poverty shapes attitudes toward entrepreneurship. In deprivation circumstances, people's decisions for start-up involvement are above all influenced by the possibility of gaining a reasonable income (George *et al*., 2016). Financial constraints (insufficient funds) play an important role in shaping entrepreneurship patterns. Wealthier households are more likely to start and invest in businesses as they face fewer financial limitations (Paulson and Townsend, 2004), whereas those lacking sufficient funds turn to microfinance. In this regard, Chen & Hu, (2019) found that home ownership has an effect on the entrepreneurial propensity. Owners of inherited housing are correlated with higher chances of entry into entrepreneurship, while those of privatized public housing are associated with lower chances. Poverty persistence in rural areas also determines the overall purchasing power of the population. Consequently, the means of consumption of poor rural areas (demand) will be different than in richer contexts.

Territorial capital: natural and human resources endowments in rural areas

Although deprived in comparative terms, the assets' structure of rural locations offers unique entrepreneurial opportunities. Firstly, there is a role of the available natural resources in shaping *the nature of rural businesses*. The reviewed literature shows that businesses in rural areas are diverse, including manufacturing, farming, tourism, and trade. There is evidence that the manufacturing industry is highly shaped by locally available natural resources (e.g., vegetables, fruits, herbal plants, wood, minerals, or landscape) and locally available human resources (e.g., craftsmen, local knowledge on herbal plants use and traditional medicine or brewery). For entrepreneurs in rural areas, developing ventures based on uniquely locally available resources may be the most advantageous strategy and, indeed, may lead to *distinct competitive advantages and value adding to traditional products*. Such advantages are inherently difficult or impossible to replicate in other spatial settings (Dinis, 2007; Müller & Korsgaard, 2018). Besides, natural resources, communities' cultural amenities (endogenous knowledge) stands as an important asset for unique products creation, value added and new product development (Balfour et al., 2018; Marques et al., 2019). This finding supports the work of other studies in this area linking "territorial capital"

with regional competitiveness. In the simplest way, territorial capital has been conceptualised as the "set of localized assets – natural, human, artificial, organisational, relational and cognitive – that constitute the competitive potential of a given territory" (Camagni & Capello, 2013, p.1387).

Even though small towns may not have some of the advantages of large urban centres' entrepreneurial systems, there have other ecosystem elements that may compensate for these deficiencies (Roundy, 2017). Despite lacking certain resources, peripheral locations can also provide unique environments in which business start-ups and quality lifestyle can be balanced easier than in urban contexts. This feature of rurality seems to be fostering 'lifestyle-oriented' entrepreneurship in rural areas. Lifestyle entrepreneurs are understood as those individuals who run businesses in rural areas and are primarily motivated by the *favourable environmental characteristics of rural areas for everyday life*. Peripheral locations provide an optimal environment in which the ease of doing business and quality of life can be more easily achieved compared to urban areas (Abreu *et al.,* 2018). Peripheral contexts can also provide spaces that stimulate moments of thinking and transformative learning, leading to creativity and innovation (Rae, 2017). More recent works on this topic focus on the potential of attracting 'creative classes' to rural areas. This approach is underpinned by the premise that the creative class – people specialising in producing new goods or designs that are broadly useful – are highly sensitive to spatial and environmental attributes (Florida, 2002; McGranahan & Wojan, 2007). However, the incorporation of advantageous resources and creativity assets into the local economy depends on the provision of a supportive local entrepreneurial context. Creative workers certainly demonstrate strong preferences for various outdoor amenities, and these preferences affect the location of talent, but the amenity- and creative class-based economic development strategies do not appear to be sufficient in themselves as their success is linked to the existence of other local policies such as good schools, stable housing stock and good infrastructure (Sands & Reese, 2008). This fact can therefore limit the generalisability of the benefits of territorial capital in the context of developing economies where such local conditions are likely to be deficient. To realise the positive effects of creative class attraction to rural areas and sustain robust growth in the periphery, locations require an 'effective growth trifecta' among outdoor amenities, creative class, and entrepreneurial context (McGranahan *et al.,* 2010). Providing a supportive environment for growth must be a precondition for inviting creative entrepreneurs.

In the same line, a trend of entrepreneurs aiming at a 'slow but steady growth' is growing in rural locations. 'Exporting' and 'ambition to internationalise' are not notorious aspirations among rural entrepreneurs. Rural entrepreneurs want their business to primarily suit their lifestyle and, thus, they would rather keep their business simple than have it grow too big (Bensemann & Hall, 2010). Similarly, Smith (2017) shows that rural and urban entrepreneurs may have differing entrepreneurial modes of operation. Making "slow-money" appears to be a common practice among village entrepreneurs. They prefer to make their wealth slowly over a lifetime by hard work and not necessarily by taking important risks. Finally, much literature in this review emphasises the active role of in-migrants on the creation of new ventures in the host location. Particularly, return migration can help to revitalise rural economies and alleviate poverty (Akgün, Baycan-Levent, Nijkamp, & Poot, 2011; Démurger & Xu, 2011). Repatriated capital is a key driving factor for promoting rural entrepreneurial development. Arrivals of entrepreneurs not only enhance economic development but also can directly contribute to compensating for the current out-migratory direction of young productive individuals (Kalantaridis & Bika, 2006). Migrants can bring innovative ideas, connections to networks outside the local community, and different perspectives on thinking about local economic development, new start-ups, and entrepreneurship (Deller et al., 2019).

Peripheral location

Regardless of distance, rurality implies a distance to urban centres. A peripheral location entails not only geographical isolation but also marginal participation in social, cultural, political, economic, and intellectual issues (Rae, 2017). In its many forms, isolation is a key barrier to entrepreneurial opportunity and business success not only by hindering access to material resources and markets (Sohns & Diez, 2017) but also to information about products and services. In the context of isolation, the success and failure of rural entrepreneurs depends on structural (highway proximity, mobility infrastructure) and interpersonal factors (travel choices, information sources; Gallardo & Scammahorn, 2011; Uparna & Weber, 2016). Since rural areas are more likely to face these challenges, recognizing this location difference can help rural communities better design and implement their entrepreneurial systems.

EE factors with a role in local community building/strengthening

Literature also shows the existence of some other factors that have a local community strengthening role in rural areas. The following section introduces these aspects.

Rural cultural values: foundation for local community building

How people interact in rural areas differs from how people interact in urban areas. Literature shows that the rural origin of entrepreneurs, their ethnic and cultural diversity, along with gender (women's roles), influence business creation and survival in rural areas. The rural origin and identity of an entrepreneur influence the likelihood of rural entrepreneurship. Involvement in entrepreneurship from young people in rural areas is demonstrated to be highly influenced by family tradition on entrepreneurship and business (North & Smallbone, 2006; Yu & Artz, 2018). Against the current tendency of young educated people migrating from rural areas looking for job opportunities, some observe that rural areas give rise to innovative entrepreneurs who are 'contravening the basic tenets of the modernisation script' (Milone & Ventura, 2018, p. 1). Young entrepreneurs are increasingly motivated to stay in the rural areas and make their contribution to rural life by creating and developing land-based rural business, often very small (Milone & Ventura, 2018). Similarly, the sense of belonging to a rural community can positively influence intentions even from those born non-locally. Nordbø (2013) argues that second-home owners could help to build a critical mass of rural entrepreneurship and innovation as they demonstrate in different ways the interest and willingness to use their knowledge and competence to contribute to the development of their second-home community and, thus, the local economy.

Another culture-related feature that can enable or inhibit the development of entrepreneurship is ethnic diversity. In countries such as Bolivia, where approximately 60% of the population is indigenous (Aymara, Quechua), the indigenous–non-indigenous (mestizo) dynamics can play a significant role in entrepreneurship development (Padilla-Meléndez & Ciruela-Lorenzo, 2018). Indigenous-based entrepreneurship has its owns actors, institutions, and favourable and adverse mechanisms (Shantz et al., 2018; Widjojo & Gunawan, 2019). Moreover, women roles have a great and complex influence on entrepreneurship in rural contexts. Basically, there is a generalized agreement about the disadvantaged position of rural women entrepreneurs linked to the society in which they live. Aiming to become entrepreneurs or already in the field, women are still influenced by societal prejudice such as societal expectations of women, gender inequality, financial

limitations, and limited entrepreneurship educational opportunities. Evidence from the rural tourism sector demonstrates that a gendered ideology persists within copreneurial relationships in rural tourism. The term corpeneurship is understood as activities of married couples in business (Bensemann & Hall, 2010). In the case of indigenous women entrepreneurs in South America, the literature still evidences a dependency syndrome, which means that indigenous women are overpowered by male stereotypes (Padilla-Meléndez & Ciruela-Lorenzo, 2018). Therefore, mechanisms like cooperative entrepreneurship and sisterhood among female entrepreneurs provide an environment for repeated affective experience that inspire women (Katre, 2018). Overall, these results reflect those of Malecki (2018) who suggests that EEs may not be gender-blind and seem to be insufficiently supportive of female entrepreneurs.

Local ties: community building mechanism at the local level

Social capital, in the generic shape of "networks" has been broadly identified as an important ingredient of successful business creation and entrepreneurship, particularly for rural locations (Jack & Anderson, 2002). Bridging social capital and bonding social capital are two different forms of social capital that describe different ways in which social networks can be structured. While bridging social capital refers to the connections between people who belong to different social groups or communities. It involves building relationships with people who have different backgrounds, perspectives, or experiences, bonding social capital, refers to the connections between people who belong to the same social group, family, or community. In this regard, research shows that bridging and bonding social capital plays is a robust predictor for nascent entrepreneurs, as well as for advancing through the start-up process (Davidsson & Honig, 2003). Literature from this review confirms the important role of social and human capital among entrepreneurs and shows the same pattern: there are several ways how both bridging and bonding social capital significantly predict community action in rural areas (Agnitsch et al., 2006; Townsend et al., 2016). In this matter, literature highlights that due to the remoteness of rural locations, rural entrepreneurs often effectuate their networks in a way that they can benefit from "the best of two worlds", the local community and the non-local networks to create opportunities (Haase Svendsen & Brink, 2013; Korsgaard et al., 2015) .

There is a general agreement that having connections with stakeholders, knowing other entrepreneurs or being able to easily travel can improve the ability of entrepreneurs to find opportunities, access to knowledge or local resources. On this subject, literature from

rural entrepreneurship emphasizes that rural locations are characterized by strong social networks, tightly connected internally and generally poorly connected to outside groups. Strong local ties can either facilitate or constrain the development of entrepreneurs' practices and decisions due to the typical rural strong reliance on informal institutions to guide people's behaviour. On the one hand, evidence from developed countries, show that collective action can be an endogenous factor for local development driven by entrepreneurial activity (Ring et al., 2010). These latter findings are in line with those of Ruef (2010) who insightfully demonstrates a positive role of entrepreneurial groups such as voluntary commercial and civil associations, business partnerships for entrepreneurial activity. In the same line, trust in officials and public servants and strong heterogeneous village associations **(**non-family groups) seem to be important in stimulating non-farm activity (Lanjouw et al., 2001).

On the contrary, in the context of rural areas the effect of social capital can also be adverse. In remote impoverished locations, strong local ties coupled with counterproductive community attitudes such as collectivism, fatalism, kinship, or tribal affinities can negatively affect entrepreneurial innovation, diverting resources and constraining agency (Lanjouw et al., 2001; Shantz et al., 2018).

A specific output measure for rural areas: Farm diversification

A great deal of the reviewed literature pays particular attention to farm diversification either as an aim of entrepreneurial efforts or as a key strategy of successful entrepreneurs in rural areas (see. Barbieri & Mshenga, 2008; Basson & Erdiaw-kwasie, 2019; Brünjes & Diez, 2012; Folmer, Dutta, & Oud, 2010; Hassink, Hulsink, & Grin, 2016; Milone & Ventura, 2018; Radicic, Bennett, & Newton, 2017; Sohns & Diez, 2017). Therefore, overall, these studies highlight the need for considering farm diversification indicators as a distinctive output measure for rural entrepreneurship. Among other, diversification activities have been empirically measured by quantitative indicators of business performance of agritourism farms, non-farm wage employment, incidence of manufacturing entrepreneurship measured by farmer's engagement in rural industrial activity or a binary indicator of portfolio entrepreneurs' choice (defined as those who operate more than one business at any one time). Farm diversification has also been measured from qualitative perspectives by analysing for instance, entrepreneurial motivation of entrepreneurs which see opportunities besides primary rural economic activities (mining). Some authors focus on tracing the motivations and challenges or paths for success of creative rural entrepreneurs

such as owners of “care farms” that were initiated by a member of the farmers' families as a diversification economic activity or successful young creative land-based rural entrepreneurs.

2.5. Approaches to measure entrepreneurial ecosystems’ complexity

A number of studies have begun to examine entrepreneurial ecosystems from a configurational approach looking to understand how entrepreneurship is created through the interaction between the system’s factors in particular territories. In the context of entrepreneurial systems, the configuration approach seeks to identify the multiple configurations that lead to entrepreneurial ecosystem success. Understanding the diverse paths (combination of factors of a system) that lead to productive entrepreneurship can be useful to answer several key research questions regarding complexity of entrepreneurial ecosystems. In this context, one of the most prominent methods is the fuzzy-set qualitative comparative analysis (fs/QCA) that is used with increasing frequency particularly in business and management research (Kraus et al., 2018).

Qualitative Comparative Analysis (QCA) has been suggested as a well-established methodology that can offer a feasible methodological solution for studying the diversity of different types of ecosystems. QCA is a method originated by the seminal work by Ragin (1987). Since the time of its first publication, QCA has become distinguished in the field of political sciences, sociology and management and it is certainly on the way to becoming a mainstream method (Benoît Rihoux et al., 2013). In a nutshell, QCA is a method that analyses complex situations among and intermediate number of cases, typically between 10 and 50. By identifying how different combinations of conditions lead to the presence or absence of a specific outcome, it can help researchers explain why change happens in some cases but not others. Among other features, this approach is seen as useful for establishing what types of regional attributes are required to achieve higher rates of scaleup entrepreneurship (Coduras et al., 2016; Roundy et al., 2018; Spigel et al., 2020). Table 6 summarizes key recent literature on how configurational approaches have been informative for studying understanding and measuring entrepreneurial ecosystems complexity.

Table 6: Key literature on QCA for studying entrepreneurial ecosystems, 2019-2022

Study	Research question/aim	Units of investigation	Conclusion/findings
(Muñoz et al., 2020)	How configurations of local entrepreneurial ecosystem attributes, as evaluated by local experts, support or hinder the emergence of *new and innovative firms*?	88 cases within 11 geopolitical areas in Chile	Three distinct ecosystem types explaining different local levels of new firm activity: Active self-propelled, indulged and passive self-absorbed.
(Torres & Godinho, 2021)	What elements of a digital entrepreneurial ecosystem are necessary to produce *digitally enabled unicorns*?	27 EU member states, plus the UK.	All elements of digital entrepreneurial ecosystems are relevant for digitally enabled unicorns
(Schrijvers et al., 2021)	Is there one way to a successful entrepreneurial ecosystem or are there are different paths?	273 regions in Europe	There is not one perfect configuration that all successful ecosystems exhibit. There are multiple configurations that lead to entrepreneurial ecosystem success.
(Xie et al., 2021)	This study explores the configurational effect of pertinent factors on *entrepreneurial quality and quantity*	173 cities in China	Both entrepreneurial quality and quantity can be created through the interaction between factors and the presence of *multiple, equally effective pathways* that lead to the same outcomes.
(Yang & Zhang, 2021)	This study analyses whether the entrepreneurial ecosystem *promotes regional development* and if so, how.	265 urban entrepreneurial ecosystems in China	The entrepreneurial ecosystem can well explain employment and innovation in the region. There is only *one configuration to promote economic growth,* which emphasizes the impacts of formal institutions and finance.
(March-Chordá et al., 2021)	This study identifies the locational *factors* of Silicon Valley that are most valued for *successful performance of new ventures* founded by immigrant entrepreneurs.	54 new ventures that were founded or co-founded by Spanish entrepreneurs in the Bay Area, U.S.	The capacity to rapidly build a solid network of investors, firms, and other stakeholders; and the unique nature of the Bay Area market which is especially conducive to testing new products, business models, and technologies have been determined as as necessary conditions.
(Komlósi et al., 2022)	The authors explore those configurations of micro, meso and macro elements of the EE of ICT firms which result in *low- or high-level networking performance*.	Survey data from 29 ICT firms in Pécs, Hungary.	*Different ecosystem configurations* are required for high informal, formal, or external networking.
(Alves et al., 2019)	The study identifies the different configurations of EE elements that lead successful Knowledge Intensive Innovation (KIE) Ecosystems.	Data from the State of São Paulo, Brazil	EE elements are distributed in *three different paths*. While configurations vary in terms of causal conditions, research universities, knowledge-intensive jobs and wider credit operations are core-causal conditions. Proximity to the main economic hub appears as a key differentiator among ecosystems.

Source: own elaboration

What emerges from the studies reported here is that a) the frameworks to define EE elements and the outcome variables employed, are different among researchers, b) fs/QCA results show in most of cases that necessity level of EEs elements and the "pathways" for ecosystems success are diverse and contingent to the ecosystem outcome measure employed. From the studies presented in the table above, it is remarkable that none of them employs the same set of causal conditions nor outcome variable in their models and in most of the cases, researchers formulate models with more than one outcome measurement.

For instance Komlósi et al. (2022) consider networking as a crucial output of EEs and employed firms' networking performance as a measurement variable in their QCA models. Alves et al. (2019) argue that successful EE have the capacity of sustaining the generation of knowledge-intensive entrepreneurship (KIE) and so they measured EEs output by the number of KIE projects granted to a given municipality. For March-Chordá et al. (2021) the location of new *ventures* founded by immigrant entrepreneurs is an important proxy of top EE success. Muñoz et al. (2020) employed three alternative levels of entrepreneurial activity: Early-stage firm activity, high-growth firm activity and low-growth firm activity as a measurement of EEs performance. Similarly, Torres & Godinho (2021) employed three possible outputs: new business creation, unicorns and digitally-enabled unicorns, as a measurement of Digital entrepreneurial ecosystem performance. In their study, Xie et al. (2021) measures EEs capacity to hold both, quality and quantity entrepreneurship. Quality entrepreneurship is measured by the number of unicorns and of companies listed on the China Growth Enterprise Market per million residents while quantity entrepreneurship is measured by the proportion of the labour force who are employed in private enterprises and self- employed people. Finally, Schrijvers et al. (2021) measure EE success by measuring its capacity to hold productive entrepreneurship which is operationalised with two measures: innovative start-ups (less than 5 years old) and unicorn firms (young private firms with a valuation of more than $1 billion).

Regarding necessity levels variation, it was observed that among the selected studies, levels of necessity of each of the ecosystem elements is diverse ranging from cases when none of the elements are necessary for an outcome to cases when high performance in all the elements of an ecosystem is necessary to achieve an entrepreneurial output like in Torres & Godinho, (2021), However, in most cases, there are sets of elements that are more relevant than others (for example in Alves, Fischer, Vonortas, & Robles, 2019 or Komlósi, Sebestyén, Tóth-Pajor, & Bedő, 2022). Despite the progress in understanding different levels of necessity of elements of an entrepreneurial ecosystem for a given output, more systematic

analysis is necessary to get a clearer understanding. However, As Schrijvers, Stam, & Bosma argue: '…the higher the entrepreneurship output, the more convergence there is to an all-round entrepreneurial ecosystem' (Schrijvers, Stam, & Bosma, 2021:1) where all ecosystem elements strongly developed.

Limitations of QCA methodology for studying entreprenership

Despite the strengths of QCA (synthesised above), several shortcomings to this method should also be acknowledged. First, is the issue of binary coding. The base version of QCA, crisp-set QCA (csQCA), makes it necessary to dichotomize all factors where every condition must be assessed as either being fully present (1) or not (0). Critics argue that binary coding leads to a loss of information, and it does not allow gradual assessment. This is particularly problematic when the method is intended to be employed to understand social and political phenomena as dichotomies are too unrefined to capture its diversity (Pennings, 2009). Nevertheless, if dichotomization are not convincing or suitable for certain kind of studies, there is still the option of using fsQCA (fuzzy set QCA) where membership grades can have any real value between 0 and 1 (Benoît Rihoux & Ragin, 2009). Regarding this issue in the context of application of QCA for studying entrepreneurial ecosystems, we can observe (from literature on Table 6) that six out of eight studies employ fuzzy set QCA while only Schrijvers et al., 2021 and March-Chordá, Adame-Sánchez, & Yagüe-Perales, 2021 enploy crisp-set QCA.

Perhaps the most serious criticism of this method is about robustness testing. Some critics argue that QCA results are very sensitive to the researcher's particular decisions on the specification and this is a fundamental issue for a correct interpretation (Seawright, 2005). Researchers have commonly approached this issue by including information about the robustness of reported results toward changes in calibration, frequency and consistency cut-off points, and alternative explanations (Meuer & Fiss, 2020). This view is supported by Torres & Godinho, (2021) who computed set membership thresholds of entrepreneurship outputs based on the distribution of values but the authors emphasises that different data might suggest different thresholds. A broadly similar point has also recently been made by Schrijvers et al., (2021), who cautions against the use of sample statistics to determine the thresholds for the configuration of the QCA. For entrepreneurship-related studies is preferable to base thresholds on previous empirical evidence (such as historical or longitudinal data) or theoretical arguments when possible. This would ensure that cases are not compared relative to each other but relative to some external threshold.

In a more practical way, to address robustness issues, Xie, Wang, Xie, & Duan, (2021) carried out a two-step sensitivity analyses. First, they reran the analysis with a higher consistency threshold of sufficiency analysis of 0.80 (before 0.75). Second, they reran the calibrations with the alternative crossover point at the 55th percentile for all their selected conditions and outcomes. In both cases, the generated solutions showed only minor changes and the interpretation of the results remained unchanged. In their study aiming to identify how the elements within the entrepreneurial ecosystem interact to promote regional short- term and long- term development in urban China, Yang & Zhang, (2021) adopted a similar approach and tested the robustness of their results by raising the consistency threshold from 0.75 and 0.85 to 0.90. In their case, the robustness test results indicated that one of their configurations changed substantially while the other configurations change little.

Summary

The first aim of this chapter was to provide a comprehensive and critical analysis of the existing literature in rural entrepreneurial ecosystems. The first section focused on conceptualising rural EEs and specifically, I aimed to find out whether rural entrepreneurial ecosystems are different from urban ecosystems and if so, in which way. Regarding this question, literature shows that there are no major differences in the composition of urban and rural entrepreneurial ecosystems. "Universal" factors such as culture, policy, formal institutions, government, opportunity startup, talent, knowledge, networks, leadership, human capital, startup skills, high growth aspirations, startup skill, technology adoption capacity, supports, markets and demand, physical infrastructure and finance are relevant for entrepreneurship both in urban and rural contexts. However, literature also allowed the identification of three "context-sensitive" elements which seem to be distinctive for rural entrepreneurship (i.e., are not covered by standard models of EEs) and that should be incorporated in rural EE measurement: rural poverty, territorial capital: natural and human resources endowments in rural locations, and peripheral location. In this regard, because these rurality-related elements are not yet embedded in standard EE frameworks, I asserted that these frameworks can only partially define EEs in rural contexts.

The second section of this chapter introduced three well-known measurement tools for EEs and reviewed the structure, advantages, and disadvantages of each of these tools. The final section of this chapter added information about the most recent approaches to measure ecosystems' complexity emphasising on the potential of QCA for studying entrepreneurial ecosystems. Together the findings of literature review helped me to formulate, in an informed way, the relevant research gap and research questions and also to define the most suitable tool to be employed in the empirical chapters (4 and 5) of this dissertation.

3. Chapter 3: Entrepreneurship in South America

Introduction

This chapter is descriptive and informative in nature and its major aim is to synthesise the available literature and data about the developmental, economic, and entrepreneurial regional features of South America, with particular focus on Colombia and Ecuador which are the areas studied in this dissertation. The first section presents an overview of the socio-economic situation of the South American countries. The second section characterize quantity-based entrepreneurship in South American countries using the Total Early-stage Entrepreneurial Activity (TEA) measure. Healthy entrepreneurial ecosystems results in high level productive (quality) entrepreneurship (Stam, 2018, 2021). Consequently, the third section presents a deeper look into how the national level EEs perform in South American countries using two entrepreneurial ecosystem measures (The Global Entrepreneurship Index – GEI, and The Index of Dynamic Entrepreneurship – IDE). The final section offers a brief overview of rural entrepreneurship in South America.

3.1. **Developmental aspects of South America**

South America is the fourth-largest continent with total area of around 17,83 million km^2 divided between 12 countries. The size of the economies of South American countries is diverse. Brazil is the biggest economy with a GDP of around 1.6 trillion USD and Paraguay was the smallest economy in the region with a GDP of around 39.50 billion USD. According to the United Nations' country classifications 2021, all South American countries are developing economies. According to the country classification by income, Bolivia is the only lower-middle income economy in the region (GNI per capita $1,046 to $4,095). Argentina, Brazil, Colombia, Ecuador, Paraguay, and Peru are upper-middle-income economies (GNI per capita $4,096 to $12,695). Chile and Uruguay are high-income economies (GNI per capita $12,695 or more) (The World Bank, 2022). Table 7 summarizes key development indicators of each South American country to reflect their stage of development.

Table 7: Economic indicators for South American countries, 2021

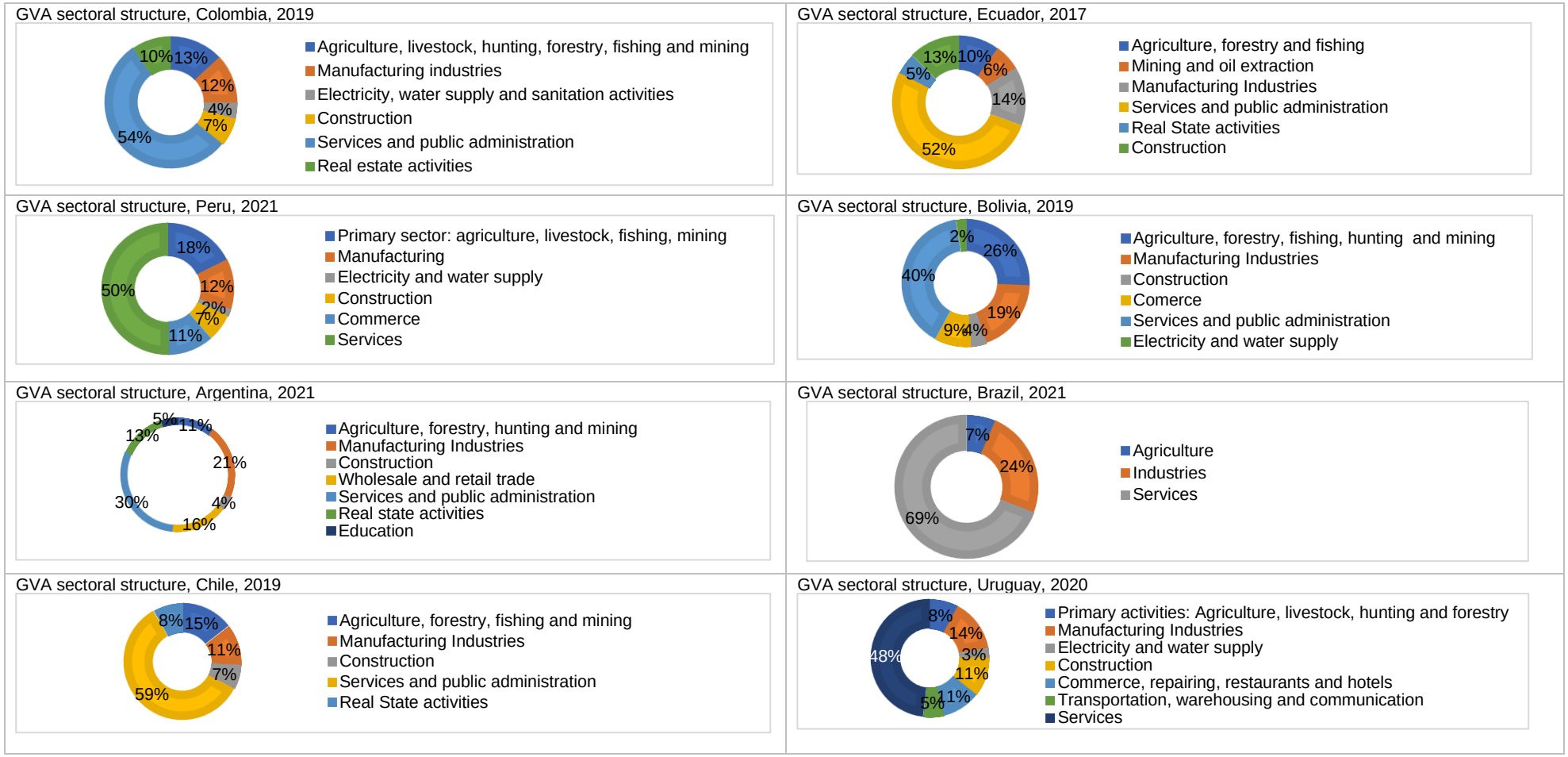
	GDP (current Billion US$) 2021	GDP growth (annual %) 2021	Unemployment, total (% of total labour force) 2021	GDP per capita, current USD, 2021
Brazil	1610	4.6	13.3	7518
Argentina	494.49	10.3	8.7	10729
Chile	317.06	11.7	9.4	16502

Colombia	314.32	10.6	13.9	6131
Peru	223.25	13.3	5.1	6692
Ecuador	99.29	4.2	4.5	5934
Uruguay	59.32	4.4	10.3	17020
Bolivia	40.41	6.1	7.9	3414
Paraguay	39.5	4.1	7.3	5891

Source: own elaboration based on The World Bank (2023)

The continent's economy is centred on services, manufacturing industry and extraction and exportation of natural resources such as minerals and petroleum. However, each economy's composition is different among South American countries. A closer view of the composition of GVA provides a clearer outline of each South American economy. As observed in Figure 3, tertiary sector (services) is the biggest sector for all South American countries. Services include a diverse set of activities within each country but mainly it accounts for transport, distribution and sale of goods, wholesaling and retailing, financial services, professional services, insurance, education, and entertainment. For Ecuador, Argentina, Uruguay, and Brazil, the second most important sector is manufacturing. For Bolivia, Chile, Peru, and Colombia primary sector (agriculture, fishing, and mining) is their second most important economic sector and manufacturing industries the third.

Figure 3: Composition of GVA in South American countries



Note. Data for Colombia from "Cuentas nacionales departamentales" by Colombian National Administrative Department of Statistics DANE, 2022. Data for Ecuador from "Valor agregado bruto por provincia, año 2017" by Ecuadorian Central Bank, BCE, 2021. Data for Peru from "Producto bruto interno en millones de soles de 2007" by Peruvian Central Reserve Bank, 2021. Data for bolivia from "Producto Interno Bruto (PIB) de Bolivia" by Integrated Bolivian System of productivity information – SIIP, 2022. Data for Argentina from "Cuentas nacionales" by Argentinian National Statistics and Census Institute, 2022. Data for Brazil from "Contas Nacionais Trimestrais" by IBGE, 2022. Data for Chile from "Producto interno bruto por clase de actividad económica, anual, volumen a precios del año anterior encadenado" by Central Bank of Chile, 2019. Note. Data for Uruguay from "Producto interno bruto por industrias" by Central Bank of Uruguay, 2020.

Poverty and living conditions in South America

One of the biggest societal issues in South America is the persistence of high rates of extreme poverty and inequality. The Multidimensional Poverty Index (MPI) is an international measure of acute multidimensional poverty which shows the "incidence" of poverty (i.e., the proportion of people within a given population who experience multiple deprivations) expressed as headcount ratio. The MPI was developed by the Oxford Poverty and Human Development Initiative (OPHI) and the United Nations Development Programme (UNDP) and aims to complement traditional monetary poverty measures by capturing the simultaneous deprivations in health, education, and living standards that a person faces. Recent MPI data shows that Bolivia and Colombia remain as the poorest countries in South America with a MPI of 6.6 and 5.5 respectively while Uruguay and Chile are the less poor countries with a MPI of 0.1 and 0.4 respectively (Table 8). What stands out from the data is that education attainment and sanitation access are the two aspects with the highest levels of deprivation in the region.

Table 8: Multidimensional poverty in South American countries, 2021

Economy	Deprivation rate (share of population)						Multidimensional poverty headcount ratio (%)
	Monetary (%)	Educational attainment (%)	Educational enrolment (%)	Electricity (%)	Sanitation (%)	Drinking water (%)	
Uruguay	0.1	2.0	0.7	0.1	1.0	0.5	0.1
Chile	0.3	4.0	0.4	0.3	0.6	0.1	0.4
Argentina	1.5	1.5	0.6	0.0	0.4	0.3	1.5
Paraguay	0.9	6.3	1.9	0.3	9.0	2.1	1.7
Peru	2.2	5.4	0.8	4.1	12.1	6.2	3.9
Ecuador	3.6	3.9	2.9	1.4	3.6	4.3	4.2
Brazil	4.6	16.0	0.4	0.2	34.2	1.7	5.3
Colombia	4.9	5.1	2.8	1.3	8.2	2.4	5.5
Bolivia	3.2	13.2	2.2	4.9	16.3	7.4	6.6

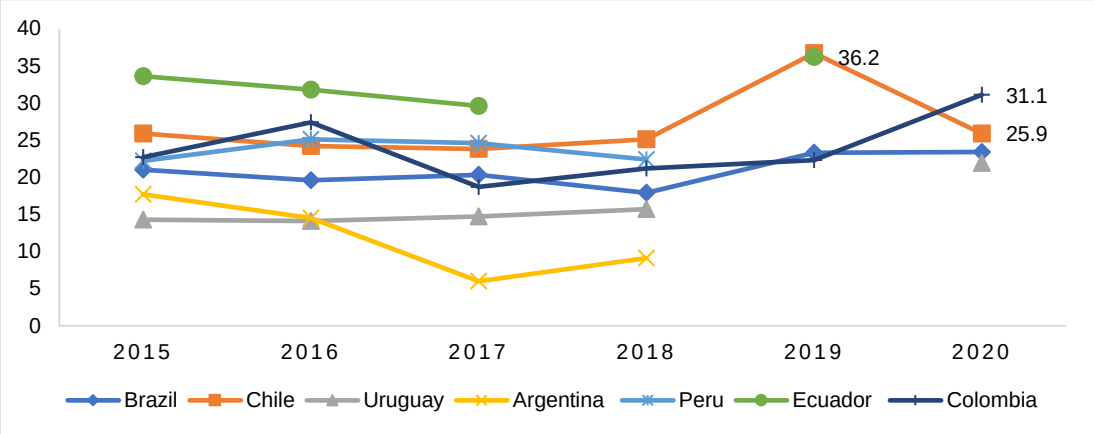
Note. Data from "Global Monitoring Database" by The World Bank, 2022.
Source: own elaboration

3.2. **Entrepreneurship in South America**

Total early-stage Entrepreneurial Activity (TEA) has been employed in this section to describe levels of entrepreneurial activity in South America. TEA is defined as the percentage of 18–64-year-old regional population who are either a nascent entrepreneur or owner-manager of a new business (GEM, 2022). TEA accounts for every kind of entrepreneurs in different production sectors, it includes self-employed people, creative and imitative entrepreneurs. Minniti & Lévesque, (2010) define imitative entrepreneurs as those entrepreneurs that imitate an existing intermediate good thereby only increasing competition and product supply. Conversely, research-based entrepreneurs are creative and introduce original technological changes thereby increasing productivity and intermediate goods' variety. Scholars suggest that

both kind of entrepreneurs are relevant for economic growth, and imitative entrepreneurship is more important in less developed economies. Therefore, TEA seems to be informative about entrepreneurial activity in South America, where all are developing countries. For TEA rates interpretation purpose, it is important to note that historically, developed countries such as U.S, Switzerland or Spain have shown low levels of TEA between 5% and 20%. Conversely, rates of TEA in South America are on the rise in most countries except by Argentina (Figure 4). The high rates of TEA indicate that *entrepreneurial activity* in South America is an important element for the countries' economies. Particularly, Ecuador and Colombia are at the top of the list of highest rates of TEA among all the south American countries.

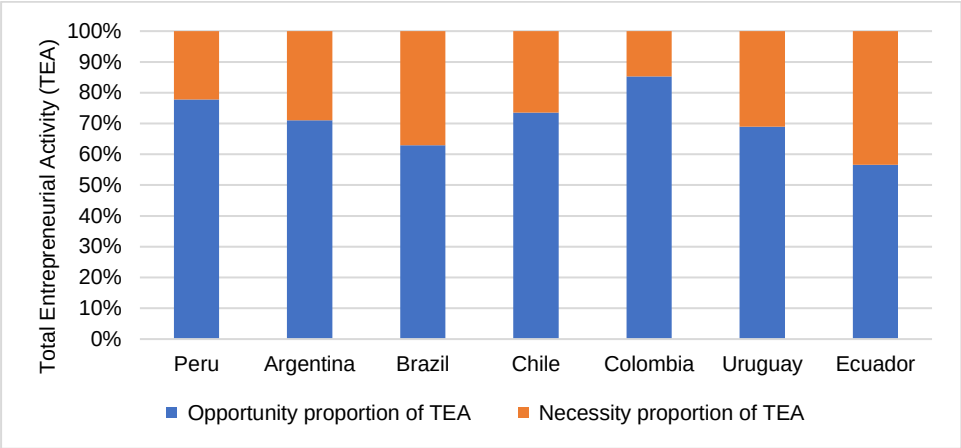
Figure 4: Evolution of TEA South America 2015-2020



Note. Data from "APS Data" by Global Entrepreneurship Monitor GEM, 2022.
Source: own elaboration

Importantly, TEA within primary sector activities and manufacturing, which are highly connected to rural areas, is significant for every country in South America (from 13.1% – 22.5% share of national TEA). Furthermore, as can be seen from Figure 5, the share of IT and professional services is relatively low for most countries except by Chile and Uruguay. Importantly, business in the retail trade, hotels and restaurants industry are the most common type of small business South America.

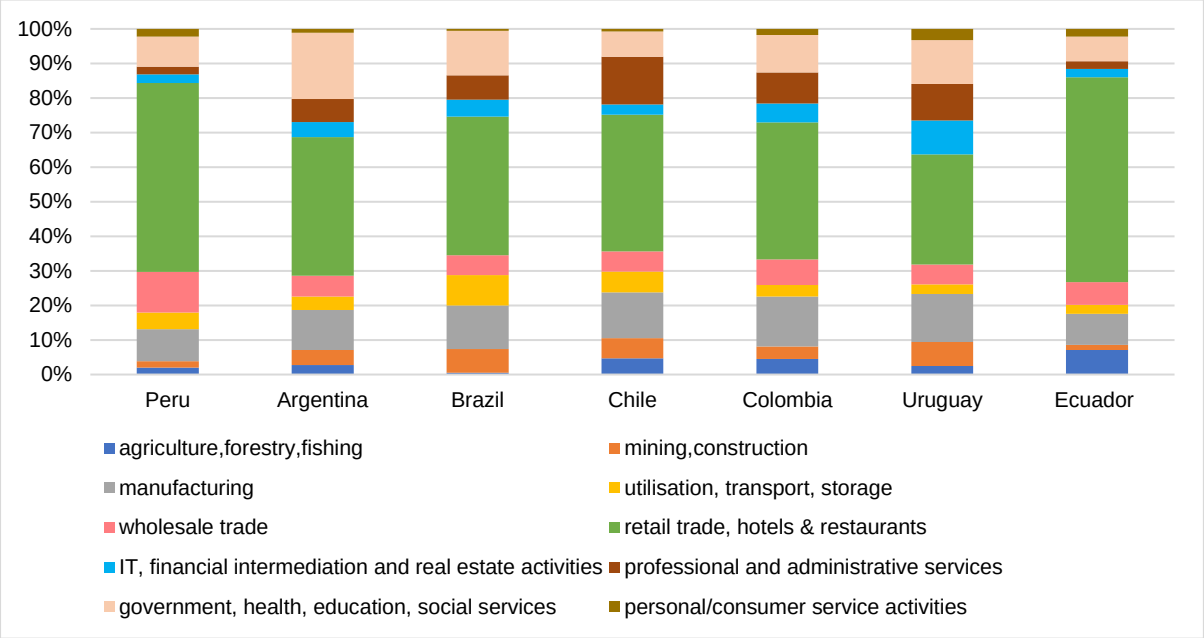
Figure 5 Necessity and Opportunity TEA rates in 7 South American countries 2018



Notes: data from 2017 for Ecuador, data not available for Bolivia and Paraguay. Source: own elaboration based on "GEM-APS Data" by Global Entrepreneurship Monitor GEM, 2022.

Necessity-driven entrepreneurship refers to starting a business out of necessity or desperation. This means that the entrepreneur starts a business because they have limited options for earning income and need to support themselves and their families. Opportunity-driven entrepreneurship, on the other hand, refers to starting a business based on identifying an opportunity in the market. This means that the entrepreneur identifies a need or gap in the market and starts a business to fulfil that need or address that gap. Historically, entrepreneurs in low-income economies have shown to be more likely motivated by necessity than in wealthier economies. Among low-income economies, an average of 35% of entrepreneurs are motivated by necessity. However, the level of necessity motives drops as economic development level increases. In middle-income economies, the average incidence of necessity driven entrepreneurship is 28%, and 18% among high-income economies (Bosma & Kelly, 2018). In the South American group confirms this trend with an average necessity driven entrepreneurship rate of 29.12%. However, what is notable is that Ecuador shows the highest rates in this region where 43.35% of entrepreneurs are primarily due to necessity. Contrastingly, in Colombia only a 14.75% are motivated by necessity. An economy with higher rates of opportunity entrepreneurship has some positive implications as it can indicate entrepreneurs seeking greater income or independence by pursuing entrepreneurial opportunities rather than engaging into entrepreneurship as a way to scape unemployment.

Figure 6: Distribution of TEA by industry sectors in South America, 2018



Notes. n= 4314. Data for Ecuador from 2017.
Source: own elaboration based on GEM (2022)

Another related aspect to be considered when analysing entrepreneurial activity in South America is the "low-productivity employment problem". Recent studies show that high rates of informality in the business sector in South America have driven to historical low productivity. Workers in the informal sector are usually unskilled independent workers, unpaid workers, microenterprise owners and employees (excluding skilled workers) and domestic workers. What is important is that high levels of informality have negative effects on aggregate productivity. By 2018, informal employment accounts for about 48% of total employment in Latin America and the Caribbean, and the labour productivity in the informal sector is equivalent to 6% of labour productivity in the formal sector (Commission for Latin America and the Caribbean (ECLAC), 2022). This denotes economies with poorly diversified structures and limited demand for skills where workers do not have productive employment alternatives and thus people absorb underemployment and subsistence employment. In this regard, policies that supports the industrial, scientific, and technological progress that help labour mobility from informal to formal sector are key to transform the current scenario.

3.3. **Entrepreneurial ecosystems in South America: National level indicators**

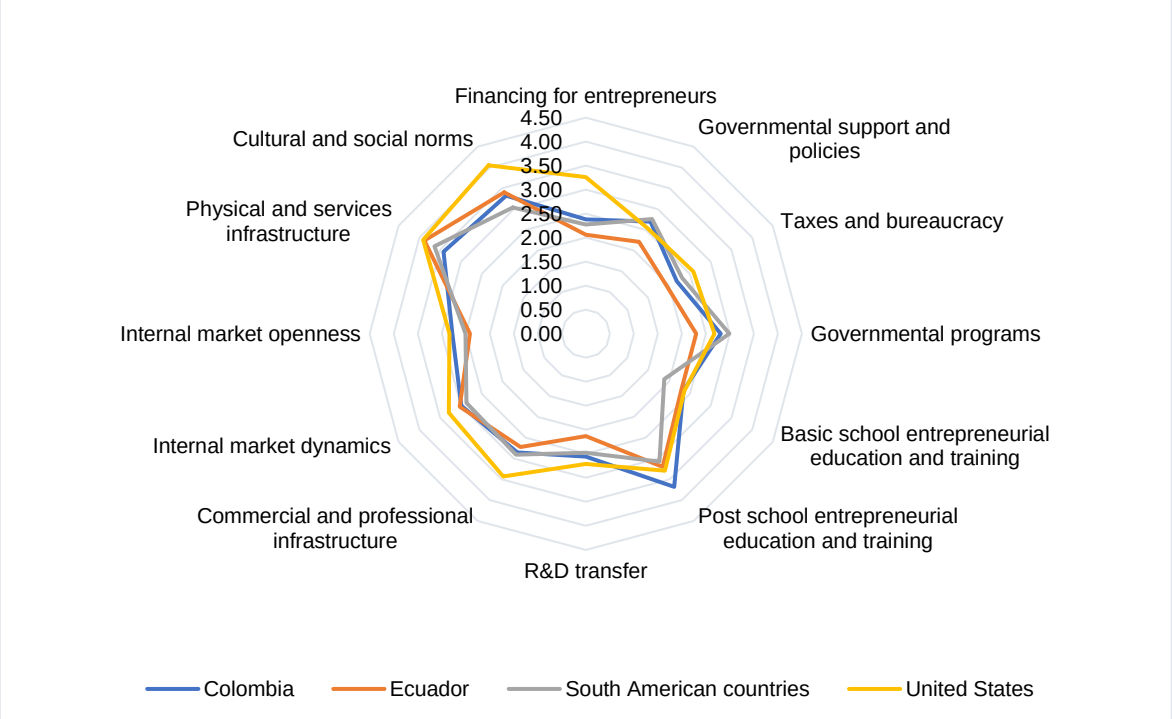
This section characterises the most important aspect about the national level conditions that support or hinder productive (quality) entrepreneurship in South American countries

employing the latest scores available from one EE framework indicator (GEM Entrepreneurship Framework Conditions EFCs) and two EE weighted measures: The GEI and the IDE.

Entrepreneurship Framework Conditions (EFCs) in South America

The GEM collects data in two ways. The Adult Population Survey (APS) which is a yearly survey administered by GEM National Teams to a representative national sample of at least 2000 respondents. The APS looks at the population's entrepreneurial behaviour and attitudes and it contains a large set of questions aiming to measure the characteristics, motivations and ambitions of individuals starting businesses, as well as social attitudes towards entrepreneurship. The GEM also gathers relevant data that allows an interpretation of the characteristics of the entrepreneurial environment in a country through the National Experts Survey (NES). The NES collects information about 12 entrepreneurship Framework Conditions (EFCs), which are relevant for entrepreneurship, from at least 36 experts in each of these aspects in each country.

Figure 7: National level entrepreneurial environment in South America, 2020



Notes. South American countries is the average of Brazil, Chile, Uruguay, Argentina and Peru. Values for Ecuador are from 2019 and for Peru and Argentina from 2018.
Source: own elaboration based on "GEM National Expert Survey" by GEM (2022).

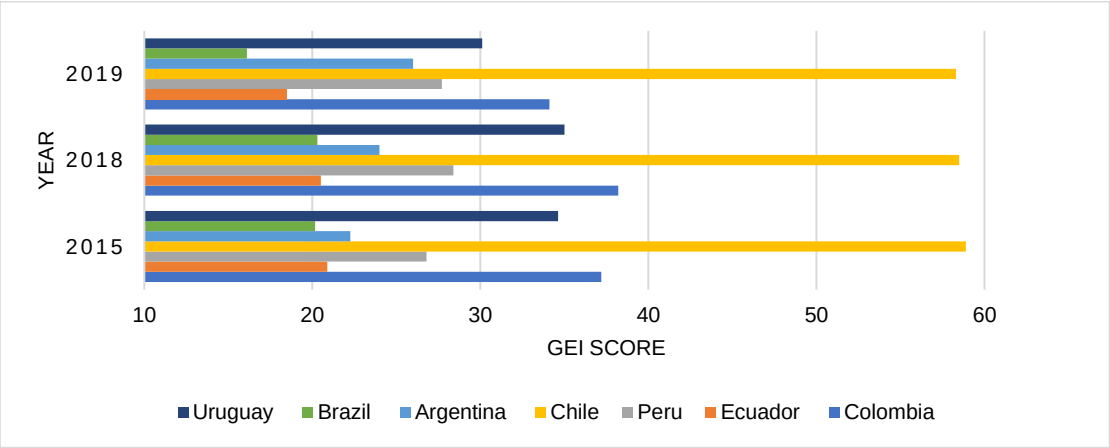
From Figure 7 we can see that the entrepreneurship framework conditions across South American countries are less favourable than those in the U.S (which is a reference of a top ecosystem). However, the differences are not significant demonstrating that conditions for entrepreneurship in South American countries are competent. Overall, taxes and bureaucracy and, basic school entrepreneurial education and training are the weakest pillars for all South American countries. All South American countries still lack public policies, taxes or regulations that support entrepreneurship directly. Moreover, training in creating or managing business is deficiently incorporated within the education and training system at primary and secondary levels.

Prior studies have noted the importance of entrepreneurship education for students' entrepreneurial skills, propensity, and intentionality (Hahn et al., 2020; Pittaway & Cope, 2007).Thus, low level of entrepreneurial education is one of the common weaknesses among south American countries and there is a need of educating new generations so that they can develop values associated with entrepreneurship. On the other hand, the strongest pillar for South American countries is physical and services infrastructure. This indicates that overall, in South America access to physical resources—communication, transportation, land, or space—is available at a price that does not discriminate against small businesses. In this pillar, Ecuador performs better than all countries in the region. This is relevant since literature suggest that startup activity is positively linked to physical and technological infrastructure as infrastructure typically enhances the connectivity of people, which in turn, is beneficial to entrepreneurial activity (Audretsch et al., 2015).

National systems of entrepreneurship in South America: GEI and IDE scores

As shown in figure 8, Chile has remained as the best performing ecosystems in South America since 2015. The score differences between Chile and the other countries in the region are significant. Historically, Chile average GEI scores are around 58 points score while Ecuador, Colombia, Peru, Argentina, Brazil, and Uruguay have historically stayed under 40 points score. It can be observed that, by 2019, Ecuadorian entrepreneurial ecosystem is still not supportive for entrepreneurship. The GEI scores for Ecuador have remained relatively low since 2015 compared to the neighbouring countries Colombia and Peru. Conversely, Colombia is the second-best performer in the region. Although still far from Chile, from 2015, Colombia has kept GEI scores over 35.

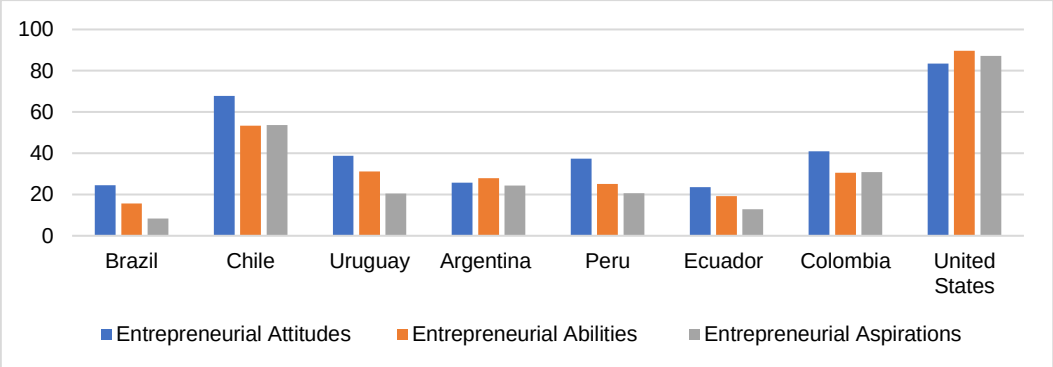
Figure 8: South American countries GEI scores 2015, 2018, 2019



Note. The data for GEI scores 2015 are from on "GEI 2006-2016 Dataset" by Szerb L, 2018. The data for GEI scores 2018 are from "The Global Entrepreneurship Index 2018" by Ács Z, Szerb L, and Lloyd A, 2018. The data for GEI scores 2019 are from "The Global Entrepreneurship Index 2019" by Ács Z, Szerb L, Lafuente E, and Markus G, 2019.

A closer examination of the subcomponents of GEI show that South American countries are characterized by high entrepreneurial attitudes but low levels of entrepreneurial aspirations. As shown in Figure 9, all countries scored lower than 30 points in entrepreneurial aspirations, except by Chile. This indicates an unbalanced configuration of ecosystems where people seem to have sufficient entrepreneurial skills and ability to recognize and undertake entrepreneurial opportunities, but they lack the qualifications and institutional support to sustain and growth their businesses.

Figure 9: GEI sub-indices for South American countries 2019



Note. From "The Global Entrepreneurship Index 2019" by Ács Z, Szerb L, Lafuente E, and Markus G, 2019. Source: own elaboration

The Index Dynamic Entrepreneurship (IDE) is a tool that helps identify the main strengths and weaknesses of countries for the emergence and development of dynamic

entrepreneurship in a country. Dynamic entrepreneurship defined as those entrepreneurial projects with growth potential and young firms that have overcome the early phase of higher mortality to become (at least) a competitive Small and Medium Enterprise (SME) with the potential and drive to continue growing. The IDE has been developed following a systemic approach to understand the emergence of dynamic entrepreneurs meaning that the creation and development of a new company is understood as the result of a process that, throughout its different stages and milestones, is affected by diverse social, cultural, political and economic factors (Kantis et al., 2021). The IDE is built around 41 variables within 10 key dimensions that have an impact on the quantity and quality of start-ups. These dimensions are grouped into three different axes: the existence of entrepreneurial human capital, the culture, the social conditions of the families in which people are born and raised, and the quality of the educational system. Data for index calculation of these variables are obtained from various international secondary data sources such as the World Bank, the Global Entrepreneurship Monitor, the Global Competitive Index, the World Value Survey and UNESCO. Since 2018 the IDE has been calculated for 64 countries including 15 Latin American countries.

As highlighted on Table 9, according to the IDE, Chile ranks as the best performing ecosystem in South America located at a rank comparable to Egypt or Italy. Ecuador, on the other hand remains as one of the worst performing ecosystems among the selected countries. What stands out in Table 9 is that all South American countries, except by Chile have “lower middle” or “low” quality entrepreneurial ecosystems. This evidences that the whole South American region is still not supportive for dynamic entrepreneurship. The deficiencies in the national ecosystems of each country are however diverse, strengths and weaknesses might vary for each country.

Table 9: Index of Dynamic Entrepreneurship -IDE ,2021 country ranking

Rank	Country	IDE score 2021	Rank	Country	IDE score 2021
1	United States	64.55	21	Chile	34.45
2	Norway	63.50	22	Italy	33.41
3	Netherlands	63.42	23	Brazil	33.30
4	Germany	62.84	24	Iran. Islamic Rep.	33.22
5	Sweden	61.22	25	India	31.22
6	Canada	56.45	26	Uruguay	30.90
7	United Kingdom	56.07	27	Mexico	30.75
8	Switzerland	55.83	28	Morocco	30.51
9	Korea, Rep.	55.26	29	Slovak Republic	30.33
10	Israel	54.48	30	Argentina	30.07
11	Austria	53.42	31	Costa Rica	29.40
12	Luxembourg	52.86	32	Croatia	29.32
13	United Arab Emirates	47.73	33	Colombia	27.73
14	Saudi Arabia	46.68	34	Indonesia	26.99
15	Qatar	43.55	35	Panama	25.63
16	Spain	40.99	36	Greece	24.78
17	Latvia	40.73	37	Dominican Republic	23.56
18	Poland	40.37	38	Peru	23.26
19	Russian Federation	38.82	39	Ecuador	21.23
20	Egypt, Arab Rep.	34.47	40	Guatemala	10.51

High
Upper middle
Middle
Lower middle
Low

Source: own elaboration based on Kantis et al. 2021, p.13

In a sum, the GEI and the IDE scores presented here provides a clear overview of the national level EEs in South American countries from two perspectives. These two measurements indicate that individuals, the population, are predisposed and reasonably able to startup (i.e., high entrepreneurial attitudes, improving entrepreneurial abilities, competent physical and commercial infrastructure, and cultural and social support towards entrepreneurship, supportive culture and strong social capital) but the institutional environment is still not supportive enough for fostering and sustaining such intentions and startup opportunities (i.e., low entrepreneurial aspirations scores, high taxes and bureaucracy levels, low internal market openness and lack of support for entrepreneurial education, weak business structure). Chile is the most developed entrepreneurial ecosystem in South America. In this line, Espinoza et al. (2019) argue that this result is the outcome of the continuous implementation of public policies based on a systemic vision of the promotion of entrepreneurship. Several programs to consolidate start-ups were launched since 1997 in Chile

led to an increasing number of incubators, establishment of new networks of angel investors and corporate entrepreneurship promotion.

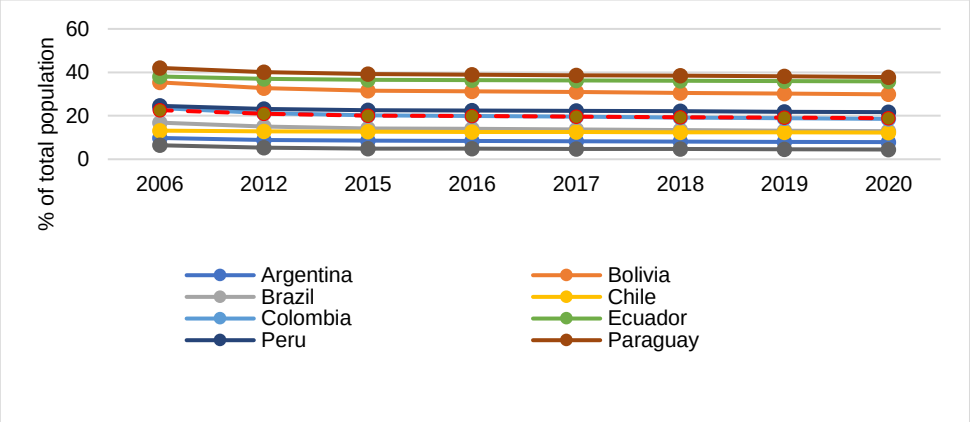
3.4. **Rural entrepreneurship in South America**

Attempting to define "rural" is a challenging task in a context of worldwide nations with diverse geography and changing demographics. While in general, the term rural refers to the feature of being "connected with or like the countryside" and the "countryside" referring to all land outside towns and cities (Oxford dictionary, 2022), the characteristics of rural areas can be immensely different among countries. In other words, a rural community (i.e., a community that is located outside a town or city) in Europe might look substantially different from a rural place in South America, both in terms of geography and developmental stage. Entrepreneurship is highly dependent on the local context and being rural implies that entrepreneurial activity is influenced by several specific systematic and structural conditions. Consequently, a clear understanding of the rural territorial differences and its implication for entrepreneurship is essential for research and policies seeking to promote rural entrepreneurship. Successful policy requires a conceptual model consistent with the specific features of rural spaces and also being free of stereotypes of entrepreneurship as being only technologically sophisticated (Modrego & Foster, 2021).

The magnitude of the rural population in South America

Although South America follows the global trend of decreasing rural populations and increasing urbanisation. In 2020, still more than 66 million inhabitants lived in rural areas in South America. Brazil holds the bigger rural population with more than 27 million people living in rural settings. As shown in Figure 10, Paraguay and Ecuador had the biggest share of rural population (37.8 and 35.83 correspondingly) while Uruguay (4.48 %) and Argentina (7.88%) hold the lowest share of rural population.

Figure 10: Share of rural population in South America, 2006-2020



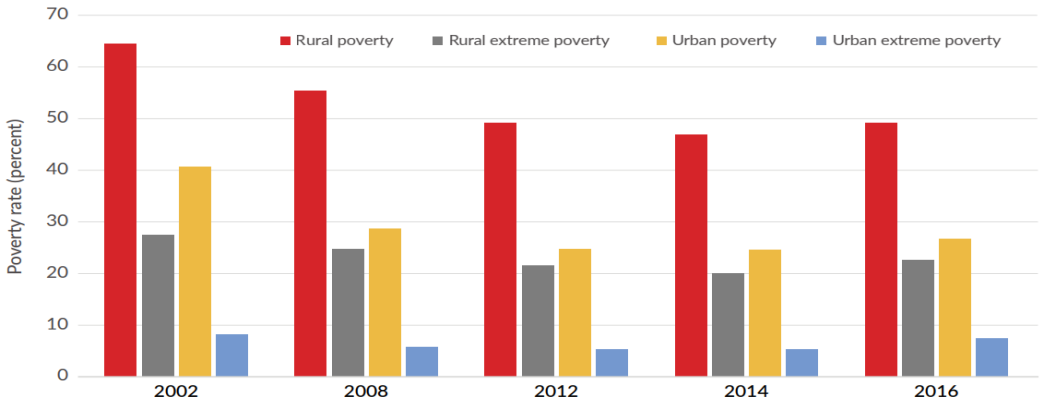
Note. Own elaboration based on "Rural population (% of total population)" by The World Bank, 2022.

The disadvantage of being rural in South America

Rural poverty is still a significant aspect of South America. Despite an evident improvement in the poverty incidence in rural areas among most south American countries, a high percentage of rural population (>25%) still live in poor conditions except by Chile and Uruguay where rural poverty is relatively low. Rate of poverty is a relevant aspect for entrepreneurship policymaking and special attention should be paid to the situation of regions and municipalities where agriculture and rural populations are predominant (like in Colombia, Ecuador, Perú, Bolivia and Paraguay). Impoverished rural areas in developing countries tend to maintain high poverty rates, and it is certain to expect the presence of poverty traps. In poor rural regions, local business culture is characterized by a high level of informality, high self-employment in agricultural land and a very weak integration of women in the labour markets (Oyarzo et al., 2020).

The wide differences in poverty rates between urban and rural populations draw the attention of researchers and policymakers as it is a clear indicator of the plausible differences in the level of development between core and peripheral regions (provinces, states, or municipalities) and the great heterogeneity in terms of socioeconomic development (Figure 11). Poverty implies several deprivations and increased adversity for entrepreneurship in rural communities. One of the key sources of difficulties for entrepreneurs that are far from the main economic and political nodes is the spatial dependence and it can harm the probability of establishing new ventures for non-urban entrepreneurs due to the limited access to private or public funding to the creation of businesses (Espinoza et al., 2019). Moreover, typical characteristics of poor municipalities in developing economies such as rurality, informality, and the lack of economic development can negatively affects start-up rates (Oyarzo et al., 2020).

Figure 11: Urban vs. rural poverty rates, Latin America, 2002-2016



Note. Average of Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, Uruguay and Venezuela.
Source: Morris et al. (2020, p.47)

Entrepreneurial activity in rural areas in Ecuador and Colombia

Despite rural settings remain relatively disadvantaged compared to urban contexts, rural areas in middle income countries can be "fertile ground for entrepreneurial activities" as rural regions also have in place assets that can be used for productive business development (Modrego & Foster, 2021). Rural communities have the potential to attract growth-oriented entrepreneurs who self-select into rural communities for hybrid motivations such as profit, social impact, and innovation (Mahn et al., 2022). As presented in Table 10, there is an important level of entrepreneurial activity in rural areas both in Ecuador and Colombia. In Ecuador, rural businesses account for 35.09% of total TEA while in Colombia, 22.0% of entrepreneurs locate in rural areas. In Ecuador, the lowest share of TEA is for IT and professional services and financial intermediation, real estate activities. Interestingly, retail trade, hotels and restaurants hold an important rural share (59.5%) in Ecuador. This can be certainly attributed to the relevance of ecotourism for Ecuadorian Economy. Ecuador's main touristic attractions for international tourists are not cities but natural landscapes (i.e., Galapagos Islands, Amazon Jungle, Andean volcanoes, Pacific Ocean beaches). As for Colombia, the lowest share of TEA is in the financial intermediation, real estate activities sector while the highest number of early entrepreneurs are engaged in business in the retail trade, hotels & restaurant sector.

Table 10 Distribution of TEA in Ecuador and Colombia by industry and area, 2016-2017

	TEA (count)	TEA by Business sector (%)								
		1	2	3	4	5	6	7	8	9
Urban Ecuador	762 (64.9%)	3.8	8.4	2.5	6.3	62.9	1.5	1.0	5.9	7.4
Rural Ecuador	412 (35.1)	15.8	7.3	1.5	6.8	59.5	0.9	0.4	3.4	4.3
Urban Colombia	709 (78%)	2.5	12.7	2.7	9.0	50.2	2.6	2.1	7.3	10.0
Rural Colombia	200 (22%)	2.5	10.5	0.5	8.5	54.5	4.0	1.5	3.5	14.5

Notes: own elaboration based on "GEM National Expert Survey" by Global Entrepreneurship Monitor GEM, 2022. 1 = Agriculture, forestry and fishing, mining and construction, 2= Manufacturing, 3= Utilisation, transport, storage, 4= Wholesale trade, 5= Retail trade, hotels & restaurants, 6= Information and communication, 7= Financial intermediation, real estate activities, 8= Professional, administrative services and personal/consumer, 9= Government, health, education, social services.

Summary

This chapter presented an overview of the socio-economic status and entrepreneurship in South America emphasising on Colombia and Ecuador which are the study areas of this dissertation. South American is composed by 12 economies that share socio economic, geographic, and cultural aspects. Out of the 12 South American economies, Bolivia is the only lower-middle income economy, Chile and Uruguay are high income countries while all the rest are middle income economies. Overall, tertiary sector (services) is the biggest sector for all South American countries. Importantly, despite the general improvement in the living conditions during the last years, the persistence of high rates of extreme poverty and inequality remains as one of the biggest societal issues in South America.

Entrepreneurial activity is an important component of the South American countries' economies. All South American countries (except by Argentina) display high rates of TEA during the last decade, particularly in Ecuador and Colombia. Although quantity entrepreneurship seems to be flourishing in South American countries, the conditions for supporting quality (productive) entrepreneurship remain inefficient in most of South American economies. Recent data from the GEI and IDE demonstrated that, overall, South American population, are predisposed and reasonably able to startup (i.e., high entrepreneurial attitudes, improving entrepreneurial abilities, competent physical and commercial infrastructure, and cultural and social support towards entrepreneurship, supportive culture and strong social capital), but the institutional environment is still not supportive enough for fostering and sustaining such intentions and startup opportunities (i.e., low entrepreneurial aspirations scores, high taxes and bureaucracy levels, low internal market openness and lack of support for entrepreneurial education, weak business structure). In this context, Chile has been regarded as

an exception to this trend as this country shows substantially better conditions for productive entrepreneurship than the other South American economies and thus can be considered a regional benchmark for entrepreneurship policy Chile has taken entrepreneurship development as a priority since 2012, declared "the year of entrepreneurship" by the Chilean Ministry of Economy. High impact measures such as strengthening the Chilean Production Development Corporation (Corporación de Fomento de la Producción) and launching great prominent startup programs[3] have helped to position Chilean EE as one of the most well developed in South America.

Literature suggests that, despite the challenges that socioeconomic disparities among urban and rural contexts represent for rural inhabitants, rural settings are fertile ground for entrepreneurial activities due to the availability of valuable natural and human resources which can be strategically utilised for productive entrepreneurial purposes (Milone & Ventura, 2018; Müller & Korsgaard, 2018; Pato & Teixeira, 2016). In relation to this, we observe that a great part of the entrepreneurial activity is already taking place in rural areas in Colombia and Ecuador. Data from TEA shows that rural areas in Colombia and Ecuador hold an important part of the total entrepreneurial activity (35.09% of total TEA in Ecuador and 22% of total TEA locate in rural areas).

[3] Capital Semilla (seed capital), Startup Chile by CORFU or "PAR Chile Apoya Mujer" for supporting companies led by women.

4. Chapter 4: Regionalized GEI: a quasi-context-sensitive method characterizing EE performance

The aim of this chapter is to empirically explore the differences between urban and rural regional entrepreneurial ecosystems in terms of EEs performance. The findings of this study provide a direct answer to RQ2: Which EE components hinder rural and urban entrepreneurship? This chapter outlines the regional entrepreneurial ecosystems of 22 urban and rural regions in Colombia (11 regions), Ecuador (7 regions), and Uruguay (4 regions) using a regionalized version of the Global Entrepreneurship Index (GEI) methodology. As introduced in Chapter 2, the GEI can be regarded as a quasi-context-sensitive method to measure the performance of EEs. One of the foremost features of the GEI conceptual model and index methodology is that it reflects the multidimensional character of entrepreneurship in two ways, first the GEI index is calculated by combining both individual (entrepreneurs, population) and institutional (contextual) data. Second, the GEI ensure the systemic nature of EEs by employing the so-called Penalty for Bottleneck (PFB) methodology in their models. Essentially, this chapter is a summary of the results of my published study entitled "Regional systems of entrepreneurship: an empirical study in selected regions of South America" (Calispa, 2021).

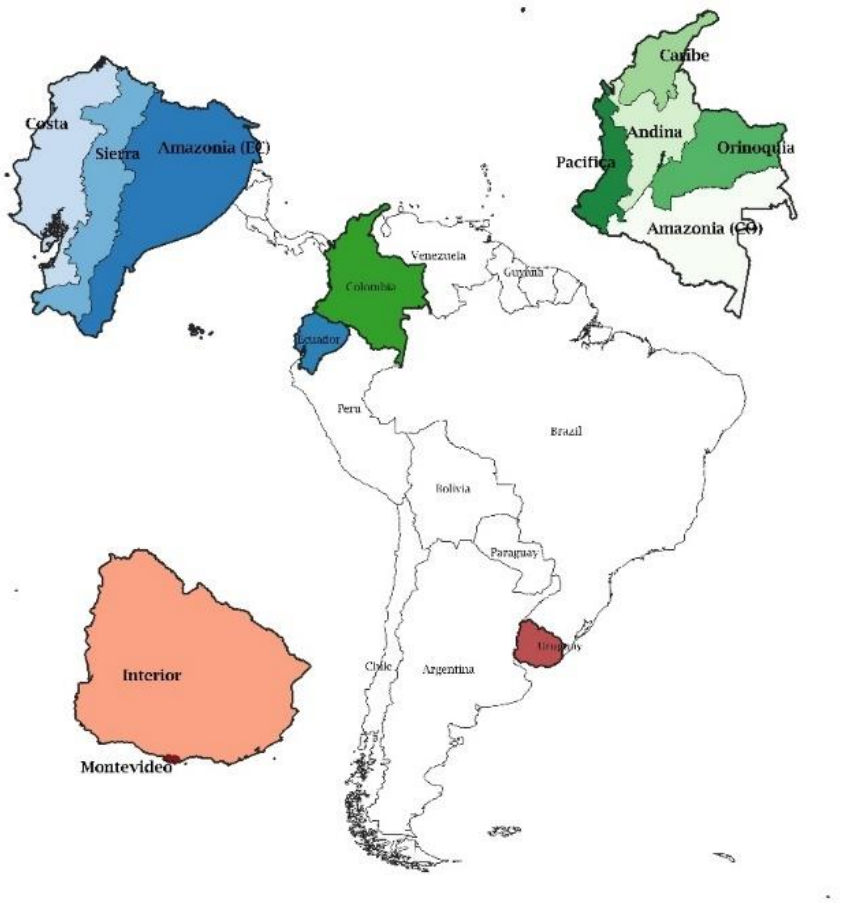
The first section of this chapter introduces the geographical scope of the study and describes the basic characteristics of the selected 22 regions. The second section explains the methodological procedure for the adaptation of the original GEI index structure to measure regional level entrepreneurship. The third section presents the results at the GEI super index, sub-index, and pillar levels. The fourth section discusses the implication of findings, and the last section summarises the content of the chapter.

4.1. **The geographical scope of the study**

Colombia is divided into 32 departments grouped in 5 macro regions: Caribe, Andina, Pacífica, Orinoquía, and Amazonía (Figure 12). The Caribe region is in the north, composed of eight departments. The Andina macro region is in central Colombia and is the country's most populated region. It contains most the country's urban centres, including the capital city of Bogota. The region includes 10 departments. The Pacífica region covers an area of 83,170 km² along Colombia's Pacific coast. This region includes four departments. The Orinoquía region is located on the eastern side of Colombia and covers most of the area of four departments. The Amazonía is the largest Colombian region. It covers the 35% of Colombia's

total territory. The region includes six departments. Andina, Caribe and Pacifica regions' economy depends mainly on manufacturing, and wholesale and retail. Orinoquía region's main economic sector is Agriculture, livestock, hunting, forestry, and fishing while Amazon region's economy is mainly based on mining and public administration and defence activities. Andina region is the least poor and the region that holds the highest level of educated population. Amazon region is the most deprived; it has the lowest per capita income and the highest rate of poverty.

Figure 12: Colombian, Ecuadorian, and Uruguayan macro regions



Source: own elaboration

Ecuador consists of 24 provinces divided into 3 continental macro regions, namely, Costa, Sierra, and Amazonía, and one island region, Galápagos. includes 7 provinces. Guayaquil, the most populated city in Ecuador, is part of this region. This region, therefore, is the most relevant for maritime trade and transportation. Coast region is the most urbanized region of the country, and it holds the 49.7% of the national population. The Sierra region is

in the Central part of the country and contains 10 provinces and it includes Ecuador's national capital, Quito. The Amazonía region, also known as Oriental, includes six provinces. Sierra and Costa regions' economy depends mainly on construction, public administration, and defence. Ecuadorian Amazon region's economy is mainly based on Oil and natural gas extraction and related services. Amazonía is the largest region in Ecuador, but it is also the most sparsely populated and the poorest region in the country in terms of multidimensional poverty. However, Amazon region shows the highest GDP per capita, which is calculated accounting for oil production regional income. Nevertheless, it is evident that oil-production-related income is not necessarily equally redistributed to the local populations (i.e., high rates of regional income poverty). Ecuador is a decentralised state', a term that refers to the decentralised administrative, political, and fiscal character of governance.

Uruguay is a high-income and a transition from efficiency-driven to innovation driven' country. Its total land area is 176,215 km². The country is divided into 19 administrative departments grouped into two major regions: Montevideo and Interior (Figure 12). The Montevideo region is a particularly densely populated region because it covers an area of 530 km², a mere 0.3% of the total national territory, but holds approximately 40% of the total population. The Montevideo region includes the capital city, Montevideo. The Interior region covers the remaining 18 departments. Economy in both regions depends on commerce and services. Uruguay has typically been a unitary state with its main political institutions and fiscal power centralised in Montevideo.

4.2. **Methodological aspects**

The regional adaptation of the GEI

The GEI is a composite indicator that measures both the quality of entrepreneurship and the attributes of the supporting EE in a *country*. The GEI is a complex four-level index that combines 14 pillars, each of which contains an individual and an institutional variable corresponding to the micro- and macro-level aspects of entrepreneurship (see the structure of the GEI in chapter 2, Table 4). For employing the national GEI methodology to analyse regional entrepreneurship systems, data and structures need to be modified to reflect the regional conditions. The optimal scenario would be to have the access to and use regional data on the same variables used at the national level. Nonetheless, acquiring the same original GEI data type is challenging in the context of South America, where no strong regional institutions are responsible for collecting and sharing regional data. In the present study, this issue is solved

by employing regional data obtained from disaggregated data available at national-level institutions, such as national statistics institutes. Therefore, to calculate GEI scores for Ecuadorian and Colombian regions, this study employed an adaptation of the GEI original methodology that consists of a slightly modified index variables' structure and a mix of regional and national level data. This approach is accepted as earlier studies have measured regional entrepreneurial systems in Hungary and Spain by using a modified, i.e. *regionalized version* of GEI methodology (Ács et al., 2012; Szerb et al., 2013).

The individual GEI variables for all 22 regions are calculated in the same way as the original index structure owing to the availability of a large, pooled data set of more than 75,000 observations from the Global Entrepreneurship Monitor (GEM) Adult Population Survey 2010–2018. GEM raw datasets (those containing recent data and including geographical identification variables) from the Global Entrepreneurship Monitor are confidential. Therefore, I contacted and formally requested the access to the corresponding National Team in 2020. Initially, I tried to collect these datasets for Peru, Argentina, Bolivia, Chile, Argentina, and Brazil but the access was denied by the national teams of these countries, therefore, limiting my geographical scope to Colombia, Ecuador and Uruguay whose team leaders kindly provided me with the access to their raw databases from 2010-2018 in SPSS (.sav) format. I got the raw data in separate datasets per year; therefore, the first step was to pool the data. Merging data for several years was one of the most challenging steps of data processing as the variables' structure of the datasets were not the same among years and it limited the use of automated merging functions of SPSS. Once data was pooled, I proceeded to regionalize datasets employing the geographical identification available variable ("COUNTRYregion" "COUNTRYprovince" or "COUNTRYcity"). This step was also complex as the categories within geographical variables changed from one year to another in some cases. Finally, having data pooled and uniformly categorized into regions, I proceeded with individual variable calculations. Individual variable level values can be found in Table A1 in the Appendix.

In contrast to individual variables calculation, the calculation of institutional variables was more complicated because of the lack of a "one source" regional data. Institutional data is secondary data from several national-level and regional-level institutions from each country which in many cases was not perfectly available or required long processes of manual regionalisation. In the case of lack of proper data, two approaches are used alternately to overcome this issue. First, for the unavailable variables, closely correlated proxy variables are employed to substitute for the missing data. When specific variables cannot be replaced efficiently by similar proxies, the national-level values are employed for all the regions. For

example, pillar "opportunity perception" is calculated by the multiplication of "Opportunity recognition" (individual variable) and "Freedom" (institutional variable). However, in this case, data for opportunity recognition was available at the regional level while data for economic freedom was only available at the national level. Therefore, I utilised the same aggregate institutional variable score for the countries to which the regions belong but the individual indicators for each pillar are calculated using entirely regionalised data. Consequently, the least variance can be seen where the institutional variables are the same for all regions and the pillar-level value would correspond entirely to variations in the individual-level variable used**.** Institutional variable level values can be found in Table A2 in the Appendix. Out of the 14 institutional variables for the entrepreneurship index construction, seven employ national-level values: (1) Freedom, (2) Country Risk, (3) Corruption, (4) Governance, (5) Competitiveness, (6) Economic Complexity, and (7) Depth of Capital Market, while the remaining seven variables employ a combination of regional and national-level data.

The unit of analysis in the present study is the "Macro region'. Macro regions are composed of various smaller administrative, subnational-level units, namely, departments or provinces within a country. Macro regions are smaller than a country but bigger than the country administrative units; therefore, they are rather similar to the Nomenclature of Territorial Units for Statistics (NUTS 2) level regions of the EU classification. A total of 10 macro regions in Colombia (5), Ecuador (3), and Uruguay (2) are studied. Six of these ten regions are subdivided into urban and rural subregions in order to analyse them separately and identify possible differences between these two configurations.

4.3. **Results**

The GEI scores are calculated following an eight-stage process, which starts with the selection of variables, construction and normalisation of pillars, capping, average pillar adjustment, penalising, as well as the calculation of sub-index and GEI super index (Ács et al. 2014). Pillar values range from 0 to 1 as these are first normalised. Thereafter, the pillars are allocated into three building blocks or sub-indices, namely, entrepreneurial attitudes (ATT), (ABT), and (ASP). The value of a sub-index is the arithmetic average of its adjusted pillars for that sub-index multiplied by 100. Finally, the average of the three sub-indices constitutes the entrepreneurship super-index (Acs et al., 2018). The index scale ranges between 0 and 100, with 100 as the maximum value and 0 as the potential minimum. The Appendix B explains the steps in more detail.

4.3.1. The GEI super index

First, the regional GEI super-index scores of the South American regions are compared to 33 worldwide, efficiency-driven' or "transition from efficiency- to innovation-driven" economies according to the World Economic Forum (2018) classification. In this case, regions are conceptually treated as small nations that have specific individual and institutional dynamics. Moreover, recognizing that different forms of entrepreneurial activities can exist at different stages of development (Ács & Naudé, 2013), the performance of the study's selected regions are compared with the performance of similar economies. In Table 11, the South American regions' performance is relatively heterogeneous, with scores distributed from 40.11 for the Colombian Andina Urban region at the high end to 14.25 for the Ecuadorian Amazonía region at the low end.

Table 11: The GEI 2017 scores: Countries and South American regions compared

Rank	Country/Region	GDP	GEI score*	Rank	Country/Region	GDP	GEI score
1	Chile	14999	58.8	29	Lebanon	7801	28.8
2	Saudi Arabia	20804	47.2	30	Interior Rural	14789	28.69
3	Poland	13865	46.6	31	Thailand	6593	27.1
4	Slovakia	17557	44.1	32	Peru	6711	26.8
5	Turkey	10895	43.7	33	Panama	15150	26.2
6	Latvia	15682	43	34	Morocco	3036	25.7
7	Andina Urban	7393	40.11	35	Mexico	9288	25.7
8	Andina	7393	39.7	36	Russia	8705	25.4
9	Colombia	6377	37.3	37	Georgia	4062	24
10	Montevideo	21050	36.81	38	Bulgaria	8334	22.7
11	Andina Rural	7393	36.32	39	Egypt	2444	22.7
12	Hungary	14606	36.3	40	Argentina	14613	22.2
13	China	8879	36.3	41	Iran	5520	22.1
14	Uruguay	17322	34.6	42	Sierra Urban	6119	21.43
15	Pacífica	5018	34.16	43	Indonesia	3838	21.2
16	Malaysia	10259	33.4	44	Ecuador	6214	21.1
17	Pacifica Urban	5018	32.72	45	Jamaica	4843	21
18	South Africa	6132	32.6	46	Sierra	6119	20.3
19	Caribe Urban	4485	32.52	47	Brazil	9925	20.1
20	Jordan	4177	31.7	48	Bosnia and H.	5395	19.9
21	Interior Urban	14789	31.44	49	El Salvador	3806	19.8
22	Caribe	4485	30.88	50	Costa Urban	5248	19.23
23	Croatia	13452	30.8	51	Costa	5248	18.97
24	Interior	14789	30.67	52	Sierra Rural	6119	18.19
25	Amazonía (CO)	2880	30.24	53	Guatemala	4451	17.9
26	Orinoquía	9578	29.68	54	Costa Rural	5248	17.48
27	Caribe Rural	4485	29.39	55	Amazonía (EC)	8170	14.25
28	Pacifica Rural	5018	29.02				

*Note: GDP per capita (current USD). Colombian, Ecuadorian, and Uruguayan regions are highlighted. * Global Entrepreneurship Index (GEI) values for Uruguayan regions are from 2018.*
Source: Calispa-Aguilar (2022, p.61)

Comparatively, Colombia ranks at the level of Hungary. Uruguay performs at the level of China or Malaysia, while Ecuador's performance is more akin to Indonesia's.

Interestingly, certain regions have significantly higher rankings than their home country, as is the case with Colombia's Urban Andina region, which ranked 7th, while Colombia is ranked 9th. Similarly, Uruguay is ranked 14th, but the Montevideo region is ranked 10th. In Ecuador, the Sierra Urban region is ranked 42nd, whereas the country is ranked 44th. This observation is critical as it demonstrates the differences in the characteristics among subnational ecosystems. Overall, Chile has the best-performing entrepreneurship system among the compared economies, while the Ecuadorian Amazon region has the weakest ecosystem.

4.3.2. Relative positions of South American regions at the sub-index level

This subsection analyses the regional scores of the 22 South American regions according to the three GEI sub-indices of ATT, ABT, and ASP. Analysis at the subindices level allows for observations of specific issues around entrepreneurship development, and simultaneously, it enables more specific regional differences to be identified. In Table 12 the regional scores for ATT rank between 18.90 and 47.19, ASP range between 15.58 and 37.84, while the range for entrepreneurial aspirations is relatively wider – the regional scores range between 8.28 and 43.65. For both ATT and ABT, Montevideo receives the highest values, while for ASP, Andina Urban attains the highest scores. Amazonía (Ecuador) scores the lowest regional values for the three sub-indices.

Table 12: GEI ATT, ABT and ASP values and ranks of 22 South American regions, 2017

Region		Attitudes			Abilities			Aspirations			GEI		
		Rank*	*Rank***	ATT	Rank*	Rank**	ABT	Rank*	*Rank***	ASP	Rank*	Rank**	GEI
Colombia	Andina	3	*2*	43.17	3	*2*	33.68	2	*2*	42.27	2	*2*	39.70
	Caribe	12	*8*	36.55	10	*7*	25.86	7	*7*	30.22	9	*7*	30.88
	Pacífica	7	*4*	41.24	6	*4*	29.69	5	*5*	31.54	5	*4*	34.16
	Orinoquía	14	*10*	35.79	13	*10*	24.93	9	*9*	28.32	12	*9*	29.68
	Amazonía (Colombia)	15	***11***	35.71	15	***11***	24.24	6	*6*	30.76	11	*8*	30.24
	Andina Urban	4	*3*	42.65	2	***1***	34.03	1	***1***	43.65	1	***1***	40.11
	Andina Rural	2	***1***	44.12	4	*3*	31.24	4	*4*	33.59	4	*3*	36.32
	Caribe Urban	8	*5*	40.62	8	*5*	27.51	8	*8*	29.42	7	*6*	32.52
	Caribe Rural	10	*6*	39.62	12	*9*	25.47	12	***11***	23.08	13	*10*	29.39
	Pacifica Urban	11	*7*	37.04	9	*6*	26.89	3	*3*	34.24	6	*5*	32.72
	Pacifica Rural	13	*9*	36.41	11	*8*	25.80	11	*10*	24.83	14	***11***	29.02
	Colombia averages			39.35			28.12			31.99			33.15
Ecuador	Sierra	19	*4*	26.40	17	*2*	19.48	17	*2*	15.03	17	*2*	20.30
	Costa	18	*3*	26.52	20	*5*	17.58	19	*4*	12.81	19	*4*	18.97
	Amazonía (Ecuador)	22	***7***	18.90	22	***7***	15.58	22	***7***	8.280	22	***7***	14.25
	Sierra Urban	17	*2*	27.19	16	***1***	20.39	16	***1***	16.7	16	***1***	21.43
	Sierra Rural	20	*5*	25.21	19	*4*	17.79	21	*6*	11.57	20	*5*	18.19
	Costa Urban	16	***1***	27.47	18	*3*	18.05	20	*5*	12.18	18	*3*	19.23
	Costa Rural	21	*6*	23.91	21	*6*	15.70	18	*3*	12.82	21	*6*	17.48
	Ecuador averages			25.08			17.79			12.77			18.55
Uruguay	Montevideo	1	***1***	47.19	1	***1***	37.84	10	***1***	25.39	3	***1***	36.81
	Interior	6	*2*	41.31	7	*3*	28.63	14	*3*	22.08	10	*3*	30.67
	Interior Urban	5	*3*	41.58	5	*2*	30.34	13	*2*	22.39	8	*2*	31.44
	Interior Rural	9	***4***	40.42	14	***4***	24.46	15	***4***	21.20	15	***4***	28.69
	Uruguay averages			42.62			30.31			22.76			31.90

*Note: *Rank = 22 region ranking. **Rank = INTER-regional rankings. Red highlight = lowest scoring region among 22 regions, orange highlight = second lowest scoring region among 22 regions, green highlight = best scoring regions among 22 regions, light green= second best scoring region among 22 regions. Red font colour = lowest performing region within the given country, green font colour = best performing region within the given country.*

Source: Adapted from Calispa-Aguilar (2022).

From Table 12, two cluster groups can be identified: first, the leading entrepreneurial regions, that is, those that perform relatively strongly for most of the three sub-indices and the overall GEI score, such as the Colombian regions of Andina, Andina Urban, and Andina Rural, and the Uruguayan region of Montevideo. These regions also show some common characteristics: both Andina and Montevideo are highly urbanised (81% and 98.94%), capital city is within these regions, and they have the highest rates of tertiary education and the lowest levels of poverty of the 22 regions. Second, the lagging entrepreneurial regions can also be identified. The Ecuadorian regions of Amazonía and Costa Rural and Sierra rural have the lowest values in most of the three sub-indices and overall, GEI score. Moreover, comparing the country subindices averages it van be observed that ATT averages are the highest in the three countries, meaning that overall, the population and institutions in these countries enable an optimistic view and positive attitude towards entrepreneurship. In the case of Uruguay and Ecuador we can see an entrepreneurial aspiration deficit, while in Colombia shows a different picture: entrepreneurial aspirations are high, while abilities-related sub-index shows a relatively lower level.

4.3.3. South American regions compared at the GEI's pillar level

Pillar-level provide a more detailed and precise picture of the entrepreneurial profile of each of the regions. Table 13 shows the pillar scores for all 22 regions and identify the most favourable and the least favourable pillar value for each region. It is apparent from this table, that regions face different difficulties. Although in Colombia, least and most favourable pillars are the almost the same for all regions same (except by the Amazonia region), in Ecuador and Uruguay most of the regions shows a different combination of strengths and weaknesses. Furthermore, data at the pillar level was also employed to identify the pillar composition of the best or leading and the worst or lagging regions within each country. Next section examines Colombian, Ecuadoran and Uruguayan specific regional strengths and weaknesses and their performance relative to the country performance.

Table 13: South American regions relative position at the GEI pillar level

Regions	Pillars														Indicators	
	Opportunity Perception*	Start-up Skills	Risk Acceptance*	Networking	Cultural Support*	Opportunity Start-up*	Technology Absorption	Human Capital	Competition*	Product Innovation	Process Innovation	High Growth	Internationalisation	Risk Capital*	**Least favourable**	**Most favourable**
Andina	0.64	0.61	0.24	0.35	0.31	0.27	0.34	0.47	0.27	0.57	0.17	0.58	0.46	0.33	Process Innovation	Opportunity Perception*
Caribe	0.61	0.38	0.24	0.29	0.3	0.25	0.22	0.32	0.23	0.38	0.1	0.42	0.37	0.24	Process Innovation	Opportunity Perception*
Pacífica	0.69	0.45	0.3	0.28	0.34	0.3	0.21	0.39	0.29	0.46	0.17	0.44	0.28	0.24	Process Innovation	Opportunity Perception*
Orinoquía	0.6	0.26	0.31	0.38	0.24	0.25	0.2	0.28	0.27	0.21	0.14	0.41	0.39	0.27	Process Innovation	Opportunity Perception*
Amazonía (Colombia)	0.61	0.43	0.28	0.22	0.24	0.24	0.07	0.3	0.36	0.22	0.23	0.28	0.5	0.31	Technology Absorption	Opportunity Perception*
Andina Urban	0.64	0.6	0.24	0.35	0.3	0.27	0.35	0.48	0.26	0.58	0.17	0.6	0.48	0.35	Process Innovation	Opportunity Perception*
Andina Rural	0.66	0.62	0.24	0.35	0.34	0.24	0.29	0.4	0.32	0.5	0.17	0.45	0.31	0.25	Process Innovation	Opportunity Perception*
Caribe Urban	0.66	0.43	0.29	0.33	0.32	0.24	0.2	0.37	0.28	0.42	0.12	0.42	0.28	0.23	Process Innovation	Opportunity Perception*
Caribe Rural	0.66	0.43	0.29	0.27	0.34	0.21	0.17	0.32	0.32	0.32	0.10	0.32	0.21	0.21	Process Innovation	Opportunity Perception*
Pacifica Urban	0.63	0.40	0.25	0.27	0.3	0.26	0.24	0.35	0.22	0.43	0.16	0.46	0.40	0.27	Process Innovation	Opportunity Perception*
Pacifica Rural	0.61	0.39	0.24	0.26	0.32	0.25	0.2	0.27	0.32	0.39	0.10	0.33	0.24	0.19	Process Innovation	Opportunity Perception*
Sierra	0.29	0.52	0.06	0.26	0.2	0.2	0.17	0.19	0.21	0.14	0.19	0.12	0.08	0.22	Risk Acceptance*	Start-up Skills
Costa	0.32	0.37	0.07	0.37	0.2	0.2	0.11	0.15	0.24	0.14	0.17	0.06	0.05	0.22	Internationalisation	Networking
Amazonía (Ecuador)	0.29	0.24	0.06	0.17	0.19	0.18	0.08	0.1	0.25	0.07	0.14	0.02	0.07	0.11	High Growth	Opportunity Perception*
Sierra Urban	0.29	0.53	0.06	0.28	0.19	0.21	0.19	0.23	0.19	0.16	0.2	0.12	0.09	0.26	Risk Acceptance*	Start-up Skills
Sierra Rural	0.28	0.49	0.06	0.23	0.20	0.19	0.15	0.13	0.25	0.12	0.16	0.11	0.06	0.12	Risk Acceptance*	Start-up Skills
Costa Urban	0.32	0.39	0.07	0.4	0.19	0.21	0.12	0.17	0.23	0.14	0.17	0.07	0.05	0.17	Internationalisation	Networking
Costa Rural	0.31	0.33	0.06	0.29	0.21	0.18	0.09	0.08	0.28	0.12	0.16	0.03	0.04	0.29	High Growth	Start-up Skills
Montevideo	0.47	0.61	0.36	0.49	0.42	0.39	0.59	0.28	0.25	0.29	0.29	0.37	0.22	0.09	Risk Capital*	Start-up Skills
Interior	0.46	0.29	0.33	0.5	0.49	0.37	0.28	0.24	0.25	0.22	0.27	0.33	0.20	0.09	Risk Capital*	Networking
Interior Urban	0.46	0.29	0.33	0.49	0.49	0.38	0.33	0.24	0.25	0.22	0.28	0.33	0.20	0.09	Risk Capital*	Cultural Support*
Interior Rural	0.45	0.29	0.3	0.51	0.47	0.36	0.15	0.23	0.24	0.21	0.26	0.33	0.19	0.07	Risk Capital*	Networking
Colombia 2017	0.66	0.44	0.23	0.22	0.27	0.21	0.39	0.36	0.32	0.54	0.23	0.92	0.70	0.29	Opportunity startup	High growth
Ecuador 2017	0.17	0.51	0.06	0.42	0.19	0.26	0.14	0.23	0.28	0.31	0.20	0.13	0.07	0.25	Risk acceptance	Start-up Skills
Uruguay 2017	0.58	0.56	0.40	0.45	0.62	0.37	0.32	0.30	0.32	0.44	0.22	0.49	0.31	0.11	Risk capital	Cultural support

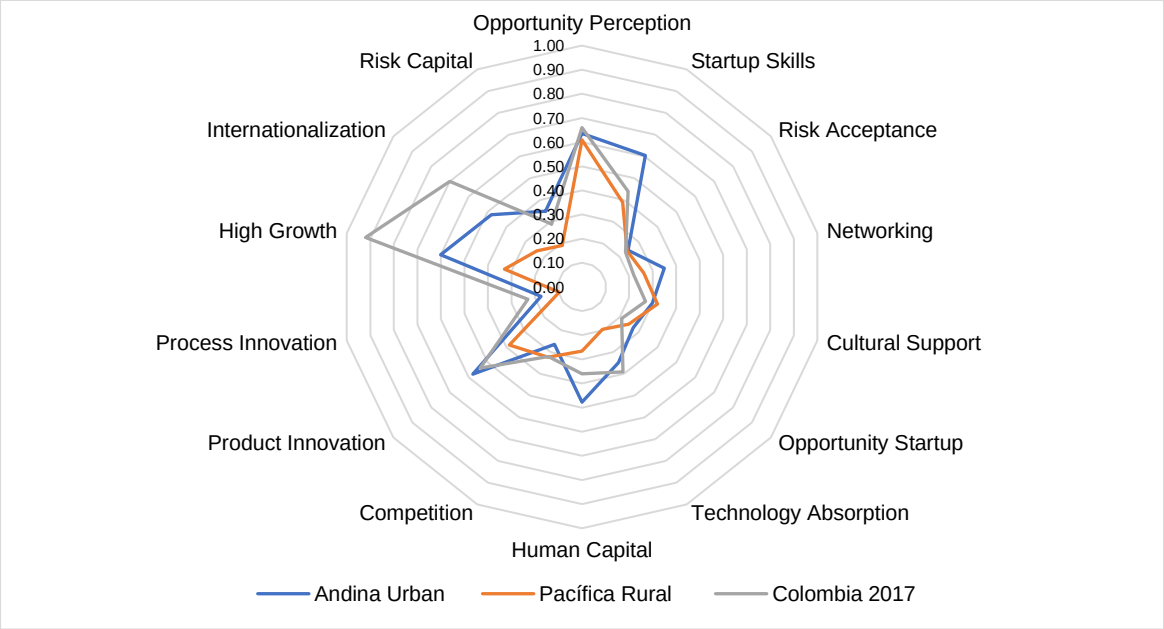
*Note: * = pillars where the institutional variable used is the same national-level value. Data for Colombia, Ecuador and Uruguay country level scores and are from (Ács et al., 2017).*

Source: Adapted from Calispa-Aguilar (2022)

Colombia's regions compared at the GEI's pillar level

Figure 13 displays the pillar composition of the best and the worst performing regions of Colombia. Andina Urban region (GEI 40.11) is the best-performing region within Colombia, while the Pacífica Rural region (GEI 29.02) ranks in the lowest position. A variation of 11.09 points can be observed between these two regions. Overall, the Andina Urban region performs better than Colombia as a whole (GEI 37.30). The strengths of the Andina Urban region compared to Colombia are in networking, startup skills and human capital. Overall, the Pacífica Rural region underperforms compared to the national scores; the most significant differences are evident in the high growth and internationalisation pillars Interestingly, the Pacífica Rural region scores higher in the cultural support pillar than Andina Rural and Colombia.

Figure 13: Colombian leading and lagging region, GEI pillar level, 2017



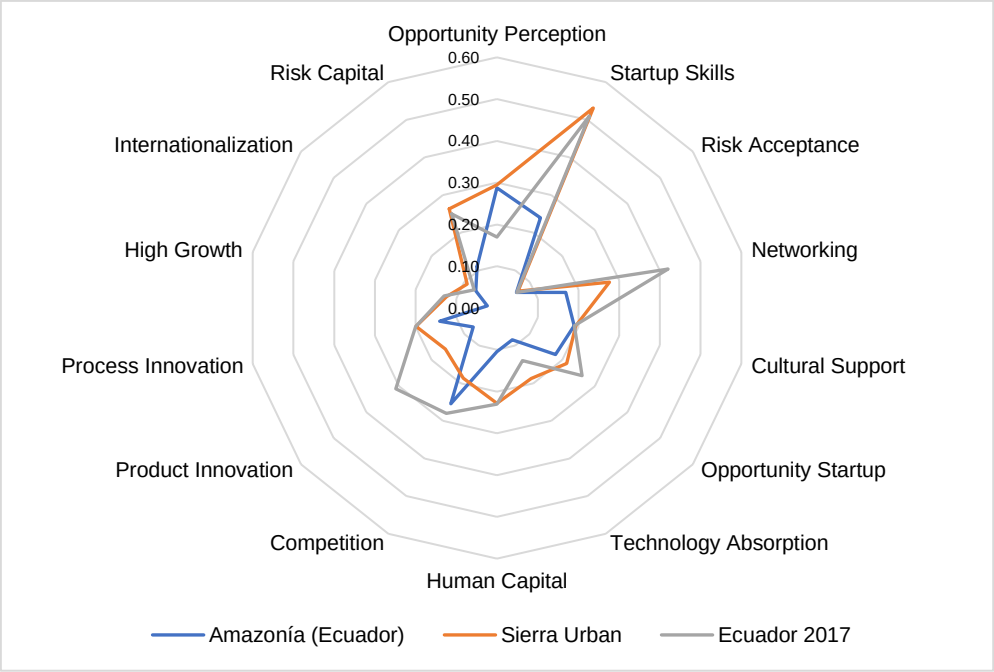
Source: Calispa-Aguilar (2022, p.64)

Ecuador's regions compared at the GEI's pillar level

Figure 14 displays the pillar composition of the best and the worst performing regions of Ecuador. Sierra Urban (GEI 21.43) is the best-performing region, while Amazonía (GEI 14.25) ranks the lowest. A difference of 7.18 points can be observed between these two regions. The most significant differences are in the start-up skills and risk capital pillars, where the

Amazonía region significantly underperforms compared to Sierra Urban. The Sierra Urban region performs better than the country overall. The region's scores indicate strong opportunity perception and capacity for technology absorption compared to the national scores. Sierra Urban scores are lower for the networking and product innovation pillars compared to the national scores. The weakest pillars for the Sierra Urban region are risk acceptance (0.06) and internationalisation (0.09).

Figure 14: Ecuadorian leading and lagging region, GEI pillar level, 2017

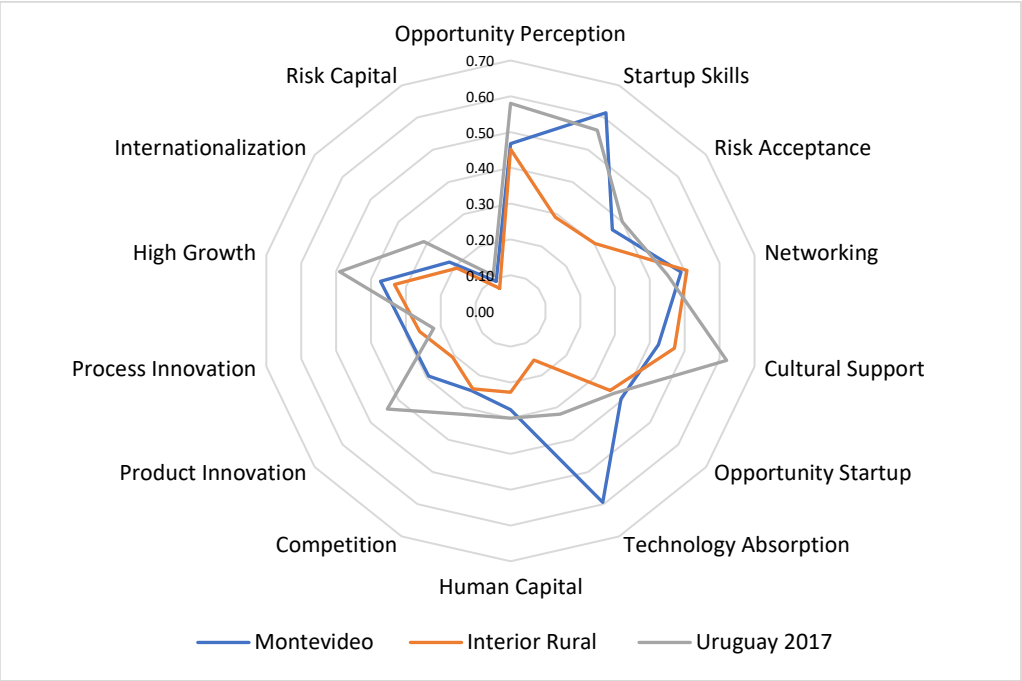


Source: Calispa-Aguilar (2022, p.65)

Uruguay's regions compared at the GEI's pillar level

Figure 15 displays the pillar composition of the best and the worst performing regions of Uruguay. The Montevideo region (GEI 36.81) is the best-performing region, while Interior Rural (GEI 28.69) ranks in the lowest position. A difference of 8.12 points can be observed between these two regions. The most significant differences are evident in the start-up skills and technology absorption, where the Interior Rural region underperforms significantly compared to Montevideo. Interestingly, the Interior Rural region performs better than Montevideo and Uruguay in the networking and better than Montevideo in cultural support pillar. Overall, Montevideo performs significantly better than Uruguay (GEI 34.60) in technology absorption and startup skills, but it underperforms in cultural support. Montevideo's weakest pillars are internationalisation and risk capital.

Figure 15: Uruguayan leading and lagging regions, GEI pillar level, 2018



Source: Calispa-Aguilar (2022, p.66)

4.3.4. The main 'bottlenecks' for the selected regions' ecosystems

Table 14 shows the "top three" most constraining bottlenecks for each region. Overall, process innovation is the most severe bottleneck (i.e., number one weakest pillar) for 10 of the 22 regions. Process innovation aims to measure the ability to use new technologies by start-ups. This pillar is calculated by combining a measurement of the percentage of businesses using new technology that is less than five years old and the product of the Gross Domestic Expenditure on Research and Development (GERD) by the average of the level of availability of scientific institutions and availability of scientists and engineers in the country. The low scores in this pillar indicate that businesses do not generally use new technology as they have limited access to high-quality human capital in Science, Technology, Engineering, Mathematics (STEM) fields. Internationalisation is the most common least favourable pillars as it affects 11 of the 22 regions. Interestingly, networking is a challenge only in the Colombian Amazonía region, and competition is a challenge prevalent in mainly urban regions.

Table 14: The least favourable pillars for Colombian, Ecuadorian, and Uruguayan regions

MACRO REGIONS			
	1st	2nd	3rd
Andina	Process Innovation	Risk Acceptance	Opportunity Startup
Caribe	Process Innovation	Technology Absorption	Competition
Pacífica	Process Innovation	Technology Absorption	Risk Capital
Orinoquía	Process Innovation	Technology Absorption	Product Innovation
Amazonía (COL)	Technology Absorption	Product Innovation	Networking
Sierra	Risk Acceptance	Internationalisation	High Growth
Costa	Internationalisation	High Growth	Risk Acceptance
Amazonía (ECU)	High Growth	Risk Acceptance	Internationalisation
Interior	Risk Capital	Internationalisation	Product Innovation
URBAN REGIONS			
	1st	2nd	3rd
Andina Urban	Process Innovation	Risk Acceptance	Competition
Montevideo	Risk Capital	Internationalisation	Competition
Caribe Urban	Process Innovation	Technology Absorption	Risk Capital
Pacifica Urban	Process Innovation	Competition	Technology Absorption
Interior Urban	Risk Capital	Internationalisation	Product Innovation
Sierra Urban	Risk Acceptance	Internationalisation	High Growth
Costa Urban	Internationalisation	Risk Acceptance	High Growth
RURAL REGIONS			
	1st	2nd	3rd
Andina Rural	Process Innovation	Opportunity Startup	Risk Acceptance
Caribe Rural	Process Innovation	Technology Absorption	Internationalisation
Pacifica Rural	Process Innovation	Risk Capital	Technology Absorption
Interior Rural	Risk Capital	Technology Absorption	Internationalisation
Sierra Rural	Risk Acceptance	Internationalisation	High Growth
Costa Rural	High Growth	Internationalisation	Risk Acceptance

Note: dark grey highlight = most severe bottleneck, light grey highlight = most common bottleneck.
Source: Calispa-Aguilar (2022, p.67)

4.4. Discussion of findings

National level implications

The aggregated GEI score (Table 12) shows that Colombia is among the best performers within South American countries (surpassed only by Chile). Process innovation is the most constrictive bottleneck for all Colombian regions, except for the Amazonía region. In this context, national policies centred on improving the capacity of entrepreneurs to create new products and to enhance the innovation linkages between university and industry (Dutta et al., 2018; Sebestyén et al., 2021) could have a significant impact on business innovation. Conversely, the most favourable pillar for Colombia is high growth. As shown in Table 14, internationalisation is among the top three least favourable pillars for most Ecuadorian and Uruguayan regions. Therefore, national-level policies centred on facilitating the internationalisation of entrepreneurs by improving the country's export potential and increasing productivity are required to boost entrepreneurship in both countries. These policies are crucial for Uruguay, as they could also help overcome the country's sharp contraction (–

12%) of export volumes experienced in 2018 (Giordano et al., 2019). For Ecuador, the most favourable pillar is start-up skills. A possible explanation for this might be that since 2007, Ecuador has experienced steady improvement in its tertiary education enrolment rate, increased internet access in schools, and the local availability of specialised training services (World Economic Forum 2018).

Subnational level implications

Certainly, regional and national GEI scores are similar because of the use of national-level values in the calculation of some institutional variables. However, as the individual data are entirely regional, variations can be observed to reveal valuable insights for regional policy. First, sub-index regional averages denote that the regional entrepreneurial attitudes average is higher than that of similar economies. Therefore, it is evident that the South American population's attitudes, perceptions, and behaviour towards entrepreneurship, coupled with regional institutional conditions, are particularly favourable for entrepreneurship across the region. This is a noteworthy feature of the South American context in contrast to similar economies in other parts of the world. This finding is in line with previous research that shows that for most of the high Total Entrepreneurial Activity (TEA)countries, the levels of entrepreneurship are related to attitude-inclined aspects, such as entrepreneurial capacity (skills), low fear of failure, and perceived entrepreneurial opportunity (Beynon et al., 2016). However, ABT and ASP for South American regions are lower than the global average.

The underperformance of ABT and ASP has different causes within each country. In Ecuador, policies for improving abilities require immense effort to enhance technology absorption (values for all Ecuadorian regions are under 0.20 in this pillar). Technology absorption, as measured in this study, depends on the level of access to communication and information technology (internet). In this regard, research highlights the importance of understanding territorial inequalities in the information society as these may create differences in a similar way as economic development does (Páger & Zsibók, 2014). Therefore, policies aiming to bridge gaps in access to technology could have a significant impact. Similarly, technology absorption is also the most constraining pillar for the Colombian ABT sub-index. Low firm-level technology absorption capacity and decreasing foreign direct investment for technology transfer are persistent issues for competitiveness both in Ecuador and Colombia (World Economic Forum 2018). For Uruguay, efforts to improve ABT are required in the human capital and competition pillars. In the case of ASP for Ecuador, the internationalisation

and high growth pillars are the most constraining ones within the sub-index. The scores for internationalisation in Ecuador are critically low (all the Ecuadorian regional scores are lower than 0.10 in this pillar). For Colombia, the process innovation pillar is the most constraining for this sub-index (all the Colombian regional scores are lower than 0.25 in this pillar).

In Uruguay, the risk capital and internationalisation pillars are the main limitations for the aspirations sub-index. Mainly, policy efforts are required to improve risk capital, which is extremely low in all the Uruguayan regions (scores lower than 0.10). One explanation for such low values is the low level of informal investment. Therefore, centring regional policy on tackling the underlying individual (Honjo & Nakamura, 2020) and environmental (Szerb et al., 2007) causes of low formal investment rates among the Uruguayan population could have a great impact.

Finally, specific differences in the performance at the urban-rural regional levels are found. First, it can be observed that within countries, *rural ecosystems always perform lower than urban ecosystems*. Moreover, *specific bottleneck pillars for urban-rural regions are evident* (Table 13). In Colombia, while process innovation is the least favourable pillar for almost all regions, for Colombian Amazon region (which is fundamentally rural) the most severe bottleneck is technology absorption. In Ecuador, internationalisation is the most severe bottleneck for Costa Urban ecosystems while for Costa rural ecosystems is high growth. Importantly, another observed difference concerns the severity of bottlenecks among urban-rural regions. Having a look of the relative position on the 1-to-3 categorisation of the least favourable pillars in Table 14, its apparent that each *configuration of the "top three" bottlenecks is unique in each urban and rural region.* Although there are similar pillars constraining regional systems of entrepreneurship, it is evident that some ecosystem elements are performing at different levels in the urban and rural areas within the same main region. Summarily, these results suggest that attention should be paid to designing policies that address specific aspects of urban and rural entrepreneurial systems.

Summary

This chapter presented the results from my first empirical study that aimed to adapt and apply the GEI methodology to measure regional-level entrepreneurship across 22 regions in Colombia, Ecuador, and Uruguay. This study was of great significance because, on the one hand it marks the first attempt to examine regional entrepreneurial systems in the context of South American regions and on the other hand, it provided one source of empirical evidence regarding the differences between urban and rural EEs. Another valuable finding emerging

from the present study is that the GEI methodology is suitable for studying regional entrepreneurial systems in the developing countries. Although they do not ensue from a centralised regional database, most of the indicators required for the GEI calculations are available at the disaggregated level for South American countries. Herein, the selected regions are conceptually treated as small nations. Therefore, the GEI regional values are calculated in the same way as they would be for countries.

In comparing the aggregated GEI scores of our regions within a set of 33 countries at the same level of development, it is observable that South American regions rank heterogeneously, ranging from Colombia's Andina Urban region, which ranks among the top-ten best global performers, to the Ecuadorian Amazonía region, which ranks at the bottom of the group. The South American regions are also investigated at the GEI sub-index and pillar levels. As a big region, the selected regions together show higher average scores in ATT. This implies an overall high acceptance and recognition of the role of entrepreneurship in within these three countries. At the sub-index level, the Colombian Andina, Andina Urban, and Andina Rural regions have a relatively better position among the 22 studied regions. Conversely, the Ecuadorian regions of Amazonía, Sierra Rural, and Costa Rural are at the lowest position in the group. The selected South American regions are particularly weak in ASP, with the "process innovation", "internationalisation" pillars being their most critical bottlenecks.

Importantly, *specific weaknesses and strengths for urban and rural subregions are also identified.* The insights gained from this study was of assistance to gaining a deeper understanding of the characteristics and quality of regional EEs in Colombia and Ecuador. However, given that the GEI only provides answer regarding the performance of EE in terms of main strengths and bottlenecks, it is crucial to explore these ecosystems in more complex ways, for example from a configurational approach.

5. Chapter 5: Fuzzy-set QCA: A novel method for contextualised EE research

Introduction

Literature review showed that both entrepreneurship in urban and rural entrepreneurship are overall influenced by the same factors. Scholars agree that aspects such as culture, policy, formal institutions, government, opportunity startup, talent, knowledge, networks, leadership, human capital, startup skills, high growth aspirations, startup skill, technology adoption capacity, supports, markets and demand, physical infrastructure and finance are of universal relevance for entrepreneurship both in urban and rural contexts. Questions remain about the differences in how entrepreneurial ecosystems operate, that is, how these important factors interact to "produce" entrepreneurship. At this point, several complex questions, such as are all the ecosystem's factors equally necessary for supporting entrepreneurship in urban and rural areas? Do entrepreneurial ecosystems operate differently in urban and rural areas? Is a general configuration of elements, a "recipe", that leads to high levels of regional entrepreneurship in cities and rural areas? These remain unanswered.

Previous research has stablished that entrepreneurship is an important driver of regional economic growth and innovation. However, less is known about the existent regional entrepreneurship disparities, and it is not clear why do certain regions have higher levels of entrepreneurial activity than others. In this line, more is known about ecosystems in large, urbanized regions, located primarily in developed economies and little attention has been paid to understanding differences in ecosystems functioning in smaller, non-urban regions. Entrepreneurial ecosystems are complex structures composed of a multilateral set of partners and environmental features that need to *interact* to materialize entrepreneurship (Adner, 2017; Roundy, Bradshaw, & Brockman, 2018). Therefore, useful insights to understand regional disparities could arise from understanding of the differences in the nature of high performing and low performing regional entrepreneurial ecosystems both in urban and non-urban regions.

Chapter 4 presented results from a first empirical study showing differences in the performance (key strengths and bottlenecks) of rural and urban regional EE. This chapter, in addition, provides additional evidence about the key differences between urban and rural EEs from a configurational perspective. In this study, I conducted fuzzy-set Qualitative Comparative Analysis (fs/QCA) to explore the differences between ecosystem configurations

among urban and rural regions in 42 sub-national regions in Colombia and Ecuador. Qualitative Comparative Analysis (QCA) is a novel method that originated from sociology but is increasingly employed in economics, business, management, and entrepreneurship research. Unlike the GEI method, the QCA method has no underlying simplifying assumptions about the systemic nature of EEs, and therefore has the potential to reveal the natural complexity of interconnectedness of EE components. Unlike the previous chapter study, this QCA study did not include Uruguay because it has a significantly different demographic, geographic and socio-economic context as compared to Colombia and Ecuador (i.e., Uruguay is a high-income, "transition from efficiency- to innovation-driven" economy, and its urbanisation rate is 96%).

This study conceptualises and measures entrepreneurship from two perspectives: quality entrepreneurship – or productive entrepreneurship- and quantity entrepreneurship – or entrepreneurial activity following the "Kirznerian" and "Schumpeterian entrepreneurship" concepts proposed by Szerb et al. (2019) (discussed in chapter 4). Using fuzzy-set Qualitative Comparative Analysis (fs/QCA), I explore the configurations of urban, intermediate, and rural regions which result in low or high level of quality and quantity entrepreneurship within these three types of ecosystems. The QCA study results in this chapter answer RQ3: Do EE configurations differ in rural and urban regions regarding high-level entrepreneurship?

The first section of this chapter introduces the Qualitative Comparative Analysis (QCA) method: the logic, methodological aspects and main stages of QCA. This section includes the fs/QCA model specification procedure (case and condition selection procedure and the research statements of necessity and sufficiency) and introduces dataset. Section two presents and discusses the results of the fs/QCA analysis of necessary and sufficient conditions. Together the findings from this chapter answer the dissertation's research question 3 and provided the basis to prove hypothesis 3.

5.1. **Qualitative Comparative Analysis (QCA) method**

QCA is based on set theory and conversely to regression based methods, the key issue of configurational thinking is not identifying which variable is the strongest (i.e., has the biggest net effect) but how different conditions combine and whether there is only one combination or several different combinations of conditions (causal recipes) capable of generating the same outcome (Ragin, 2008). Set theoretic approaches aims to look at the condition (or combination of conditions) that are subsets or supersets of an specific outcome

and thus to arrive at sufficient and necessary conditions (Schneider & Wagemann, 2012). The main aim of QCA is to find relationships between a set of conditions and the outcome and interpret these relations in in terms of sufficiency and necessity (Schneider and Wagemann 2012). In fs/QCA studies, the analysis of necessary conditions usually precedes the sufficiency analysis (Rihoux & Ragin, 2009). A configurational approach is advantageous because, in contrast to other techniques like linear regression, QCA method can provide answers not only to the strength of relationships between explanatory conditions -variables- and an outcome but also about how the combination of those conditions produces the outcome by identifying cross-case patterns. In this sense, QCA permits examining complex combinations of explanatory variables as antecedents of the outcome. QCA helps identifying which elements jointly explain the outcome and how do these elements combine into configurations.

5.1.1. Principles of QCA method

Asymmetry

One of the key differences between the correlation and the analysis of set relations is that set relations' design is fundamentally asymmetrical. That is, the fact that a condition X (or a combination of conditions) cause an outcome condition (Y), does not to imply that the lack of such conditions will explain the absence of the outcome. In the terms of this study, for example, the fact that high entrepreneurial abilities and high entrepreneurial aspirations yield to high number of "gazelle" business does not imply that the lack of abilities and aspirations will lead to absence of "gazelles". In this context, several researchers suggest that, if the aim is to explain both the presence and the absence of the outcome, researchers should conduct a separate analysis (Ragin, 2008; Rubinson, 2019). Causality in QCA is expressed as conditions being sufficient or necessary for the outcome, not in terms of independent variables influencing a dependent variable.

Equifinality

In QCA "equifinality" refers to the principle that a given outcome may result from several different combinations of conditions, "paths" or "recipes". These multiple pathways are generally understood as alternate and logically equivalent (i.e., as substitutable) causal paths towards the outcome and therefore all of them are important (even though some might have low coverage scores) (Ragin, 2008; Rubinson, 2019).

Conjunctural causation

Multiple Conjunctural causation is a conception of causality according to which: a) the presence of any one factor alone is not thought to be sufficient; only certain combinations of factors are capable of causing the interest outcome, b) several different combinations of conditions may produce the same outcome; and c) a given condition may have a different impact on the outcome depending on context (Ragin, 1987).

5.1.2. Numeric parameters of fit in QCA

Consistency

Consistency, also called "inclusion" level refers to the percentage of causal configurations of similar composition which result in the same outcome value. In other words, consistency coefficient expresses the proportion of cases that exhibiting a given combination of causal conditions also exhibit the outcome of interest. The higher the consistency score, the higher the reliability of the sufficiency of a casual path for the outcome. A minimum consistency at .75 or .80 is commonly used in the literature. However, the appropriate levels for consistency and coverage are research specific and varies with research project specific characteristics, such as the number of cases, the researcher's intimacy with the cases, the quality of the data, and the precision of existing theories (Schneider & Wagemann, 2010).

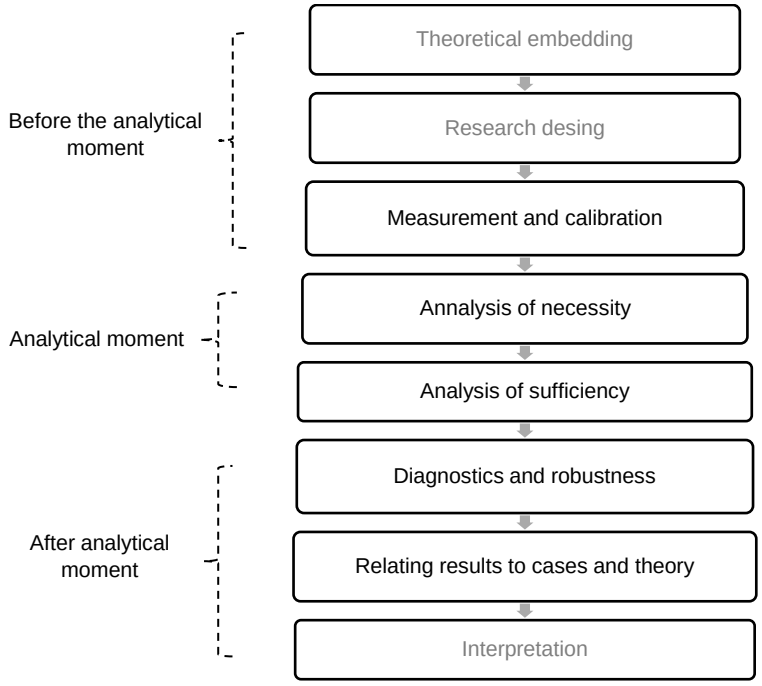
Coverage

The coefficient of coverage, a measure that expresses how much of the outcome is covered, or explained, by a particular solution term. Certainly, QCA has nothing to do with statistics and variation, but the overall interpretation of coverage coefficient is like that of R^2 in regression-based models. Clearly, for sufficiency relations, set X is more important for Y, the more it covers (Duşa, 2021). However, low coverage does not imply less *theoretical* relevance. In fact, a sufficient relation may be quite "rare" from an empirical point of view (and thus exhibit low coverage), but it still could be centrally relevant to theory. Moreover, it is important to note that higher consistency levels than coverage are expected because coverage is distinct from consistency, and the two sometimes work against each other because high consistency may yield low coverage (Ragin, 2008).

5.1.3. Stages of QCA

QCA studies are meant to follow a rigorous process including a set of quite well-defined steps.

Figure 16: Steps of QCA



Note. Gray indicates and aspect not specific to QCA
Source: adapted from (Oana et al., 2021)

As displayed in Figure 16, generally, QCA is preceded by the formulation of a clear research question based on the existing body of relevant theory. As a next step, the researcher will need to select and define a set of conditions that should be relevant in explaining the outcome of interest. This step is called model specification. In this stage is imperative to consider the "limited diversity" principle of QCA. Limited diversity refers to the analytical issue resulting from employing too many *explanatory* conditions for a small number of cases. In QCA, the number of possible combinations increases exponentially. Therefore, if an analysis involves "k" conditions, the number of potential combinations will be 2^k. The danger of proceeding with a high number of conditions is that there might be too many combinations and end up in having an individual description for each individual case, rather than an explanation**.** A high number of combinations make it difficult to find any regularity or any synthetic explanation of the outcome across the cases. For this reason, parsimony should be favoured, and it is better to select a limited number of potential conditions. The fewer number of "causes" employed to explain a phenomenon of interest, the closest the researcher is to the "core" elements of causal mechanisms. In practical terms, analysis with around 40 cases should select a maximum of 7 conditions. In this way, the logical space is limited to 128 potential combinations, and the ratio between number of cases and conditions will be 0.3125. (Rihoux & Ragin, 2009).

The second step in designing the research is case selection. This step involves defining what type and how many cases (unit of analysis) will be included in the analysis. *Before proceeding to the analytic moment*, the researcher needs to prepare the empirical material – the 'data' – that he or she can use to compare the cases in the QCA. QCA sees conditions and outcomes as sets to which cases belong or not. Therefore, once the qualitative and/or quantitative empirical information to measure the conditions and the outcome have been obtained ("raw data") and arranged into a data matrix, the next step is to transform the available data on the cases so that they reflect the sets we are interested in. This process of transforming raw data into set membership scores, in order to determine whether and to what extent cases belong to a particular set is called set calibration.

Calibration is a fundamental operation in Qualitative Comparative Analysis. It is a transformational process from the raw numerical data to set membership scores, based on a certain number of qualitative anchors or thresholds. QCA analysis is based on Boolean algebra, which is a special branch of general algebra, developed by George Boole back in 1954. In Boolean notation, everything is either true (present) or false (absent) and this can be rendered by values of zero for low or absent and one for high, or present. In a QCA study, each case is represented by a number of conditions (independent variables) and a particular outcome as a dependent variable is in regression analysis. And so, the presence of such conditions is coded by values of 1 and the absence of such condition for a case is coded as 0 into a so called "data matrix".

When using only one threshold, the procedure produces the so called binary "crisp" sets dividing the cases into two groups (fully in=1, fully out=0), and if using two or more thresholds the procedure produces the multi-value "fuzzy" sets (a continuous range, anywhere between 0 and 1) (Duşa, 2021). Thus, fuzzy scores show levels of membership (i.e., the degree to which something is in or out, true or false). Although crisp-set calibration seems easier to understand and somehow more straightforward, a scoring based on binary scores might not capture efficiently many of the phenomena that interest social scientists where cases of "in between" cases can be found. For example, while it is clear that some countries are democracies and some are not, many economies can be classified as "in-between" cases can which are not fully in the set of democracies, nor are they fully excluded from this set (Ragin, 2008). Contrastingly, in a fuzzy set, scores can be calibrated at three, four, six or continuous categories between 0 and 1. For example, scores could be rated as 1, 0.67, 0.33 or 0. In this case, a score of 0.33 would imply that a case is "more out than in" and 0.67 would mean that a case is "more in than out". In this way, fuzzy sets make it possible to rate factors that cannot -

or should not- be simply classified as present or absent. Table 15 shows an illustrative example of the structure of a crisp-set data matrix for a QCA model of three conditions and one outcome using hypothetical data.

Table 15: Example of a crisp set data matrix

	Raw values				Calibrated values			
Cases	Condition 1	Condition 2	Condition 3	Outcome	Calibrated condition 1	Calibrated condition 2	Calibrated condition 3	Calibrated outcome variable
Case A	90	20	97	99	1	0	1	1
Case B	65	52	99	72	1	1	1	1
Case C	10	10	15	22	0	0	0	0

Source: own elaboration

It is important to highlight that the selection between crisp or fuzzy set approaches depends on the logic and purpose of the research and the availability of information that supports the calibration value scheme. In this regard Ragin, (2008) adds that "In sharp contrast with the physical sciences, calibration is virtually unknown in the social sciences. Instead, measures are simply required to vary in ways that reflect relevant underlying concepts" (p.8). Through a calibration process, the degree of membership of each case to each condition is assigned. Calibration process is due to conceptual boundaries that are not sharply defined and thus it substantially involves the researcher's theoretical and substantive knowledge and quantitative and qualitative assessments. That is, the collective knowledge base of social scientists should provide the basis for the specification of precise calibrations (Khedhaouria & Thurik, 2017; Ragin, 2008; Schneider & Wagemann, 2012).

Having the data calibrated, researchers can start *the analytic moment*. At this stage the aim is to identify whether there are necessary and/or sufficient combinations of conditions for the outcome of interest. Currently, necessity and sufficiency analysis can be performed with the help of QCA software tools which has been continuously developed and improved for years (main software tools for QCA 2022 available at https://compasss.org/software/). In this study I employed the "fs/QCA 3.0" software which was developed by Ragin & Sean (2016), and it is openly available for researchers[4].

Analysis of necessity

[4] https://www.socsci.uci.edu/~cragin/fs/QCA/software.shtml

The core for understanding necessity is the fact that while all conditions in a complex configuration have an impact in the causal structure, some conditions are more important than others. There are infinite number of necessary conditions for any phenomenon but the contribution of some of them can be modest. Therefore, one question to be addressed when working with configurational comparative methods is which of the model conditions are necessary. Necessary conditions are those without which the outcome cannot occur. Braumoeller & Goertz (2000) present two definitions of necessity:
(X) is a necessary condition of (Y) if:

- X is always present when Y occurs,
- Y does not occur in the absence of X

Within the topic of this study, I could derive the following statement as an illustration: high number of creative businesses in a region (Y) is produced only in the context of high entrepreneurial abilities (X). If population lacks entrepreneurial abilities, (Y) could not be produced; it means entrepreneurial abilities is a necessary condition (although not always sufficient by itself) cause for existence of creative businesses. Analysing necessity of conditions in a QCA study contributes to find evidence about which of all the -already identified as causally relevant to Y- model conditions are strictly necessary for entrepreneurship in that specific case and for a given type of outcome (group of countries, regions, set of firms, etc).

Analysis of sufficiency

Once cases are coded in a data matrix, all the possible logical configurations are grouped together into a "truth table" depending on their respective outcome. As presented on the Table 16 using hypothetical data, a truth table rows describe the outcome for each possible combination of present and absent conditions, for all cases that have that combination.

Table 16: Exemplary structure of a binary crisp-set truth table

Condition A	Condition B	Condition C	Outcome Y	Number of cases	cases
1	1	1	1	4	A,B,G,P
0	0	1	0	2	C,M
1	1	0	1	1	D
1	0	0	1	2	E,F
…					

Source: own elaboration

This is something similar to constructing a table of frequencies, as the calibrated values in the input data have the same structure as the combinations from the truth table. QCA uses truth tables to help determine which combinations of conditions (i.e. "configurations") are sufficient to produce the outcome under investigation (Rubinson, 2019). Importantly, a truth table reveals, how many cases have the same configuration as observed in the last column of the example Table 16. It is important to understand that, in a calibrated data matrix, each row is a case, while in the truth table each row is now a configuration. In other words, a data matrix shows diversity between cases and truth tables show similarities across cases.

The structure of truth table is therefore a matrix with k columns, where k is the number of causal conditions included in the analysis. The number of rows is often presented as 2^k in the example above for 3 causal conditions there are $2^3 = 8$ rows. For multi value sets, the number of columns is determined by the product of the number of levels l (valent, categories) for each causal condition from 1 to k. Incidentally 2^3 =2×2×x2=8, but if the first of the causal conditions had three values (levels) instead of two, the structure of the truth table changes to: 3×2x2=12 (Duşa, 2021). Later, the truth table's rows are expressed in the form of "primitive expressions" employing the following operators:

* is logical AND, e.g. A*B
+ is logical OR, e.g. A+B
~ is logical NOT e.g. A~ B
→ is logical link e.g. A → Y

In this way, the primitive expressions of the example above can be described by A*B*B+A*B~C+A*~B*~C→Y

The logical, or Boolean minimization is the next step of analysis after building a truth table. The truth table shows the combinations of conditions that are sufficient for the outcome separately. The aim of this stage is to systematically compare between the truth tables rows with the sufficient combination of conditions (primitive expressions) and find the simplest possible expression (or minimal formula) that is associated with the explained value of an output.

The output of minimization of truth tables are three types of *solutions*: complex, intermediate, and parsimonious. In its broadest sense, a solution is "a combination of configurations that is supported by a high number of cases, where the rule "the combination leads to the outcome" is consistent" (Pappas & Woodside, 2021, p.11). The complex

solution, also called conservative solution, presents all the possible combinations of conditions when traditional logical operations are applied. Ragin (2008) argues that the complex solution is the most conservative because it "does not permit any counterfactual cases and thus no simplifying assumptions regarding combinations of conditions that do not exist in the data" (p. 173). However, despite the advantage of complex solutions relying on empirical information only, several researchers have argued that high complexity of these solutions makes the interpretation difficult and, in some cases, impractical (Thiem, 2019). The parsimonious solution is a simplified version of the complex solution which presents only the most important, "core" conditions which cannot be left out from any solution (Fiss, 2011). Ragin & Sonnett (2005) proposed an intermediate solution type, which is a simplified version of the complex solution and includes the parsimonious solution. Intermediate solution is now widely recommended and regarded as the most attractive, "superior" type of QCA's solutions because intermediate solution strikes a balance between complexity and parsimony (Baumgartner, 2015; Ragin, 2008). In this context, it is important to highlight that each of them can be interpreted appropriately in different circumstances. This set of solutions are core for interpretation and provide the empirical evidence to answer the formulated research questions.

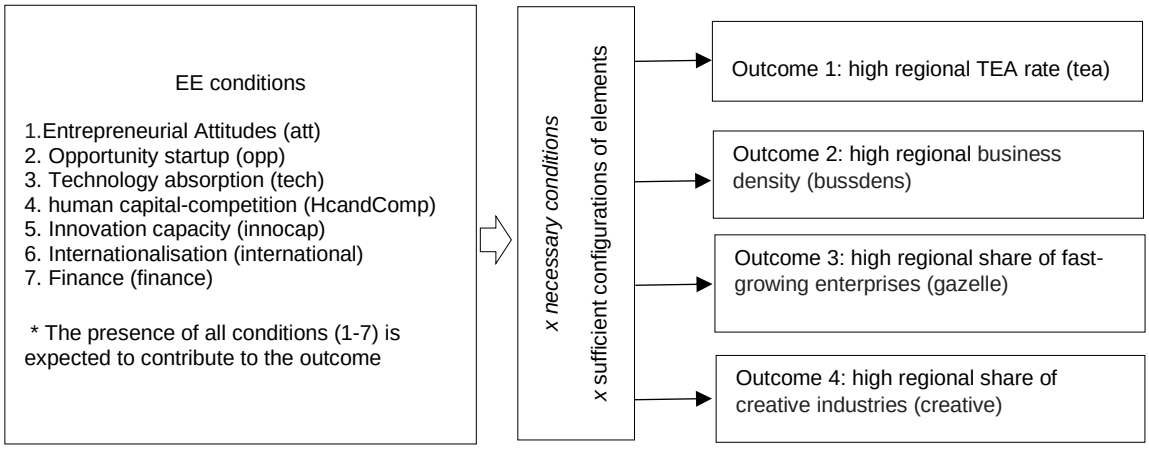
Once identified necessary and sufficient (combinations of) conditions for the outcome, researchers can apply several procedures for increasing the confidence in the results, for clarifying the extent to which our findings can be generalised to other contexts, and for deriving more abstract conclusions. While there are a variety of diagnostics and check the robustness of the results (for example for example, changes in raw consistency, changes in calibrations, or changes in the frequency cut-off), in this QCA study, sensitivity was checked by setting two alternative thresholds in the assignment of set-membership for the seven conditions and evaluating the changes in the necessity scores and sufficient solutions. The final step is to relate the results to cases or theory. Like for robustness, there are several approaches to reasoning about inferences from QCA results toward more abstract conceptual or theoretical knowledge (Thomann & Maggetti, 2020). In this case, the interpretation of results was in line to compare the necessity levels and causal mechanisms between three types of regions: predominantly urban, intermediate, and predominantly rural. In this way we could learn from the cases about new, before unexplored or underexplored patterns, and derive some form of abstract lessons (Oana et al., 2021).

5.2. **fs/QCA empirical study: model specification, data and results**

5.2.1. fs/QCA model

Figure 17 presents a visual representation of the proposed fs/QCA model where the central idea is that the high levels of an EE outcome is contingent to a specific set of necessary conditions and to different configurations of elements. The number of necessary conditions (if any) for each outcome measurement and the number of sufficient configurations is unknown, *x*, and will be revealed by fs/QCA analysis.

Figure 17: Seven - condition fs/QCA model for quantity and quality entrepreneurship

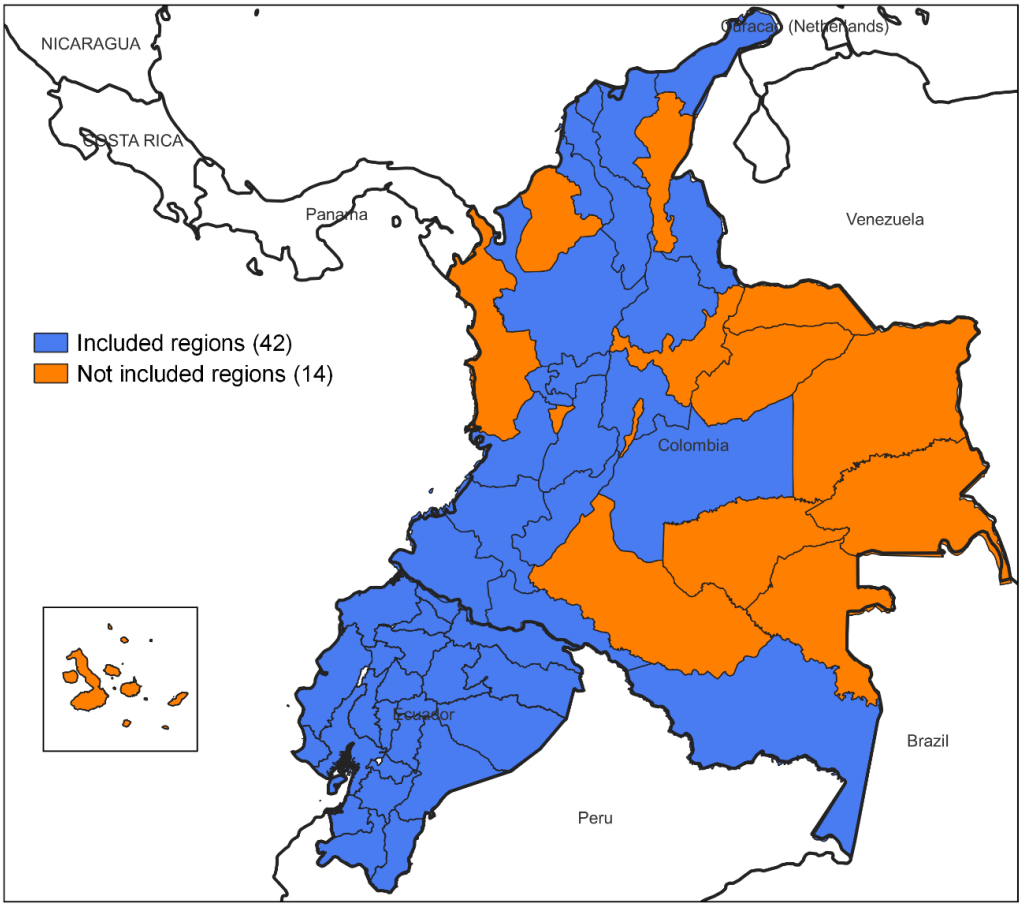


Source: own elaboration

5.2.2. Case selection

A total of 42 subnational regions were selected for this study: 23 provinces in Ecuador and 19 departments in Colombia. Figure 18 shows the location of the selected regions. Provinces and departments are intermediate level subnational administrative units which belong to bigger macro regions and at the same time, are composed of various smaller sub-national units (i.e., cantons in Ecuador and municipalities Colombia). The selection of this unit of analysis was mainly due to the availability of representative individual data (from GEM Adult Population survey).

Figure 18: Location of the included regions



Note: colour code: region is blue if it is included, orange if it is excluded from the investigation.
Source: own elaboration

Table 17 provides an overview of the economic aspects of each region included in the study. Data for Colombia is only available aggregated at three levels, primary, secondary and tertiary sectors. Tertiary sector groups the activities of electricity, gas, steam and air conditioning supply; water distribution; evacuation and treatment of residual waters, waste management and environmental sanitation activities; wholesale and retail, repair of motor vehicles, transportation and storage, lodging and food services, information and communications, financial and insurance activities, real estate activities, professional, scientific, technical and administrative activities, public administration and defence, obligatory affiliation social security plans, education, human health care and social service activities, artistic, entertainment and recreation activities and other service activities.

Table 17: Demographic and economic characteristics of the 42 selected regions

Regions		Capital City	Macro region	Regional GVA 2017, in million USD	Region's participation in National economy, % of GDP	Main economic activity	Firm density
				Colombia			
1	Cundinamarca	Bogotá	Andina	88906.70	31.38	Tertiary activities	468416(37.97%)
2	Valle del Cauca	Cali	Pacífico	27450.54	9.69	Tertiary activities	120025(9.73%)
3	Santander	Bucaramanga	Andina	16723.36	5.90	Tertiary activities	56980 (4.62%)
4	Meta	Villavicencio	Orinoquía	9844.93	3.47	Primary activities	23327 (1.89%)
5	Tolima	Ibagué	Andina	6287.52	2.22	Tertiary activities	20517 (1.66%)
6	Bolívar (Colombia)	Cartagena de Indias	Caribe	10068.05	3.55	Tertiary activities	43080 (3.49%)
7	Norte de Santander	San José de Cúcuta	Andina	4610.50	1.63	Tertiary activities	21841 (1.77%)
8	Antioquia	Medellín	Andina	40835.72	14.41	Tertiary activities	181472(14.71%)
9	Atlántico	Barranquilla	Caribe	12468.69	4.40	Tertiary activities	75296 (6.10%)
10	Huila	Neiva	Andina	4864.19	1.72	Tertiary activities	18481 (1.50%)
11	Risaralda	Pereira	Andina	4612.74	1.63	Tertiary activities	19380 (1.57%)
12	Nariño	San Juan de Pasto	Pacífico	4514.27	1.59	Tertiary activities	17445 (1.41%)
13	Magdalena	Santa Marta	Caribe	3992.66	1.41	Tertiary activities	17840 (1.45%)
14	Caldas	Manizales	Andina	4587.76	1.62	Tertiary activities	15368 (1.25%)
15	Putumayo	Mocoa	Amazonía	1181.61	0.42	Tertiary activities	6365 (0.52%)
16	Sucre	Sincelejo	Caribe	2462.67	0.87	Tertiary activities	10131 (0.82%)
17	Guajira	Riohacha	Caribe	3534.34	1.25	Primary activities	7735 (0.63%)
18	Amazonas	Leticia	Amazonía	229.37	0.08	Tertiary activities	909(0.07%)
19	Cauca	Popayán	Pacífico	5162.29	1.822	Tertiary activities	12975 (1.05%)
				Ecuador			
20	Pichincha	Quito	Sierra	26406.87	27.27	Public administration, professional, technical, and administrative activities	210438 (23.18%)
21	Guayas	Guayaquil	Costa	25815.76	26.66	Wholesale and retail trade, construction Industry,	171827 (18.92%)

22	Azuay	Cuenca	Sierra	5013.92	5.18	Construction Industry, wholesale, and retail trade.	55450 (6.11%)
23	Orellana	Francisco de Orellana	Amazonía	3935.40	4.06	Oil and gas extraction and related services, public administration	8509 (0.94%)
24	El Oro	Machala	Costa	3467.43	3.58	Banana, coffee and cocoa production, wholesale, and retail trade.	45362 (5.0%)
25	Manabí	Portoviejo	Costa	6212.36	6.42	Construction Industry, wholesale, and retail trade.	81830 (9.01%)
26	Loja	Loja	Sierra	1751.49	1.81	Construction Industry, wholesale, and retail trade.	28998 (3.19%)
27	Santo Domingo de los Tsáchilas	Santo Domingo	Costa	1886.21	1.95	Construction Industry, wholesale, and retail trade.	25919 (2.85%)
28	Esmeraldas	Esmeraldas	Costa	3047.27	3.15	Oil refining products and agriculture	21859 (2.41%)
29	Imbabura	Ibarra	Sierra	1846.12	1.91	Construction Industry, wholesale, and retail trade.	30386 (3.35%)
30	Los Ríos	Babahoyo	Costa	3675.42	3.80	Banana, coffee and cocoa production, wholesale, and retail trade.	32319 (3.56%)
31	Santa Elena	Santa Elena	Costa	1358.83	1.40	Construction Industry, wholesale, and retail trade.	12348 (1.36%)
32	Carchi	Tulcán	Sierra	662.90	0.68	Agriculture, wholesale, and retail trade.	11920 (1.31%)
33	Sucumbíos	Nueva Loja	Amazonía	1508.82	1.56	Oil and gas extraction and related services, oil refining products	11366 (1.25%)
34	Pastaza	Puyo	Amazonía	634.61	0.66	Oil and gas extraction and related services, public administration	6368 (0.70%)
35	Tungurahua	Ambato	Sierra	2857.48	2.95	Construction Industry, wholesale, and retail trade.	43445 (4.78%)
36	Chimborazo	Riobamba	Sierra	1900.01	1.96	Construction industry and Education	29382 (3.24%)
37	Cañar	Azogues	Sierra	1124.01	1.16	Construction industry, transport, and warehousing	17393 (1.92%)
38	Napo	Tena	Amazonía	479.63	0.50	Water and electricity supply, construction industry	7145 (0.79%)
39	Morona Santiago	Macas	Amazonía	505.54	0.52	Construction industry and Education	7565 (0.83%)
40	Cotopaxi	Latacunga	Sierra	1837.79	1.90	Construction Industry and wholesale and retail trade.	27355 (3.01%)
41	Bolivar (Ecuador)	Guaranda	Sierra	634.67	0.66	Construction industry and Education	13285 (1.46%)
42	Zamora Chinchipe	Zamora	Amazonía	277.48	0.29	Public administration and Education	7511 (0.83%)

Note. Firm density = total firms per region year 2019 and % of total country number of firms in parenthesis.
Source: Own elaboration based on data from "Valor agregado bruto por provincia, año 2017" by Ecuadorian Central Bank -BCE, 2022 and from "Valor Agregado por municipio. Grandes actividades económicas, año 2017" by National Administrative Department of Statistics - DANE, 2021.

5.2.2.1. Regionalisation of individual data

Values for the model conditions are calculated employing a combination of individual and institutional data for each region. Individual data comes from GEM Adult Population survey. The GEM provides public access to their APS data with a three-year delay. However, earlier datasets for Colombia and Ecuador could be accessed by contacting the national teams directly. In this case, the corresponding Colombian, and Ecuadorian national teams provided the 2010-2017 raw databases which not only were unpublished by that time but also contained geographical identification variables which are not included in public datasets. Geographical identification variables such as macro regions, provinces, departments, cities, and urban-rural location were crucial for data regionalisation.

The first limitation regarding individual data was the lack of data for certain Colombian regions. From the total 32 administrative departments, GEM collects data only for 24 of them. In the case of Ecuador, GEM APS collects data from all 23 Ecuadorian provinces. The second limitation was the representativeness of individual data for regional population. In this study I employed individual data pooled from 2010-2017 databases resulting in a total of 13358 observations for Ecuadorian regions and 41745 observations for Colombia. However, when the data was regionalized, sample size was not representative for the regional population for certain regions. The approach to overcome this issue was to merge individual data for neighbouring provinces/departments that belong to the same macro geographical region until reaching a representative sample. Colombia's 32 sub national administrative regions (departments) are grouped in 5 macro regions: Caribe, Andina, Pacífico, Orinoquía, and Amazonía. Ecuador consists of 23 continental provinces divided into 3 macro regions, namely, Costa (coastal), Sierra (Highlands), and Amazonía (Amazon) and one island province and region Galápagos.

Consequently, the scores for the individual component for calculation of condition scores for the provinces that have been merged was the same for the group. Moreover, merging was not possible for 5 Colombian regions (Boyacá, Cesar, Córdoba, Choco, and Casanare) either because they are not neighbouring regions or because even after merging the sample remains unrepresentative. These regions were therefore excluded from the sample. Table 18 shows details about the individual sample.

Table 18: Individual sample representativeness summary

	Sub national Region	Sample size	Regional population 2017-2018
Ecuador	Azuay	595	838 859
	Tungurahua-Cotopaxi	385	1 041 100
	Carchi-Imbabura	610	640 456
	Chimborazo -Cañar- Bolívar	385	983 672
	Napo - Pastaza - Sucumbíos -Orellana - Zamora- Morona Santiago	608	898 547
	El Oro	704	689 760
	Esmeraldas	385	617851
	Guayas	3972	4 207 610
	Loja	478	506 035
	Los Ríos	572	888 351
	Manabí	927	1 523 950
	Pichincha	2890	3 059 971
	Santo Domingo	391	434 849
	Santa Elena	456	375 646
	TOTAL ECUADOR	13358	16 706 657
Colombia	Antioquia	6272	6 296 843
	Atlántico	2538	2 468 429
	Cundinamarca	13709	10 110 734
	Bolívar (Colombia)	2573	2 035 711
	Caldas	1014	991 363
	Guajira	865	846 012
	Magdalena	1568	1 309 259
	Meta	419	1 021 943
	Nariño	506	1 621 984
	Norte de Santander	498	1 446 748
	Risaralda	838	935 164
	Santander	1994	2 146 496
	Sucre	1789	888 638
	Valle del Cauca	6017	4 432 549
	Huila-Tolima-Cauca	738	3 861 694
	Putumayo-Amazonas	407	415 854
	TOTAL COLOMBIA	41745	40 829 421

Note. Sample comes from pooled observations from GEM Adult Population Survey 2010-2017. Data for regional population from "Proyecciones de población, años 2017,2018" by National Administrative Department of Statistics DANE, 2022 and from "Proyecciones Poblacionales, años 2017,2018" by Ecuadorian National Institute of Statistics and Censuses - INEC, 2022.

5.2.2.2. Urban-rural classification procedure

To create three sub datasets based on the regional urban-rural typology, the total 42 selected regions were categorized into three groups according to their type which was determined based on the European Commission urban-rural typology methodology[5]. Regions in the EU are classified as predominantly urban (PU), intermediate, or predominantly rural (PR) based on the percentage of population living in local rural units. This approach classifies regions on a three-step process. The first step is to identify populations in rural areas (i.e., areas outside urban clusters). The second step is to classify regions based on the share of their population in rural areas as follows:

[5] Full methodology description at https://ec.europa.eu/eurostat/web/rural-development/methodology

- 'Predominantly rural' if the share of the population living in rural areas is higher than 50
- 'Intermediate' if the share of the population living in rural areas is between 20 and 50
- 'Predominantly urban' if the share of the population living in rural areas is below 20

In a third step, the presence of a city in the region is considered.

- A predominantly rural region which contains an urban centre of more than 200 000 inhabitants making up at least 25% of the regional population becomes intermediate.
- An intermediate region which contains an urban centre of more than 500 000 inhabitants making up at least 25% of the regional population becomes predominantly urban.

It is important to highlight that, the country administrative standards for urban-rural definition for Ecuador and Colombia are slightly different. What is considered rural in Colombia can be somehow different to what is considered rural in Ecuador. However, what is important for setting an urban-rural typology is to know the *share* of their population in rural areas and this is clearly defined for each selected region. Table 19 present the results of each of the classification stages and the final urban rural classification for the selected regions of this study. The final classification from the sample is: 12 urban regions, 16 intermediate regions and 14 rural regions.

Table 19: Urban – rural typology 42 regions in Colombia and Ecuador

Region	Regional population 2017	Rural population 2017	% Rural population (Step 1)	Urban-rural classification (Step 2)	Presence of urban centre (Step 3)	Final Typology
Azuay	838859	380,815	45.40	Intermediate	Cuenca (580000)	P.Urban (PU)
Tungurahua	570933	346228	60.64	P.Rural (PR)	>200000	P.Rural (PR)
Cotopaxi	470167	318134	67.66	P.Rural (PR)	>200000	P.Rural (PR)
Carchi	182719	87086	47.66	Intermediate	>500000	Intermediate
Imbabura	457737	207974	45.44	Intermediate	>500000	Intermediate
Chimborazo	510935	295704	57.88	P.Rural (PR)	>200000	P.Rural (PR)
Cañar	267643	143257	53.53	P.Rural (PR)	>200000	P.Rural (PR)
Bolivar (Ecuador)	205094	141490	68.99	P.Rural (PR)	>200000	P.Rural (PR)
Orellana	153269	76974	50.22	P.Rural (PR)	>500000	P.Rural (PR)
Sucumbíos	215499	122,290	56.75	P.Rural (PR)	>200000	P.Rural (PR)
Zamora Chinchipe	112835	64487	57.15	P.Rural (PR)	>200000	P.Rural (PR)

Napo	125538	81018	64.54	P.Rural (PR)	>200000	P.Rural (PR)
Pastaza	105494	58773	55.71	P.Rural (PR)	>200000	P.Rural (PR)
Morona Santiago	183728	121738	66.26	P.Rural (PR)	>200000	P.Rural (PR)
El Oro	689760	153109	22.20	Intermediate	>500000	Intermediate
Esmeraldas	617851	248629	40.24	Intermediate	>500000	Intermediate
Guayas	4207610	643388	15.29	P.Urban (PU)		P.Urban (PU)
Loja	506035	190773	37.70	Intermediate	>500000	Intermediate
Los Ríos	888351	392721	44.21	Intermediate	>500000	Intermediate
Manabí	1523950	617215	40.50	Intermediate	>500000	Intermediate
Pichincha	3059971	1075,304	35.14	Intermediate	Quito (1911966)	P.Urban (PU)
Santo Domingo	434849	106715	24.54	Intermediate	>500000	Intermediate
Santa Elena	375646	172038	45.80	Intermediate	>500000	Intermediate
ECUADOR	16706657	6044429	36.18			
Antioquia	6296843	1423624	22.61	Intermediate	Medellín (2427129)	P.Urban (PU)
Atlántico	2468429	127243	5.15	P.Urban (PU)		P.Urban (PU)
Cundinamarca	10110734	828515	8.19	P.Urban (PU)		P.Urban (PU)
Bolivar (Colombia)	2035711	512457	25.17	Intermediate	Cartagena (1024882)	P.Urban (PU)
Caldas	991363	259165	26.14	Intermediate	>500000	Intermediate
Guajira	846012	451467	53.36	P.Rural (PR)	>200000	P.Rural (PR)
Magdalena	1309259	393673	30.07	Intermediate	>500000	Intermediate
Meta	1021943	240480	23.53	Intermediate	Villavicencio (531275)	P.Urban (PU)
Nariño	1621984	909182	56.05	P.Rural (PR)	Pasto (392930)	Intermediate
Norte de Santander	1446748	308456	21.32	Intermediate	Cúcuta (711715)	P.Urban (PU)
Risaralda	935164	206409	22.07	Intermediate	>500000	Intermediate
Santander	2146496	525762	24.49	Intermediate	Bucaramanga (581130)	P.Urban (PU)
Sucre	888638	329754	37.11	Intermediate	>500000	Intermediate
Valle del Cauca	4432549	659906	14.89	P.Urban (PU)		P.Urban (PU)
Huila	1086654	425314	39.14	Intermediate	>500000	Intermediate
Tolima	1326203	423414	31.93	Intermediate	Ibagué (529635)	P.Urban (PU)
Putumayo	340750	169940	49.87	Intermediate	>500000	Intermediate
Amazonas	75104	38774	51.63	P.Rural (PR)	>200000	P.Rural (PR)
Cauca	1448837	908778	62.72	P.Rural (PR)	>200000	P.Rural (PR)
COLOMBIA	40829421	9142313	22.39			

Note. Data for regional population and rural population from "Proyecciones de población, años 2017,2018" by National Administrative Department of Statistics DANE, 2022 and from "Proyecciones Poblacionales, años 2017,2018" by Ecuadorian National Institute of Statistics and Censuses - INEC, 2022.

5.2.3. Conditions selection

For a fs/QCA analysis, there is no specific rule for selection of conditions, rather, the selection of conditions must be guided by prior knowledge (theory). The idea is that researchers should narrow their perspective about a phenomenon to only a few "core" theories, and therefore, a smaller set of "explanatory" conditions for the outcome of interest (Rihoux and Ragin, 2009). Condition selection is not an easy task as it is bounded to a well-known drawback of QCA that pertains to the limited number of conditions that can be used in QCA models. Elements of EEs are diverse, and indicators are usually complex (built by combining smaller constituent parts, variables, indicators). Ideally, studies could decompose the indicators into their constituent parts and examine which parts are essential for productive entrepreneurship. However, the decomposition of indicators is not possible without making the QCA overly complicated due to the causal complexity (Schrijvers et al., 2021). In this context, authors studying EEs must carefully find a way to minimize the elements of EEs to an adequate number that respects causal complexity limitations (no more than 7 as suggested by Ragin, 2008) and at the same time is well founded in theory. In this regard, researchers have adopted several approaches to rationally select a proper number of causal conditions for their QCA models. Table 20 summarises the structure of QCA models in key studies and the way how authors justified their choice of causal conditions and outcome measurements.

Table 20: Approaches to QCA models' causal conditions selection

Study	QCA model structure		Source
(Muñoz et al., 2020)	*6 causal conditions* Policy support, Local programs, financial support, Cultural celebration, Market behaviour and entrepreneurial learning.	*Outcome condition* Early-stage firm activity, high-growth firm activity and low-growth firm activity	Authors assessed the narrated attributes as evaluated by local experts.
(Torres & Godinho, 2021)	*8 causal conditions* Cultural and informal institutions Formal institutions, regulation, and taxation Market conditions Physical infrastructure Human capital Finance Networking and support Knowledge creation and dissemination	*Outcome conditions:* 1. the number of new business creation normalized by the country population size 2. Number of new unicorns 3.Number of digitally enabled unicorns	Digital EE elements from the European Index of Digital Entrepreneurship Systems (EIDES)
(Schrijvers et al., 2021)	*10 causal conditions* Formal institutions Culture Networks Physical infrastructure Finance Leadership Talent Knowledge Demand Intermediate services	Outcome conditions: 1. innovative start-ups (less than 5 years old) 2. unicorn firms (young private firms with a valuation of more than $1 billion).	Elements and outputs of the entrepreneurial ecosystem adapted from Stam & van de Ven, (2019).
(Xie et al., 2021)	*7 causal conditions* Innovation capacity Market potential Human capital Financial capital Physical infrastructure	Outcome conditions: 1. Number of unicorns and of companies listed on the China Growth Enterprise Market per million residents 2. Proportion of the labour force who are employed in private enterprises and self- employed people	The set of causal conditions have been selected by the authors employing different supporting literature while for the outcome conditions, the author follows insights from Acs, Åstebro, Audretsch, &

	Internet infrastructure Number Government size		Robinson, (2016) and Acs, Stam, Audretsch, & O'Connor, (2017).
(Yang & Zhang, 2021)	*7 causal conditions* Formal institutions Culture Talent Finance Knowledge Supports Markets	*Outcome conditions*: 1. Innovation: Number of patent authorisations 2.Growht: Gross regional product growth rate 3. Employment: employment rate	Elements and outputs of the entrepreneurial ecosystem adapted from Stam & van de Ven, (2019).
(March-Chordá et al., 2021)	*4 causal conditions* Image and prestige Investment Networking Market	*Outcome conditions*: 1. success after 5 years 2. sector: digital or another sector 3. employees: companies with more than 25 employees, or less than 25 employees.	Selection of key elements of a startup ecosystem according to Tripathi, Seppänen, Boominathan, Oivo, & Liukkunen, (2019).
(Komlósi et al., 2022)	*7 causal conditions* Demographic characteristics Entrepreneurial identity Entrepreneurial attitude Venture tenure Idea development, Capacity for innovation Entrepreneurial environment	*Outcome conditions:* 1.permissive "high networking outcome" 2. strict "very high networking outcome"	The set of causal conditions have been selected by the authors employing different supporting literature while for the outcome conditions are selected based on the consideration of Khedhaouria & Thurik (2017).
(Alves et al., 2019)	*5 causal conditions* Science & Technology Human Capital Market Dynamics Business Dynamics Infrastructure	*Outcome conditions:* Knowledge-Intensive Entrepreneurial Ecosystems: Number of projects granted to a given municipality	Causal conditions selected based on Isenberg, (2010), Mason & Brown (2014) and Stam, (2015).

Source: own elaboration

In order to define number of ecosystem elements in this study, I employed the GEI index conceptual model of Ács, Szerb, Lafuente, & Márkus, (2019) which discloses detailed definitions regarding the elements of an entrepreneurial ecosystem and its measurement. (The index's conceptual model and index structure are fully explained in chapter 2). The GEI has been adopted as the theoretical criteria for defining the fs/QCA model in this study because it precisely establishes the core constituent elements of a regional entrepreneurial ecosystems and its systemic interrelationships. Nevertheless, the 14 constituent pillars (potential conditions) of the GEI methodology remains too great for an intermediate-N fs/QCA analysis. fs/QCA method is computationally limited to small groups of conditions due to the methodological "limited diversity" problem (Further explained in theorical background section). Therefore, to overcome this computational issue the fs/QCA model was limited to seven conditions calculated based on the 14 GEI pillars. In this way, the logical space for this study is reduced to 2^7 = 128 potential combinations. Importantly, none of the pillars was omitted, as pillars were not discarded but merged. This merging procedure certainly led to some losses as compared to using less composed indicators. In this context, my approach was to build indicators by merging conceptually related pillars.

As presented in Table 21, all the pillars belonging to the attitudes sub index were merged into one. Opportunity startup and technology absorption pillars stay in its original form. Human capital and competition pillars were merged in one pillar. The first reason I considered merging these pillars is that both pillars' institutional measurements are related to market and labour (Human capital: Labour market = staff training * labour freedom) and competition (Competitiveness= market dominance* market regulation). Therefore, I considered these are conceptually related. The second commonality is that both pillars belong to the abilities sub-index and, since the abilities sub index tries to measure very different aspects, a relatively better approach to lose less was to merge indicators rather than discarding either of them. Finally, Following Stam & van de Ven, (2021) implications, high growth pillar's individual indicator "gazelle" was employed as an output instead of an input variable.

The model seven conditions' values were calculated using a combination of individual and institutional regional data following the GEI index building methodology and as described in Table A3 in the Appendix.

Table 21: Formulation of QCA model conditions based on GEI structure

	Original Pillars	Variables (ind./inst.)	Selected conditions for QCA
GLOBAL ENTREPRENEURSHIP INDEX	*1. Entrepreneurial attitudes*		
	OPPORTUNITY PERCEPTION	Opportunity recognition	1. Entrepreneurial Attitudes (att)
		Freedom (economic freedom*property rights).	
	STARTUP SKILLS	Skill perception	
		Education (gross enrolment tertiary education)	
	RISK ACCEPTANCE	Risk perception	
		Country risk	
	NETWORKING/ ROLE MODEL	Know entrepreneurs	
		Networking: Agglomeration * % of firms belonging to a business group)	
	CULTURAL SUPPORT	Career status	
		ease of Starting a business	
	2. Entrepreneurial abilities		
	OPPORTUNITY STARTUP	Opportunity motivation	2. Opportunity startup (opp)
		Governance (taxation*good governance) Regional governance measured by "local transparency' indicator	
	TECHNOLOGY ADOPTION	Technology level	3. Technology absorption (tech)
		Technology absorption	
	HUMAN CAPITAL	Educational level	4. Human capital - competition (HcandComp)
		Labour market (average: staff training, labour freedom)	
	COMPETITION	Competitors	
		Competitiveness (market dominance*regulation)	
	3. Entrepreneurial *aspirations*		
	PRODUCT INNOVATION	New product	5. Innovation capacity (innocap)
		Technology transfer	
	PROCESS INNOVATION	New technology	
		Science (GERD* (average quality of scientific institutions, availability of scientists and engineers)	
	HIGH GROWTH	Gazelle	Employed as output indicator
	INTERNATIONALISATION	Export	6. Internationalisation (international)
		Average: Business sophistication AND Economic complexity	
	FINANCE	Business angel	7. Finance (finance)
		Average of penetration of financial access and depth of capital market.	

Source: own elaboration based on Ács et al. (2019)

Outcome variables selection

Efficient entrepreneurial ecosystems are said to produce entrepreneurship as an output (Stam & van de Ven, 2021). However, the definition of "entrepreneurship" is broad and different among researchers (Ahmand & Seymour, 2008; Chowdhury et al., 2015; Prince et al., 2021) who consequently choose an indicator according to how they define entrepreneurship. In this regard, it can be observed that researchers usually specify entrepreneurship in line to its productive nature or the quality or quantity type (see. Chowdhury, Audretsch, & Belitski, 2019; Xie et al., 2021). In this study, the "Kirznerian" and "Schumpeterian entrepreneurship" concepts proposed by Szerb et al. (2019) are taken as a basis for selecting four outcome variables for the fs/QCA models. Kirznerian entrepreneurship is the term used to refer to all entrepreneurs, creative or not creative, whose primarily focus is on the identification and

exploitation of existing business opportunities under given technology restrictions rather than on the creation of new opportunities. Conversely, Schumpeterian entrepreneurship refers to those entrepreneurs that introduce radical innovations to the market that create new combinations of inputs and outputs (Lafuente et al., 2020). Researchers found distinguishing effects of these two types of entrepreneurships in regional economic growth and innovation. The contribution of Kirznerian type of entrepreneurship to economic performance is mainly enhanced market efficiency while Schumpeterian type of entrepreneurship is assumed to stimulate economic development by promoting innovations which constitutes the driving force of the shift of production curves (Szerb et al., 2017). So, when the aim is to measure "quality" entrepreneurship researchers choose for example innovative firms, gazelles, high-growth firms, firms from creative industry, or opportunity-seeking firm, etc. Conversely, when the aim is to measure "quantity-type" entrepreneurship, researchers employ for example indicators of number of firms, TEA, business density, self-employment rates, etc. In this context, both quality and quantity entrepreneurship are considered valid outputs of EEs. Based on this premise, four entrepreneurship output measures that account for these two types of entrepreneurships were selected as described below.

Quality "Schumpeterian entrepreneurship" measurement

I employ the regional young fast-growing enterprises (gazelles) and the ratio of creative industries as a proxy of "Schumpeterian entrepreneurship". The presence of high growth companies, or the so-called "gazelle" has been adopted as a measurement of innovative entrepreneurship start-ups. The regional "gazelles" are the percentage of the TEA businesses having high job expectation average (over 10 more employees and 50% employment growth in 5 years). Data for the calculation of this indicator comes from GEM. The second measurement of productive entrepreneurship is the ratio of firms in creative industries. Creative industries were earlier defined as "all those industries which have their origin in individual creativity, skill and talent and which have the potential for wealth and job creation through the generation and exploitation of intellectual property" (Department for Digital, Culture, Media & Sport, 2001, p.5). There is no perfect measurement for creative industries due to the wide definition of "creative" jobs with qualifications to be included within this sector (Jones et al., 2004). In this study, the ratio of firms which belong to creative sectors is calculated by the total employment in creative industries in a region divided by the regional economically active population. Creative industries are those within selected ISIC industrial classifications: J (information and communication), K (financial and insurance activities), L (Real estate

activities), M (professional, scientific, and technical activities), P (education), and R (arts, entertainment, and recreation).

Quantity "Kirznerian entrepreneurship" measurement

On the one hand, Total early-stage Entrepreneurial Activity (TEA) rate aim to measure a systems *quantity* related entrepreneurial output. The second selected indicator employed regional business density as an indicator of business formation rate. For this study, regional business density was calculated as total firms per region divided by the regional working-age population.

5.2.4. Research statements

Research propositions for analysis of necessity

While all ecosystems' elements have an impact in the ecosystems' performance, maybe some elements are more important than others. Some elements are so important, that the output doesn't happen in their absence. A necessary ecosystem element, in terms of QCA, is therefore that element or elements that must be present in the causal combinations that lead to high levels of entrepreneurship. Not to be misinterpreted, a necessary element is important enough to be a necessary part of the causal mix, but it might not be sufficient to trigger the outcome on their own. In the context of this study, necessity analysis will show whether all the elements of an ecosystems necessary for achieving high levels of regional entrepreneurship in urban, intermediate, and rural regions. According to the selected conceptual framework, the contributing causal factors of an ecosystem has been set to seven (selection choice explained in previous section, case selection): entrepreneurial attitudes, entrepreneurial opportunities, technology absorption, human capital-competition, innovation capacity, internationalisation capacity and financing. Rihoux and Ragin (2009) suggest that for each condition, researchers should formulate a clear proposition regarding its connection to the outcome.

In this study, I proposed that while all seven factors define EE, and all these factors affect the performance of EE in different ways, not all these factors are equally important for achieving an outcome. Therefore, the first aim of QCA analysis is to reveal the levels of necessity (weight/role) of each of these elements regarding the outcome variable by identifying whether there are "superset" factors that are always necessary for reaching high levels of an outcome.

In this line, the following necessity propositions were formulated:

Statement 1: The presence of regional population able to recognize and take advantage of entrepreneurial opportunities and the institutional environment supporting entrepreneurial *attitudes* is necessary for the presence of regional entrepreneurship.

Statement 2: The presence of high level of *regional opportunity startup* is necessary for the presence of regional entrepreneurship.

Statement 3: The presence of high levels of *regional technology absorption capacity* is necessary for the presence of regional entrepreneurship.

Statement 4: The presence of *highly educated and competitive regional human capital* is necessary for the presence of regional entrepreneurship.

Statement 5: The presence of *high regional innovation capacity* is necessary for the presence of regional entrepreneurship.

Statement 6: The presence of *a high level of regional internationalisation capacity* is necessary for the presence of regional entrepreneurship.

Statement 7: The *wide availability of inclusive regional financing and strong capital market* is necessary for the presence of regional entrepreneurship.

Statement 8: All ecosystem elements are equally necessary for achieving an outcome.

Research propositions for sufficiency analysis

After defining the necessary conditions from the set of seven variables, I turn to the ecosystem configurations that are sufficient for high levels of regional entrepreneurship. Sufficient configurations are those conditions, or combinations of conditions, that are part of a causal path leading to high level of regional entrepreneurship. In this case, sufficiency analysis will provide evidence about the synergy between elements, the way h*ow* entrepreneurial ecosystem elements combine to support entrepreneurship in urban, intermediate, and rural areas. The following research propositions about the characteristics of sufficient configurations have been formulated:

Statement 1 There are different ways (causal paths, or solutions) to a successful entrepreneurial ecosystem

Statement 2. The causal paths to successful entrepreneurial ecosystems are different in urban and rural regions.

Finally, two additional methodological research statement were added following the approach taken by Torres & Godinho (2021) and Xie et al. (2021) who distinguished between quality and quantity entrepreneurship and employed more than one outcome measurement variable in their QCA studies. The aim of these latter statements is to empirically evaluate the sensitivity of the fs/QCA results to different output's measurement.

Statement 1. The degree of necessity of the ecosystem elements is sensitive to the outcome measure variable employed.

Statement 2. Sufficient ecosystem configurations that lead to high levels of entrepreneurship are sensitive to the outcome measurement employed.

5.2.5. Dataset and data calibration

Values for each of the seven conditions and four outcome variables were calculated following the GEI index methodology and using data from various sources as detailed in Table A3 in the Appendix. The raw values for the model components and outcome components for the fs/QCA models of this study are presented in Table A4 in the Appendix.

Data calibration: data matrix and truth table

Generally, two techniques for calibrating conventional interval-scale variables as fuzzy sets, have been usually employed to address the calibration procedure: direct and indirect methods. The first method, the so-called direct method, is to specify three qualitative breakpoints: full membership, full non membership, and the crossover point. These breakpoints are then used to transform the original interval-scale values to fuzzy membership scores. The second method, the so-called indirect method, is to use external standards based on researcher's qualitative assessment of the degree to which cases with given scores on an interval scale are members of the target set. In this case, the researcher assigns each case into one of six categories and then uses a simple estimation technique to rescale the original measure so that it conforms to these qualitative assessments. At the end, both methods result in a fine-grained calibration of the degree of membership of cases in sets, with scores ranging from 0.0 to 1.0 (Ragin, 2008). In this study, the *direct* method was adopted.

The breakpoints for the seven conditions were calculated employing the percentiles of the sample distribution as follows: the 75^{th} percentile for full membership, the 50^{th} percentile for the crossover point and the 25^{th} percentile for the full non-membership. The reason to use of sample statistics to calculate the calibration thresholds is to assess regions relative to each

other. Under this reasoning, a region is only considered a member of a condition if it scores good (higher than the 75th percentile) on a given element compared to the other regions in the group and not to external benchmarks. For an overview of the chosen threshold and the quantitative anchors for input and output variables and descriptive statistics of the data for each of the three groups (urban, intermediate, and rural datasets), see Table A5 in the Appendix. The calibrated fuzzy-set data matrices for the three datasets, urban, intermediate, and rural regions can be found in Table A6 in the Appendix. Truth tables were built from these calibrated data matrices for each region type and for the four selected outcome variables with a sufficiency inclusion score of ≥ 0.8 and at least 1 case per row. Truth tables can be found in Table A7 in the Appendix.

Sensitivity test

Following methodological directions from Skaaning (2011), in this QCA study, sensitivity was checked by setting two alternative thresholds in the assignment of set-membership for the seven conditions. While many breakpoints are possible, I placed the alternative thresholds at levels near the original anchors. As the focus of this study was to identify the combination of EE elements that leads to the presence of *high* levels of entrepreneurship, alternative thresholds for the outcome were not set and tested. Table A8 in the Appendix provides an overview of the breakpoints originally used to translate the raw scores into fuzzy values (i) and the two alternative breakpoints (ii or iii). The original breakpoints for the seven conditions were calculated employing the percentiles of the sample distribution as follows: the 75th percentile for full membership, the 50th percentile for the crossover point and the 25th percentile for the full non-membership. The first alternative (i) thresholds are defined by the 80th, 50th and 20th percentile correspondingly. The second alternative (ii) thresholds are defined by the 90th percentile for full membership, the 75th percentile for the crossover point and the 50th percentile for the full non-membership. After performing fs/QCA necessity and sufficiency analysis using these more and less strict thresholds for membership I found that the necessity levels and the solutions remain qualitatively the same.

5.3. **Fs/QCA Results**

5.3.1. fs/QCA analysis of necessary conditions

I began the verification of necessary conditions for EEs in Colombian and Ecuadorian regions by testing if any of the seven selected conditions could represent necessary conditions for the four selected outcomes. A necessary condition is a condition that *must* be present for the outcome to achieve. So, for regions to achieve high levels of entrepreneurship they must always must a strong presence of these conditions. To be considered "necessary" or "almost always necessary", a condition must show a consistency score that exceeds the threshold of 0.90 or 0.80 and a non-negligible coverage (Ragin, 2008; Schneider & Wagemann, 2012) The following Tables 22, 23, and 24 summarize the results from necessity analysis for predominantly urban, intermediate, and predominantly rural regions. Necessary and almost always necessary conditions have been highlighted.

Table 22: Necessary conditions for high entrepreneurial performance in predominantly urban regions

	Quantity entrepreneurship				Quality entrepreneurship			
	TEA (fstea)		**BussDens (fsbussden)**		**gazelle**		**Creative**	
	Consistency	Coverage	Consistency	Coverage	Consistency	Coverage	Consistency	Coverage
att	0.578788	0.335088	0.697	0.391	0.753	0.454	0.984	0.530
opp	0.645455	0.348609	0.306	0.160	0.715	0.403	0.554	0.278
tech	0.269697	0.147595	0.356	0.189	0.956	0.546	0.671	0.342
HcandComp	0.303030	0.164474	0.228	0.120	0.808	0.457	0.642	0.324
innocap	0.418182	0.230384	0.453	0.242	0.953	0.548	0.870	0.446
international	0.409091	0.212934	0.216	0.109	0.994	0.539	0.629	0.304
finance	0.693939	0.386172	0.456	0.246	0.828	0.481	0.811	0.420
	~fstea		**~fsbussden**		**~fsgazelle**		**~Creative**	
att	0.454023	0.692982	0.457	0.705	0.439	0.660	0.358	0.561
opp	0.526437	0.749591	0.611	0.881	0.461	0.646	0.520	0.759
techadop	0.614943	0.887230	0.588	0.857	0.340	0.483	0.467	0.692
HcandComp	0.619540	0.886513	0.642	0.929	0.457	0.643	0.506	0.743
innocap	0.602299	0.874791	0.556	0.816	0.347	0.496	0.408	0.608
international	0.601149	0.824921	0.660	0.916	0.371	0.502	0.502	0.707
finance	0.471264	0.691400	0.532	0.789	0.381	0.550	0.413	0.622

Note. Shaded values with consistency score > .80, dark grey – always, light grey – "almost" always
Source: own elaboration

Table 22 presents the results of the fs/QCA analysis of necessary conditions for EE's high performance in predominantly urban regions. The consistency scores become higher as we move from quantity type outcomes to quality type outcomes. In urban regions, none of the

conditions can be considered necessary for high levels of TEA not for high levels of business density. Conversely, the fs/QCA identifies technology absorption, innovation capacity and internationalisation capacity as necessary and human capital - competition and finance as almost always necessary for high levels of gazelles. Entrepreneurial attitudes are always necessary while innovation capacity and finance are almost always necessary for high levels of creative industries.

Table 23: Necessary conditions for high entrepreneurial performance intermediate regions

	TEA (fstea)		BussDens (fsbussden)		gazelle		Creative	
	Consistency	Coverage	Consistency	Coverage	Consistency	Coverage	Consistency	Coverage
att	0.443956	0.269693	0.348	0.216	0.621	0.385	0.773	0.486
opp	0.498901	0.270238	0.451	0.250	0.554	0.306	0.620	0.348
tech	0.358242	0.212794	0.142	0.086	0.914	0.554	0.344	0.211
HcandComp	0.219780	0.128041	0.161	0.096	0.981	0.583	0.393	0.237
innocap	0.189011	0.113456	0.219	0.135	0.983	0.602	0.461	0.286
international	0.243956	0.136364	0.247	0.141	0.942	0.537	0.340	0.197
finance	0.413187	0.225150	0.521	0.291	0.828	0.460	0.490	0.277
	~fstea		~fsbussden		~fsgazelle		~Creative	
att	0.544105	0.831776	0.546	0.826	0.467	0.709	0.386	0.582
opp	0.575546	0.784524	0.595	0.804	0.543	0.735	0.563	0.757
tech	0.587773	0.878590	0.640	0.948	0.341	0.505	0.589	0.868
HcandComp	0.662882	0.971831	0.676	0.982	0.335	0.488	0.552	0.798
innocap	0.647162	0.977573	0.646	0.967	0.331	0.496	0.517	0.770
international	0.640175	0.900491	0.645	0.898	0.370	0.516	0.617	0.856
finance	0.608734	0.834731	0.575	0.781	0.445	0.605	0.563	0.762

Note. Shaded values with consistency score > .80
Source: own elaboration

Table 23 presents the results of the fs/QCA analysis of necessary conditions for EE's high performance in intermediate regions. The results are similar to those in urban regions, the consistency scores become higher as we move from quantity type outcomes to quality type outcomes. In intermediate regions, four conditions can be considered necessary for gazelles: technology absorption, human capital-competition, innovation capacity and internationalisation while finance is almost always necessary. Moreover, none of the conditions can be considered necessary for all the other three outcomes: TEA, business density and creative industries.

Table 24: Necessary conditions for high entrepreneurial performance in predominantly rural regions

	TEA (fstea)		BussDens (fsbussden)		gazelle		Creative	
	Consistency	Coverage	Consistency	Coverage	Consistency	Coverage	Consistency	Coverage
att	0.554430	0.307584	0.725	0.393	0.630	0.374	0.486	0.294
opp	0.620253	0.358187	0.425	0.240	0.398	0.246	0.695	0.437
tech	0.688608	0.415267	0.534	0.315	0.768	0.495	0.330	0.217
HcandComp	0.526582	0.286501	0.347	0.185	0.751	0.437	0.616	0.365
innocap	0.691139	0.405045	0.469	0.269	0.815	0.510	0.398	0.254
international	0.562025	0.318508	0.459	0.254	0.967	0.585	0.253	0.156
finance	0.658228	0.378457	0.521	0.293	0.825	0.507	0.333	0.208
	~fstea		~fsbussden		~fsgazelle		~Creative	
att	0.513433	0.724719	0.523	0.952	0.514	0.706	0.539	0.735
opp	0.506468	0.744152	0.506	0.959	0.592	0.846	0.452	0.642
tech	0.422886	0.648855	0.491	0.972	0.381	0.569	0.592	0.878
HcandComp	0.590050	0.816804	0.552	0.986	0.460	0.620	0.539	0.720
innocap	0.433831	0.646884	0.508	0.978	0.375	0.545	0.587	0.846
international	0.502488	0.724534	0.529	0.985	0.346	0.485	0.653	0.910
finance	0.493532	0.721980	0.511	0.965	0.393	0.559	0.581	0.821

Note. Shaded values with consistency score > .80
Source: own elaboration

Table 24 presents the results of the fs/QCA analysis of necessary conditions for EE's high performance in rural regions. The results are similar to those in urban and intermediate regions, and the consistency scores become higher as we move from quantity type outcomes to quality type outcomes. In rural regions, one condition can be considered necessary for gazelles: internationalisation while innovation capacity and finance are almost always necessary. Moreover, none of the conditions can be considered necessary for all the other three outcomes: TEA, business density and creative industries.

In a sum, as can be seen from the summary Table 25, on the one hand, the ecosystem conditions are not equally necessary for all cases and, on the other hand, the level of necessity of each condition is contingent upon the geographical typology of the ecosystem and the desired outcome.

Table 25: Results of the fs/QCA analysis of necessary conditions (consistency scores)

Ecosystem condition	Quantity entrepreneurship						Quality entrepreneurship					
	TEA			Business Density			Gazelles			Creative industries		
	U	I	R	U	I	R	U	I	R	U	I	R
Entrepreneurial attitudes												
Attitudes	NN	NN	NN	NN	NN	NN	NN	NN	NN	0.98	NN	NN
Entrepreneurial abilities												
Opportunity startup	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN
Technology absorption	NN	NN	NN	NN	NN	NN	0.95	0.91	NN	NN	NN	NN
human capital-competition	NN	NN	NN	NN	NN	NN	0.80	0.98	NN	NN	NN	NN
Entrepreneurial aspirations												
Innovation capacity	NN	NN	NN	NN	NN	NN	0.95	0.98	0.81	0.87	NN	NN
Internationalisation	NN	NN	NN	NN	NN	NN	0.99	0.94	0.97	NN	NN	NN
Finance	NN	NN	NN	NN	NN	NN	0.82	0.82	0.83	0.81	NN	NN

Note: NN Not necessary (consistency score < 0.80). Highlighted = necessary conditions (consistency score > 0.80). U = predominantly urban, I = intermediate, R = predominantly rural.
Source: own elaboration

The results of fs/QCA analysis of necessary conditions indicate that:

a) No single condition was necessary for explaining high levels of "quantity" entrepreneurship (in this case measured as regional business density and regional TEA rate). This is true for all types of ecosystems (predominantly urban, intermediate, and predominantly rural). The result from the analysis of necessary conditions displays consistency scores lower than 0.80 for all seven selected ecosystem's conditions. Therefore, indicating that that quantity entrepreneurship can be achieved in a region even with ecosystems where these components work at minimal levels.

b) Ecosystem conditions become necessary when the expected outcome is high levels of "quality" entrepreneurship (in this case measured as regional share of gazelle firms or regional share of creative industries). This is true for all types of ecosystems (urban, intermediate, rural). This study found that supporting the rise of high levels of productive entrepreneurship is "demanding" in terms of minimum necessary conditions. Unlike quantity entrepreneurship, achieving productive outputs require ecosystems where several components *must* be present for the outcome to occur. These results provide empirical confirmation to previous findings of Torres & Godinho (2021) who investigated the levels of necessity of digital entrepreneurial ecosystems in the European Union and also found that EEs elements are indeed important for producing very high-quality outputs (measured by the number of new unicorns and the number of digitally-enabled unicorns). But, for new business creation, the ecosystem elements do not

have the same importance. Importantly, results from my study show that this statement is true for regional EEs in developing countries and it is also true for urban and rural regions as well.

c) In this vein, *a high presence of gazelle firms is the "hardest" most challenging ecosystem's outcome to achieve*. Urban and intermediate regions aiming to support the rise of high rates of regional gazelle firms require an almost all-round ecosystem where five out of the seven ecosystem conditions are necessary (necessity consistency score ≥ 0.80). High rates of regional gazelle firms cannot be achieved in the absence of well-developed technology absorption capacity, human capital-competition, innovation capacity, internationalisation capacity, and regional financial availability. This finding is somewhat in accordance with earlier propositions sustaining that the higher the entrepreneurship output, the more convergence there is to an all-round entrepreneurial ecosystem where are the ecosystem's components must be well developed (Schrijvers, Stam and Bosma 2021). Interestingly, In the case of predominantly rural regions, only *aspirations-related* pillars, innovation capacity, internationalisation capacity, and financial availability are necessary conditions for high rates of regional gazelle firms.

Evaluation of Necessity fs/QCA *propositions*

Based on data from fs/QCA analysis of necessary conditions, Table 26 presents a summary of the results and its relationship with the necessity propositions.

Table 26: fs/QCA Necessity propositions

Statement	Results
"The presence of regional population able to recognize and take advantage of entrepreneurial opportunities and the institutional environment supporting entrepreneurial attitudes is necessary for the presence of regional entrepreneurship"	This statement is true only for achieving high levels of creative industries in urban regions. High levels of entrepreneurial attitudes are not necessary for high levels of quantity entrepreneurship nor for high levels of gazelle firms.
"The presence of high level of regional opportunity startup is necessary for the presence of regional entrepreneurship"	This statement is not true for any case. High levels of opportunity startup are not necessary for achieving quality nor for achieving quantity entrepreneurship.
"The presence of high levels of regional technology absorption capacity is necessary for the presence of regional entrepreneurship"	High level of technology absorption capacity is necessary only for gazelles in urban and intermediate regions.

The presence of high levels of Human capital and competition is necessary for the presence of regional entrepreneurship.	High level of human capital-competition is almost always necessary for gazelles in urban regions while it is always necessary for gazelles in intermediate regions. Human capital-competition capital is not necessary for the presence of quantity entrepreneurship.
The presence of high regional innovation capacity is necessary for the presence of regional entrepreneurship.	Innovation capacity is always necessary for gazelles in urban and intermediate regions and almost always necessary in rural regions. High level of innovation capacity is almost always necessary for creative industries in urban regions. Quality entrepreneurship does not require the necessary presence of high regional innovation capacity.
The presence of a high level of regional internationalisation capacity is necessary for the presence of regional entrepreneurship.	High level of internationalisation is always necessary for the presence of gazelle firms in urban, intermediate, and rural regions. Internationalisation is not necessary for achieving quantity entrepreneurship.
The wide availability of inclusive regional financing and strong capital market is necessary for the presence of regional entrepreneurship.	The presence of inclusive financing and a strong regional capital market is almost always necessary for gazelle firm in urban, intermediate, and rural regions. Financing is also always necessary for creative industries in urban regions. Financing is not necessary for achieving quantity entrepreneurship.
All ecosystem elements are equally necessary for achieving an outcome	This is false for all regions and outputs. Ecosystem elements' degree of necessity are different within and among regions. Furthermore, elements' degree of necessity also varies depending on the outcome measurement employed.
The degree of necessity of the ecosystem elements is sensitive to the outcome measure variable employed (Methodological proposition1).	This is true in all cases. The degree of necessity of the ecosystem elements is different for business density, TEA rates, gazelle firms and creative industries share.

Source: own elaboration

5.3.2. fs/QCA analysis of sufficient conditions

Having completed the analysis of necessity, the next methodological step was to identify the configurations of ecosystem's factors required for high level of quantity and quality entrepreneurship. The next section presents the causal paths, "recipes" that lead to a high level of regional business density, TEA rate, gazelle firms and share of creative industries in predominantly urban, intermediate, and predominantly rural regions followed by an explanation of the logic behind these paths. soft

At this stage, it is suggested that researchers should create a table that will show both *core and peripheral condition*. Core conditions are those conditions present in both parsimonious and intermediate solutions and the evidence indicates a strong causal relationship with the outcome of interest. Conversely, peripheral conditions are present only in the intermediate solution and the evidence for a causal relationship with the outcome is weaker.

The results of sufficiency analysis in this study are presented in the form of the so called "Fiss-style tables" where black circles (●) indicate the presence of a condition and the circle with a cross (⊗) indicate its absence. Large circles distinguish core conditions from peripheral ones (Fiss, 2011). In fs/QCA, a researcher usually concludes that a model is informative when consistency is above 0.74 and coverage is between .25 and .65 (Ragin, 2008; Woodside, 2013). In Fiss-style tables, each column represents an alternative causal recipe, that is, a combination of conditions that associate to the respective outcome.

Paths for high levels of "Quantity entrepreneurship"

Drawing on the existing literature (Content et al., 2020; Lafuente et al., 2020), in this study I employed regional TEA as a proxy for *entrepreneurial activity.* I considered this a suitable ecosystem quantity-type output indicator. As displayed in Table 27 the results of the fs/QCA shows that high levels of regional TEA in *urban regions* are led by a highly developed entrepreneurial attitudes (solutions 1,2,3,7,8) or by a combination of the presence of opportunity startup and finance availability (solutions 4-6). Solution 1,2,3,7,8 share a high presence of entrepreneurial attitudes combined with low innovation capacity (1), low human capital-competition and finance (2), opportunity startup and finance (3), low internationalisation and finance (7) and low technology absorption and finance (8). This path seems to be consistent with other research which found that in high TEA countries in Latin America, levels of entrepreneurial activity relates to entrepreneurial attitudes (entrepreneurial intention, perceived entrepreneurial capabilities combines with lack of fear of failure) (Beynon et al., 2016). The case with greater membership in these configurations is the Ecuadorian province Guayas and the Colombian department of Meta. These causal paths sufficiently explain a very high regional TEA performance by 62.4% of the total cases and cover 68.8% of them.

For *intermediate regions*, there are five sufficient configurations. Solution 1a to 4a share a high presence of entrepreneurial attitudes and finance and low internationalisation (1a), low innovation capacity(2a), low human capital-competition (3a), and low opportunity startup(4a). Finance is a core condition in solutions 1a to 3a while for solution 4a both entrepreneurial attitudes and financing are core conditions. Solution 5a includes the presence of high entrepreneurial attitudes, high opportunity startup and technology absorption and low finance. In this solution, opportunity startup and technology absorption are core conditions. These five causal paths sufficiently explain a very high regional TEA performance by 59.2%

of the total cases and cover 41.8% of them. The cases with greater membership in these configurations are the Ecuadorian provinces of Imbabura and Santa Elena.

For *rural regions*, there are six sufficient configurations that explain a very high regional TEA. Solutions 1b to 5b share the presence of high level of human capital-competition and finance combined with low innovation capacity (1b), low internationalisation (2b), low opportunity startup and technology absorption (3b), low entrepreneurial attitudes (4b), and low entrepreneurial attitudes and technology absorption (5b). Solution 6b includes the presence of five of the seven conditions: entrepreneurial attitudes, opportunity startup, technology absorption, innovation capacity, internationalisation combined with low finance. Human capital-competition remains indifferent for the outcome in this case. The presence of finance is a core condition for 5 of the 6 solutions (1b-5b) while innovation capacity is core for solution 6b. The case with greater membership in these configurations is the Ecuadorian provinces of Napo and Chimborazo. Overall, it can be evidenced a key role of the presence of finance for all three types of regions. Together, these solutions sufficiently explain a very high regional TEA performance by 64.9% of the total cases and cover 39.7% of them.

Interestingly, taken together these causal paths suggest that, unlike in cities, high rates of TEA in rural regions are led by entrepreneurs' abilities and entrepreneurial aspirations while the presence of entrepreneurial attitudes remain indifferent or peripheral for the outcome. This is good news for rural regions which lack elements that are related to the population attitude and therefore are particularly hard to change, such as opportunity perceptions, startup skills, risk acceptance, networking, or cultural support. In a sum, the results suggest an important role of entrepreneurial attitudes and opportunity startup in urban regions and an overarching role of finance for high levels of TEA in intermediate and rural region. These results broadly supports the work of other studies in this area confirming the positive role of access to financial capital and financial inclusion in stimulating business opportunities and business formation (Audretsch, 2007; Cassar, 2004; Fareed et al., 2017). Overall, it can be observed that high rate of TEA in are led by relatively *simpler* recipes where the presence of only one, two or maximum three well developed factors are in most cases enough to lead to the outcome. It can thus be suggested that TEA is a relatively easy-to-achieve entrepreneurial output to achieve and can be sustained almost naturally in every ecosystem type (urban, intermediate, and rural).

Table 27: Configurations for achieving a high level of quantity of regional entrepreneurship (regional TEA)

	High TEA																		
	Urban								Intermediate					Rural					
	1	2	3	4	5	6	7	8	1a	2a	3a	4a	5a	1b	2b	3b	4b	5b	6b
Entrepreneurial attitudes																			
Attitudes	●	●	●				●	●	•	•	•	●	•				⊗	⊗	•
Entrepreneurial abilities																			
Opportunity startup			⊗	●	●	●						⊗	●		⊗	⊗			•
technology absorption						⊗		⊗					●			⊗		⊗	•
Human capital-competition		⊗									⊗			•	•	•	•	•	
Entrepreneurial Aspirations																			
Innovation capacity	⊗				⊗					⊗				⊗					●
Internationalisation				⊗			⊗		⊗						⊗		⊗		•
Finance		⊗	⊗	●	●	●	⊗	⊗	●	●	●	●	⊗	●	●	●	●	●	⊗
Raw coverage	0.367	0.309	0.312	0.306	0.464	0.439	0.300	0.309	0.226	0.226	0.222	0.143	0.200	0.203	0.210	0.228	0.195	0.228	0.175
Unique coverage	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.191	0.000	0.008	0.000	0.000	0.000	0.154
Consistency	0.699	0.667	0.831	0.871	0.874	0.873	0.656	0.829	0.725	0.640	0.765	0.528	0.705	0.593	0.874	0.900	0.885	0.918	0.627
Overall solution coverage	0.688								0.418					0.397					
Overall solution consistency	0.624								0.592					0.649					
Regions	Guayas (ECU)	Guayas (ECU)	Guayas (ECU)	Meta (COL)	Meta (COL)	Meta (COL)	Guayas (ECU)	Guayas (ECU)	Imbabura (ECU)	Imbabura (ECU)	Imbabura (ECU)	Imbabura (ECU)	Santa Elena (ECU)	Napo (ECU)	Napo (ECU)	Napo (ECU)	Napo (ECU)	Napo (ECU)	Chimborazo (ECU)

Source: own elaboration

It can be seen from the data in Table 28 that for high level of regional *business density in urban regions* there is one only sufficient configuration (~opportunity startup*~ human capital-competition → high business density) where most of the components are indifferent for the outcome. The cases with greater membership in this configuration are the Ecuadorian provinces Pichincha, Guayas, and Azuay. This solution sufficiently explains a very high regional business density by 75.6% of the total cases and cover 74.7% of them.

Table 28: Configurations for achieving a high level of quantity of regional entrepreneurship (regional business density)

	Business Density						
	Urban	Intermediate				Rural	
	1c	1d	2d	3d	4d	1e	2e
Entrepreneurial attitudes							
Attitudes		•	•	•	●	•	●
Entrepreneurial abilities							
Opportunity startup	⊗				⊗		⊗
Technology absorption						⊗	
Human capital-competition	⊗			⊗			
Entrepreneurial Aspirations							
Innovation capacity			⊗				
Internationalisation		⊗				●	•
Finance		●	●	●	●		
Raw coverage	0.747	0.219	0.219	0.215	0.137	0.352	0.295
Unique coverage	0.747	0.000	0.000	0.000	0.000	0.109	0.052
Consistency	0.756	0.718	0.634	0.758	0.520	0.708	0.452
Overall solution coverage	0.747	0.219				0.404	
Overall solution consistency	0.756	0.493				0.473	
Regions	Azuay (ECU), Guayas (ECU), Pichincha (ECU)	Imbabura (ECU)	Imbabura (ECU)	Imbabura (ECU)	Imbabura (ECU)	Bolívar (ECU)	Bolívar (ECU)

Source: own elaboration

These findings are consistent with the work of studies linking entrepreneurship with urban and agglomeration economies. The benefits of agglomeration in cities ultimately come from sharing, facilities, inputs, infrastructure, and labour pool. Agglomeration allows workers and employers better match their skills and need in a larger labour pool while firms can learn about new technologies and business practices more readily when located in a larger market (Duranton & Puga, 2004; Glaeser et al., 2012; Gordon & Richardson, 2012; Marshal, 2013;

Moretti, 2004). In this context, the pre-existence of these spatial arrangements matters for successful entrepreneurial discovery and implementation. In cities this "entrepreneurial base" is already working and the opportunity of implementing a business is more likely as they have ready access to key inputs such as human capital-competition, ICT infrastructure, access to local and international markets, innovation knowledge, or venture capital. Therefore, suggesting that, for urban regions it is possible to have a well-functioning ecosystem which can enable high rates of business density without high performance on all seven elements.

High level of *business density in intermediate regions* is led by a combination of presence of attitudes and finance. There are 4 sufficient configurations: attitudes*~international**finance+ attitudes*~innocap*finance + attitudes* ~HcandComp*finance+ attitudes*~opp**finance → high business density. Solutions 1d to 4d share the presence of high level of entrepreneurial attitudes and finance combined with low internationalisation (1d), low innovation capacity (2d), low human capital-competition (3d) and low opportunity startup (4d). Finance is a core condition in three of the 4 solutions while entrepreneurial attitudes is core for the last solution (4d). The case with greater membership in these configurations is the Ecuadorian province Imbabura. These solutions together sufficiently explain a very high regional business density by 49.3% of the total cases and cover 21.9% of them. These results seem to be consistent with other research which found that access to capital for firms in smaller cities is more constraining than for those located in bigger cities and financings institutions prefer to locate in bigger cities rather than intermediate size cities (Lee & Luca, 2019). Ecuador and Colombia are developing countries and thus still suffering from a "big-city bias" in access to finance. In this context, for intermediate-type regions, a proper access to finance is a key driver of entrepreneurial success.

For high level of regional *business density in rural regions* there are two sufficient configurations. The first configuration (1e) includes the presence of high entrepreneurial attitudes and internationalisation combined with low level of technology absorption. The second configuration (2e) also includes the presence of high entrepreneurial attitudes and internationalisation, and it is characterized by low opportunity startup. Internationalisation is a core condition for solution 13 while entrepreneurial attitudes is a core condition in solution 2e. The case with greater membership in these configurations is the Ecuadorian province Bolívar. These solutions together sufficiently explain a very high regional business density by 47.3% of the total cases and cover 40.4% of them.

The first configuration reflects the nature of businesses in rural regions in Colombia and Ecuador. Regular rural businesses are mainly in field of agriculture production, retail sales, and services like tourism or restaurant and accommodation. Agricultural production systems in Latin America still face various problems of access to information (opportunity perceptions), productive assets and services, connection of family producers with different markets (networks), physical infrastructure, communications, and dependency intermediaries (ECLAC et al., 2021). Thus, regions that have overcame these constraints and have reached a sufficient level of positive entrepreneurial attitudes among rural populations are able to hold high levels of business density. The case with greater membership in these configurations is the Ecuadorian province Bolívar. This result also accords with earlier observations which showed that in Bolivar province, entrepreneurial attitude, particularly cultural support and strong endogenous community networking are among the most important aspects of entrepreneurial activity in this region (Barragán & Ayaviri, 2017).

The second path for high levels of rural business density in rural regions suggests that high level of internationalisation is needed. This result is in keeping with previous studies in localisation economies that demonstrated that the location of industrial activities in a geographical area gives rise to certain benefits among which is the rise of subsidiary businesses in the region (Ravix, 2014). Another type of business present in rural regions in Ecuador and Colombia are manufacturing services which mainly serve as complementary service providers or subcontractors of bigger, most likely transnational companies located in rural settings. This is evident in the case of rural provinces of Ecuadorian Amazon region, where a great part of the rural businesses is fostered to provide supporting services such as transportation and warehousing, food, accommodation, industrial maintenance to international oil companies that have been operating in these provinces since 1972 (Petroecuador, 2019).

Paths for high levels of "Quality entrepreneurship"

The results of the fs/QCA for high levels of quality entrepreneurship, measured trough two indicators; regional gazelles and regional creative firms, are presented below. First, following Stam, (2018) approach, I used the share of high growth "gazelle" firms in a region as a proxy for productive entrepreneurship. Evidence from research on gazelles, high growth, high-impact firms in developed economies reveal that gazelles exist in all industries (i.e., services, manufacturing, knowledge intensive business sector) and are also found in different locations (states, cities, smaller towns, counties) and it is increasingly recognized that they are

not limited to high-technology industries (Zoltan Ács et al., 2008; Du & Temouri, 2015; Henrekson & Johansson, 2010; Segarra & Teruel, 2014; Stam, 2005). Gazelles are defined as those businesses that have a high job expectation average (over ten more employees and 50% employment growth in five years).

Table 29: Configurations for achieving a high level of quality of regional entrepreneurship (share of regional gazelles).

	Gazelle						
	Urban		Intermediate		Rural		
	1f	2f	1g	2g	1h	2h	3h
Entrepreneurial attitudes							
Attitudes		•	•		•	●	
Entrepreneurial abilities							
Opportunity startup	•		⊗	⊗		⊗	
technology absorption	●	•	•	•	⊗		●
Human capital-competition		•	●	●			●
Entrepreneurial Aspirations							
Innovation capacity	•	•	●	●			•
Internationalisation	•	●	●	●	●	●	●
Finance	●	●		•			•
Raw coverage	0.561	0.578	0.254	0.325	0.289	0.491	0.649
Unique coverage	0.206	0.224	0.121	0.192	0.017	0.024	0.398
Consistency	0.985	0.961	0.992	0.848	0.635	0.821	1.000
Overall solution coverage	0.785		0.446		0.908		
Overall solution consistency	0.971		0.881		0.769		
Regions	Cundinamarca (COL), Valle del Cauca (COL)	Cundinamarca (COL), Atlántico (COL)	Sucre (COL)	Magdalena (COL)	Bolívar (ECU)	Bolívar (ECU)	Guajira (COL)

Source: own elaboration

As can be seen from Table 29, for *urban regions*, there are 2 sufficient configurations (1f, 2f). The first configuration is based on the presence of opportunity startup, technology absorption, innovation capacity, internationalisation, and finance while entrepreneurial attitudes and human capital-competition are conditions that "doesn't matter" for the outcome. The second configuration is an almost all-round path and requires the presence of six of the seven conditions: strong entrepreneurial attitudes, technology absorption, human capital-competition, internationalisation capacity and availability of financing

(opp*tech*innocap*internationalisation*finance+
attitudes*tech*HcandComp*innocap*internationalisation*finance → high rate of gazelles). Technology absorption and finance are core condition in the first solution (1f) while internationalisation and finance are core for the second solution (2f). The cases with greater membership in these configurations are the Colombian departments Valle del Cauca, Cundinamarca, and Atlántico. These solutions together sufficiently explain a very high regional gazelles by 97.1% of the total cases and cover 78.5% of them.

These results can also be interpreted in line with the theory of the effect of urban economies in entrepreneurship. It was argued before that the agglomeration of talent, capital and firms in predominantly urban regions facilitates quantity entrepreneurship. However, agglomeration implicit positive effects are not enough sufficient catalyst for high levels of gazelles. High level of gazelles requires an ecosystem where most of the factors need to be present and well developed. These results seem to be consistent with other research which found that gazelles' formation and scale-up activity in developing countries need a highly supportive ecosystem where finance, knowledge, marketization in the local economy, and demand are crucial (Zhang & Roelfsema, 2020). Findings of this study suggest that high growth firms in cities need more than the already existent supportive set of framework conditions, but special policy effort is required to create a distinctive type of environment where most of the ecosystem's elements perform excellent. These results reflect those Mason & Brown (2014) who also argue that growth-oriented entrepreneurship requires distinguishing features of entrepreneurial ecosystems.

From a closer view of the core conditions, we can see that the first causal path for successful ecosystem is one driven by strong technological absorption capacity (defined by the combination of the proportion of entrepreneurs in the medium- or high-tech sector in a region and indicators of access to latest technologies and internet among the regional population) combined with strong finance capital access. In this case, regional population's entrepreneurial attitudes are indifferent for the output. The second scenario for successful ecosystem is one causal path based on strong internationalisation capacity combined with strong finance capital access. In this study, "finance" indicator was measured by the availability of business angels in the region and the average of regional penetration of financial access and national depth of capital market. The finding that finance play a key role for the development of urban gazelles can be explained by the high growth nature of gazelle firms. Gazelles are essentially innovative firms and innovative performance is a competitive advantage, a key driver and an important strategic skill to achieve gazelles' characterizing "above average" growth (Anton, 2019; Demir

et al., 2017; Goedhuysa & Veugelers, 2012; Hölzl, 2009). Fast growth requires special funding capabilities and opportunities thus financial access plays an essential role in gazelles' likelihood of growth, especially when the local credit conditions are weak (Brown & Earle, 2017; Krasniqi & Desai, 2016; Moreno & Casillas, 2007).

However, access South American entrepreneurs face diverse and complex barriers in access to finance. On the one hand, in Latin America, access to bank credit is in general limited and entrepreneurs face high transaction costs and barriers due to the newness of businesses. Consequently, there is a more negative attitude of Latin American entrepreneurs toward local financial institutions due to the generalised perception that the supply of credit is inadequate and support information is not abundant (García Pérez De Lema et al., 2013; Kantis et al., 2005). Nevertheless, in Latin America, banking system is still a relevant source of funding for firms (including high-growth entrepreneurs) because angel investor environment, and to a lesser extent the incubation and venture capital environment, are not well developed in the region either (Llisterri & García-Alba, 2008). In this line, Naranjo, Matíz, Hernández, & Mogollón, (2011) add that, in Colombia, it is relatively simple to create a business, however, low entrepreneurial capacity development and insufficient access to financing is a key constraint for survival and high growth of firms. Our results also suggest that regional policy efforts for supporting high levels of gazelles in urban regions must focus on compensating for the weak informal venture capital (low business angels) by facilitating access to formal finance for high growth firms by for example, improving regional penetration of financial access.

Achieving high levels of *gazelle firms in intermediate regions* also requires complex configurations of elements. For intermediate regions there are two solutions which are variations of the same type because human capital-competition, innovation capacity, and internationalisation are core in both. Solution 1g includes the presence of high entrepreneurial attitudes, technology absorption, human capital-competition, innovation capacity and internationalisation combined with low opportunity startup. In this case, finance remains indifferent for the outcome. The second solution includes the presence of high technology absorption, human capital-competition, innovation capacity, internationalisation and finance combined with low opportunity startup. In this case, entrepreneurial attitudes, is a condition that "doesn't matter" for the outcome. In both solutions, human capital-competition, innovation capacity and internationalisation are core conditions. The cases with greater membership in these configurations are the Colombian departments Sucre and Magdalena. These solutions together sufficiently explain a very high regional gazelles by 88.1% of the total cases and cover 44.6 % of them.

For rural regions, there are 3 sufficient configurations (1h-3h). The first configuration (1h) is based on the presence of high entrepreneurial attitudes and strong internationalisation capacity combined with low technology absorption. The second configuration (2h) combines presence of entrepreneurial attitudes and internationalisation capacity combined with low opportunity startup. The third configuration (3h) is relatively more complex and includes the presence of high level of technology absorption, human capital-competition, innovation capacity, internationalisation, and finance. In this case, entrepreneurial attitudes and opportunity startup remains indifferent for the outcome. The cases with greater membership in these configurations are the Colombian departments Guajira, Amazonas and Cauca, and the Ecuadorian province of Bolívar. These solutions together sufficiently explain a very high regional gazelles by 76.9 % of the total cases and cover 90.8 % of them.

The core role of internationalisation for paths in intermediate and rural regions suggest that firms located in non-urban regions in South America can only become "gazelles" by sustaining their growth in external markets. This is in line with earlier studies about the determinants of high growth firms that suggest that the market orientation of the firm may also influence its growth performance and an orientation towards international markets combined with prior international experience for the entrepreneur enhances the firm growth performance (Audretsch, 2012). Most developing countries in Eastern Europe, Latin America or Africa, do not have a sufficient domestic market to support all high growth ventures dedicated exclusively to serving local markets (Lecuna et al., 2017) and thus export orientation of ventures becomes a crucial determinant for firm growth. Nevertheless, Latin America has the lowest rate of exporter entrepreneurs and only few companies enter export markets in contrast to Asia, Middle East or even Africa (Lederman et al., 2013). Low exporting capacity is particularly evident in Ecuador with most of entrepreneurs serving only the local market (Arteaga & Lasio, 2009). Evidence from "born global" companies, those young firms that export at least 25% of their products, in Colombia suggest that not only the internal features of the entrepreneur and the firm itself but also regional features such as economic conditions, regional exporting intensity (sectoral exporting tradition) supports firms internationalisation (Escandon & Hurtado, 2014). Thus, it makes sense that high levels of internationalisation in a region is a salient manifestation and an essential feature to sustain high levels of regional gazelles.

There is a growing body of literature that recognises the presence of *creative industries* and the "creative class" as an essential component of regional economic development (regional labour productivity) (Florida et al., 2008; Higgs & Cunningham, 2008) and the role of entrepreneurial activity as the channel through which new ideas from these creative entrepreneurs transfer into economic growth (Audretsch & Belitski, 2021; Boschma & Fritsch, 2009; Mueller, 2006; Schulte-Holthaus, 2018). Creative workers such as scientists, engineers, designers, artists, and entertainers

establish an emerging creative class of highly educated and skilled entrepreneurial people who are a driving force in regional economy (Florida, 2002). Creative entrepreneurs and organisations have been portrait as potential creators of productive entrepreneurship through the materialisation of creative production and generation of new business models based on creativity, high levels of novelty and innovation which subsequently translate in various forms of cultural and economic capital (Kaufman & Sternberg, 2015; Townley & Gulledge, 2015). Therefore, I defined the regional share of creative industry firms as a proxy for quality, "Schumpeterian" entrepreneurship because creativity and innovation are inherent to these kind of firms, and creativity is central to generate localised innovation and value through productive entrepreneurship (Boix et al., 2014; Marinova & Borza, 2015; Schumpeter, 1934). Fs/QCA results are summarized in the following table.

Table 30: Configurations for achieving a high level of quality of regional entrepreneurship (share of creative industries)

	Creative Industries											
	Urban				Intermediate						Rural	
	1i	2i	3i	4i	1j	2j	3j	4j	5j	6j	1k	2k
Entrepreneurial attitudes												
Attitudes	●	●	●	●	•	•	●	•	•	•		•
Entrepreneurial abilities												
Opportunity startup				●			⊗	●		•	●	•
Technology absorption			⊗								⊗	
Human capital-competition		⊗				⊗		●		●		
Entrepreneurial Aspirations												
Innovation capacity	●	●	●	•	⊗			●		●		●
Internationalisation	⊗								⊗	⊗		•
Finance	●	●	●	●	●	●	●	⊗	●			⊗
Raw coverage	0.251	0.283	0.270	0.469	0.231	0.234	0.159	0.187	0.231	0.159	0.550	0.179
Unique coverage	0.000	0.000	0.000	0.322	0.000	0.013	0.004	0.032	0.000	0.000	0.427	0.056
Consistency	0.653	0.879	0.680	0.929	0.677	0.833	0.610	0.889	0.768	0.915	0.690	0.694
Overall solution coverage	0.606				0.352						0.606	
Overall solution consistency	0.805				0.648						0.662	
Regions	Pichincha (ECU)	Pichincha (ECU)	Pichincha (ECU)	Cundinamarca (**COL**)	Imbabura (ECU)	Imbabura (ECU)	Imbabura (ECU)	Loja (ECU)	Imbabura (ECU)	Loja (ECU)	Sucumbíos (ECU)	Chimborazo (ECU)

Source: own elaboration

As can be seen from the Table 30, there are four configurations for high levels of regional share of *creative industries in urban regions*. These solutions together sufficiently explain a very high regional performance by 80.5 % of the total cases and cover 60.6 % of them. Solutions 1i-3i share strong entrepreneurial attitudes, high innovation capacity and availability of financing combined with low internationalisation (1i), low human capital-competition (2i) and low technology absorption (3i). All components of solutions 1i-3i are core. The fourth configuration is quite similar, but it includes the presence of strong entrepreneurial attitudes, opportunity startup, innovation capacity and high level of financing. In this case, innovation capacity is a periphery condition while entrepreneurial attitudes, human capital-competition and internationalisation remain indifferent for the outcome. The cases with greater membership in these configurations are the Colombian department Cundinamarca and the Ecuadorian province Pichincha.

These results confirm the major relevance of population's social tolerance and openness, personal networks (personal links, professional and social relations and other types of local social connections related to people's life course) and economic incentives (i.e., housing affordability, income, and job opportunities) for creative entrepreneurs' agglomeration in urban areas (Boschma & Fritsch, 2009; Cerisola, 2018; Hausmann, 2010; Musterd & Gristai, 2012; You & Bie, 2017). Results also suggest that besides, entrepreneurial attitudes, local innovation capacity, opportunity startup and accessing to bank financing are also necessary for the urban creative sector. These results are in keeping with previous studies from developing countries, which also suggest that while a good cultural environment (art, cultural, tourism input and well living environment) are powerful means to attract the creative class, a region aiming to retain creative class should build a climate with sufficient fair business competition, openness, universities, and high-tech industries (Yu & Tan, 2022). Moreover, an improved bank financing has been also earlier identified as crucial for creative sector firms' sustainability (Borin et al., 2018).

Although the high concentration of creative class is generally evidenced in big cities due to several factors that provide an adequate urban vitality for the creative class, a growing body of research have identified an increasingly important presence of creative firms in peripheral regions and trends of creative class diffusing outward from central cities, growing most rapidly in sparsely settled suburbs and smaller cities (Boix et al., 2014; Herslund, 2012; Lorenzen & Andersen, 2012; McGranahan & Wojan, 2007). *For intermediate regions*, there are six sufficient configurations that lead to high regional share of creative industries. These configurations sufficiently explain a high regional performance by 64.8% of the total cases and

cover 35.2% of them. Configuration 1j-3j share the presence of high entrepreneurial attitudes and finance combined with low innovation capacity (1j), low human capital-competition (2j) and low opportunity startup (3j). Finance is a core conditions for solutions 1j and 2j while attitudes and finance are core conditions for solution 3j. Solution 4j includes the presence of entrepreneurial attitudes, strong opportunity startup, human capital-competition, and high innovation capacity combined with low finance. In this case, internationalisation remains indifferent for the outcome and entrepreneurial attitudes stays as peripheric condition. Solution 5j combines the presence of entrepreneurial attitudes and high level of finance combined with low internationalisation. In this case, the presence of finance is a core condition, the presence of entrepreneurial attitudes stays peripheral, and all the other elements remain indifferent for the outcome. Solution 6j includes the presence of entrepreneurial attitudes, opportunity startup, high human capital-competition and high innovation capacity combined with low internationalisation. In this case, technology absorption and finance remain indifferent for the outcome. The cases with greater membership in these configurations are the Ecuadorian provinces Loja and Imbabura. In general, in *intermediate regions*, high level of creative industries can be held by two types of ecosystems: one with strong presence of entrepreneurial attitudes and finance, and one ecosystem characterized by the presence of entrepreneurial attitudes, opportunity startup, human capital-competition, innovation capacity, and the lack of financing.

Overall, the paths for high levels of creative firms in intermediate regions are similar to those in urban regions (i.e., receptive entrepreneurial attitudes among the population, high regional innovation capacity, opportunity startup and favourable access to finance are essential) but for intermediate regions, the presence of human capital-competition becomes core. In this study, human capital-competition is measured by a combination of indicators of regional educational level, quality of regional labour market in means of regional staff training and country labour freedom, combined with indicators of regional competitiveness. These results are in accord with recent studies indicating that although the creative class is most likely to form and expand in metropolitan areas, smaller metropolitan areas with large university systems will be able to support a large share of workers in the creative class due to the region's ability to produce information through higher education institutions (Lang, 2006). The regions in this configuration are the Ecuadorian provinces Loja and Imbabura.

Data from 2016-2017 indicates that Loja, a province with a total population of 506.035 inhabitants, held around 62500 university students which represents a share of 10.2% of national university enrolment in Ecuador while Imbabura' province, a province with a total

population of 457737 inhabitants held a total of 15555 university students (SENESCYT, 2018, 2020). Moreover, in 2014, “Yachay” an ambitious government research-oriented project aiming to create a hub for technological innovation and knowledge intensive businesses was established in Imbabura province. Yachay project included the settlement of several research centres and a public university called Yachay Tech University which has nowadays more than 1000 undergraduate students and it has become a top academic knowledge source (Gómez-Urrego, 2019; Universidad Yachay Tech, 2022).

For rural regions, there are two sufficient configurations. (1k, 2k). The first configuration is based on the presence of strong opportunity startup and low technology absorption while all the other conditions remain indifferent for the outcome. The second configuration is based on the presence of entrepreneurial attitudes, opportunity startup, strong innovation capacity, internationalisation capacity and lack of finance. In this case, only the presence of innovation capacity is a core condition. Moreover, technology absorption and human capital-competition remain indifferent for the outcome. The cases with greater membership in these configurations are the Ecuadorian provinces Chimborazo, Pastaza, and Sucumbíos. These configurations sufficiently explain a high regional share of creative industries by 66%of the total cases and cover 60.6% of them.

Finally, it is important to highlight an overall remark from the results on quality entrepreneurship: fostering high levels of creative industries (either attracting or developing creative class) require a considerably different approach than for “gazelles”. While high regional innovation capacity, technology absorption and internationalisation are key for gazelles in all type of regions, for high level of creative industries, the presence of technology absorption and internationalisation are essentially irrelevant.

Summary

Table 2 summarises the results presented in this section and its relation to the proposed sufficiency statements.

Table 31: fs/QCA Sufficiency propositions

Statement	Result
There are different ways (causal paths, or solutions) to a successful entrepreneurial ecosystem	This is true for all regions and almost all outcome measures employed, except by the case of business density in urban regions. In most cases, there are at least two different ways how a region can reach high levels of a selected entrepreneurial outcome.
The causal paths to successful entrepreneurial ecosystems are different in urban and rural regions.	This is true for all outcomes. No path is the same in any case. Each type of region, and each selected entrepreneurial outcome requires a unique configuration of ecosystem elements. Causal paths are substantially different among urban and rural regions.
Sufficient ecosystem configurations that lead to high levels of entrepreneurship are sensitive to the outcome measurement employed (Methodological proposition 2).	This is true for all cases. Ecosystems work differently to enable high levels of business density, high TEA rates, high share of gazelle firms, and high share of creative industries. No ecosystem configuration is the same among these four outcomes.

Source: own elaboration

6. Chapter 6: Theses of the doctoral dissertation

6.1. **Theses**

In this chapter, I present my research theses based on the results of three studies using different research methods: the literary analysis of rural entrepreneurship and rural entrepreneurial ecosystems and two conducted empirical analyses. My main objective was to understand whether urban and rural entrepreneurial ecosystems are different and, if so, in which ways. Each of my thesis is organised in the following way to be precise and detailed: First, I restate the research questions (RQ1, RQ2, RQ3), and the corresponding argumentations that provide answers to these questions. Next, I present the evaluation (accept or reject) of the associated Hypothesis (H1, H2, or H3) and then I formulate the pertinent thesis statement (T1, T2, T3).

In the first stage of my dissertation, literature on rural entrepreneurship was systematically assessed to build the theoretical background of the dissertation and to provide an answer to the following research questions:

RQ1. Are rural entrepreneurial ecosystems different?

RQ 1.1: Are rural entrepreneurial ecosystems elements different from those in non-rural (urban, regional, country, etc.) ecosystems?

RQ 1.2: Are there any elements of rurality that should be incorporated in rural EE measurement?

RQ 1.3 Can "universal" EE frameworks (fully) describe rural EE?

To determine to what extent rural entrepreneurial ecosystems are distinct from non-rural entrepreneurial ecosystems, the main themes arising from literature in rural entrepreneurial ecosystems were analysed against three well-known EEs models. Subchapter 2.4 synthesises literature review findings and explains the driving elements for rural entrepreneurship and whether these drivers are especially relevant for rural entrepreneurship or are these elements the same influencing urban entrepreneurship. In this regard, I found there are common, "place-neutral" factors mutually important for both urban and rural entrepreneurship, but there are three other "place/context-sensitive" factors that represent rurality not yet embedded in well-known EEs framework models (RQ 1.1). According to literature, rural poverty, territorial capital: natural and human resources endowments in rural locations, and peripheral location play an important role in rural entrepreneurship. However, these aspects are not yet covered in

standard EE framework models (RQ 1.2). Therefore, I assert that unless these place/context-sensitive factors are incorporated into standard EE frameworks, these remain "decontextualised" to rural contexts and, therefore, these can only *partially* reveal, measure, and evaluate *rural* EE (RQ 1.3).

Based on the findings of the systematic literature review in chapter 2 (subchapters 2.2, 2.4), *I accept Hypothesis 1 (H1)* and form the following Thesis 1 (T1):

THESIS 1

The well-known theoretical framework models were designed to primarily measure the EE performance of large, urbanized and developed regions. Consequently, these EE models can only partially be used for measuring the performance of rural EE as they do not consider many place-sensitive factors of rural areas: rural poverty, territorial capital: natural and human resources endowments in rural locations, and peripheral location. In this sense, these theoretical framework models of EE are not "contextualized" enough.

The second step to find out differences between urban and rural EEs was to empirically investigate which EE components hinder rural and urban entrepreneurship? (RQ2). To this end, I conducted an empirical study where I calculated regional GEI scores for ten macro regions in Colombia and Ecuador, and due to the availability of data, I could also calculate GEI scores for the urban and rural areas within six of these ten macro regions.

The results from this study show differences between urban and rural regions in three aspects. First, based on the Regional GEI scores in *section 4.3.1, rurality seems to decrease the overall performance of EEs*. In all cases, although belonging to the same macro region, rural ecosystems always score lower than urban ecosystems. Second, the GEI's pillar level data displayed in *section 4.3.3* reveals *specific bottleneck pillars for urban-rural regions.* Although the constraining pillars are mostly the same for both urban and rural regions within macro regions, there are partially different configurations of weaknesses and strengths for some urban and rural subregions. In Colombia, while process innovation is the least favourable pillar for most regions, for the Colombian Amazon region (which is fundamentally rural), the most severe bottleneck is technology absorption. In Ecuador, internationalisation is the most severe bottleneck for Costa Urban ecosystems, while for Costa rural ecosystems is high growth.

Third, looking at the relative position on the 1-to-3 categorisation of the least favourable pillars in section 4.3.4, its evident that each *configuration of the "top three" bottlenecks is*

unique in each urban and rural region. This implies that the *severity* of bottlenecks among urban-rural regions is different. Although similar pillars constrain regional systems of entrepreneurship, some ecosystem elements perform at different levels in the urban and rural areas within the same main region. An implication of the variation in scores and individual element performance within urban and rural regions is the possibility that the rural populations' ATT, ABT, and ASP differ from those of their urban counterparts. Therefore, the urban-rural nature of regions should be carefully considered, as each might require customised policy strategies to alleviate specific bottlenecks of urban and rural regions within a single macro region.

Based on the findings of the regionalised GEI empirical study results in chapter 4, *I accept Hypothesis 2 (H2)* and form the following Thesis 2 (T2):

THESIS 2

Thesis 2 (T2) The significance and performance of the pillars of entrepreneurial ecosystems significantly differ for urban and rural regions. First, rural ecosystems perform overall lower than their urban counterparts. Second, compared to urban regions, in rural areas other bottleneck pillars of EE determine entrepreneurship performance.

Having found insights about performance and bottlenecks differences between urban and rural EEs, the following step was to explore these ecosystems in a more complex way focusing on the natural complexity of EE factor interrelatedness. To this end I conducted an empirical study in the determinants of entrepreneurship in 42 urban and rural regions in Colombia and Ecuador using the fsQCA method. Results from this study provides an answer to the following research questions.

RQ3: Do EE configurations differ in rural and urban regions regarding high-level entrepreneurship?

RQ 3.1: What EE configuration(s) drive quantity/quality entrepreneurship in *urban regions* in Colombia and Ecuador?

RQ 3.2: What EE configurations drive quantity/quality entrepreneurship in *rural regions* in Colombia and Ecuador?

Before conducting sufficiency analysis to find the paths that lead to quality and quantity entrepreneurship, a necessity analysis was performed to evaluate the levels of necessity (weight) of each EE element and the ecosystems' configurations that result in high-level entrepreneurship are different in rural and urban regions. Subchapter 5.3 examines the conditions and sufficient configurations that lead to high levels of entrepreneurship in urban and rural regions. On the one hand, the results of fs/QCA necessity analysis, summarised in *section* 5.3.1, reveal that the ecosystem elements are not equally important *within the urban and rural ecosystems.* In *urban* regions, a well-developed technology absorption capacity, human capital-competition, innovation capacity, internationalisation capacity, and regional financial availability are necessary for high rates of regional gazelle firms. Moreover, entrepreneurial attitudes, innovation capacity and financial availability are necessary for supporting a high share of creative industries in urban regions. No single condition was necessary for explaining high levels of "quantity" entrepreneurship (regional business density and regional TEA rate).

In *rural* regions, high innovation capacity, internationalisation capacity, and regional financial availability are necessary for high rates of regional gazelle firms. Moreover, entrepreneurial attitudes, innovation capacity and financial availability are necessary for supporting a high share of creative industries in urban regions. No single condition was necessary for explaining high levels of regional creative industries, not for regional business density and regional TEA rate in rural regions. Together these results suggest that while all EEs elements are important for the outcome, their weight/role is different depending on the urban-rural context and the expected entrepreneurial outcome. Furthermore**,** the necessary condition analysis results also evidenced that quality increases the necessity of ecosystem elements in urban and rural regions. Therefore, regions attempting to spur high-quality entrepreneurship *must* meet several preconditions while achieving high levels of quantity entrepreneurship does not have any preconditions.

Results of fs/QCA sufficiency analysis in Chapter 5, section 5.3.2 show that both quantity and quality entrepreneurship results from different EE configuration(s) in urban regions and in rural regions (Questions 3.1 and 3.2). These characteristics of paths for high level *quality and quality* entrepreneurship in urban regions:

- High levels of *TEA* are fostered either by the presence of a well-developed entrepreneurial attitude among the population or by a combination of strong opportunity start-ups with broad access to financing.

- High levels of *business density* in urban region does not require high performing ecosystem pillars. Due to the pre-existence of and already working "entrepreneurial base" businesses are more likely as they have ready access to key inputs such as human capital-competition, ICT infrastructure, access to local and international markets, innovation knowledge, or venture capital. Consequently, for urban regions it is possible to have a well-functioning ecosystem which can enable high rates of business density business density without need of particularly high performing pillars.
- High level of *urban gazelles* requires an ecosystem where most ecosystem factors need to be present and well developed. Finance, technology absorption and internationalisation play a key role.
- Ecosystems drive high levels of *creative industries* in urban regions with the presence of supporting entrepreneurial attitudes, high regional innovation capacity, opportunity startup and favourable access to finance. Unlike gazelles, high entrepreneurial attitudes among the regional population are fundamental for creative industries.

These characteristics of paths for high level *quality and quality* entrepreneurship in rural regions:

- The presence of high level of human capital-competition and finance leads to high levels of regional *TEA.*
- The presence of either high levels of entrepreneurial attitudes or high levels of internationalisation capacity are essential for achieving a high level of *business density.*
- Regarding quality entrepreneurship, in rural areas, there are three alternative paths for high levels of *gazelles,* and the presence of internationalisation is core for them. Interestingly, unlike in urban regions, for rural regions, finance is not essential, but internationalisation becomes the main driver for gazelles.
- A high regional share of *creative industries* in rural regions is fostered by either the presence of high opportunity start-ups or by a more complex ecosystem with the presence of a high level of entrepreneurial attitudes, opportunity startup, innovation capacity and internationalisation capacity.

Based on the findings of fs/QCA results in chapter 5 (subchapter 5.5), *I accept Hypothesis 3 (H3)* and form the following Thesis 3 (T3):

THESIS 3

Thesis 3 (T3). The way how ecosystem elements combine and influence the occurrence of high entrepreneurship outputs in rural and urban regions is different. Both, the levels of necessity (weight) of each EE element and the ecosystems' configurations that result in high-level entrepreneurship are specific in rural and urban regions.

6.2. **Implications, research limitations and future research**

The findings of this dissertation suggest several implications on an academic level. First, since the empirical studies of this dissertation are focused in Colombia and Ecuador, the findings presented here contribute to the scarce body of literature on rural entrepreneurship and entrepreneurial ecosystems in developing economies (Cao & Shi, 2021; Miles & Morrison, 2018; Muñoz & Kimmitt, 2019; Pato & Teixeira, 2016). Although the results are restricted to a small sample of regions within these two countries, they provide an interesting case study for informing regional entrepreneurship development strategies and policies in South America. As presented in Chapter 3, south American countries are geographically, economically, and culturally alike. Therefore, insight from this study might be informative for researchers conducting similar studies in other South American countries. Second, findings about the unique mechanisms of urban-rural ecosystems corroborate the need of examining entrepreneurship and EE through the lens of complexity (Roundy et al., 2018; Spigel et al., 2020). Finally, findings about the operational distinctions between urban and rural ecosystems add to the literature suggesting caution that "one size does not fit all" when it comes to entrepreneurship policy, and rather than aiming for a generalisable, all-encompassing entrepreneurship policy, efforts should be oriented toward addressing local, regional needs and aims (Audretsch, 2019; Fabian & Achidi, 2015; Muñoz et al., 2020).

One of the major findings from this research was that there is not a single path to achieve high entrepreneurship outputs but rather, high levels of entrepreneurship are realized with a variety of entrepreneurial ecosystem configurations. These ecosystems' strategies, and the way ecosystem elements combine to spur entrepreneurship, are essentially distinctive and unique between urban and rural ecosystems. In this same line, successful ecosystems do not exhibit one common perfect configuration. Instead, it can be observed that each ecosystem "finds a way" to function with a unique combination of some or fewer elements at a high level. Remarkably, the composition of causal paths for rural entrepreneurship (both quality and

quantity) showed that rural ecosystems could function and succeed without having one or two elements at a high level. This finding contributes to Roundy's (2017) argument that thriving entrepreneurial communities can be developed in small towns that do not possess some – or many – of the "classic" pillars of entrepreneurial ecosystems in large metropolises. Consequently, policymakers interested in building successful ecosystems in their regions would not necessarily have to develop all competencies simultaneously. It can be the case when this approach is suitable (i.e., when the aim is to achieve high levels of quality entrepreneurship), and an almost all-around ecosystem is required to support entrepreneurship. However, these results provide evidence that most of the time, high performance of all ecosystems' elements is not necessary, suggesting that policy efforts can be rather optimised when directed towards those specific necessary and sufficient elements according to the entrepreneurial ecosystem.

A number of limitations need to be noted regarding the present dissertation. First, due to data availability possibilities, the definition of regions' typology is defined based on the share of rural population. Thus, interpretation must be accordingly. In relation to this, further studies could complement the validity of the present results by conducting similar investigation among smaller, more specific geographical units such as cities, smaller cities, and towns for instance. Lack of regional data was also a constrain for the calculation of some of the indicators and sometimes, national level data had to be combined with regional data. Consequently, this procedure reduced the variability in the data and might hide some important regional aspects. Second, I acknowledge that the derived results presented in this study are bounded by the selected countries conditions. Ecuador and Colombia are undoubtedly a relevant empirical context for studying ecosystems in developing economies in Latin America. However, further work is needed to conclude whether the results provided here, for Ecuador and Colombia are consistent with realities in other Latin American countries.

The pertinent questions regarding the use of fs/QCA (Baumgartner & Thiem, 2020; De Meur et al., 2009; Thiem, 2019) are the third source of limitations. The result of fs/QCA analysis in this study are delimited by the authors' choices of case and conditions, fuzzy set calibration thresholds, and the approach to identify core and periphery conditions. Although based on previous empirical evidence or theoretical arguments, these decisions are might not be free of criticism. Furthermore, since QCA is computationally and conceptually limited to small groups of conditions, this study was limited to include 7 causal conditions in fs/QCA

models. Ideally, including further constituent elements would improve the theoretical accuracy of the results, however this would turn QCA overcomplicated.

Finally, based on literature review, I found three distinguished factors of rurality which have an effect on rural entrepreneurship: rural poverty, territorial capital (human and natural resources) and peripheral location condition. Although acknowledging that these components are important for rural ecosystems, in this study, these factors were not added to the employed EE framework because the focus was not exclusively on exploring rural ecosystems but also comparing rural EE configuration to intermediate and urban ones. However, these three elements should be taken into account in future studies attempting to measure *only* rural EEs. In this same matter, literature review I found that rural poverty is directly linked to necessity-driven entrepreneurship. Therefore, empirically exploring whether this is the case in South American regions would add an important perspective for analysis.

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Appendices

Appendix A

Table A 1: Individual variable values for Colombian, Ecuadorian and Uruguayan regions

Country	Region	1*	2*	3*	4*	5*	6*	7*	8*	9*	10*	11*	12*	13*	14*
Colombia	Andina	65.19	60.78	65.24	33.58	78.66	75.55	4.50	44.36	41.88	67.30	38.62	39.60	68.63	344.89
	Caribe	65.14	58.40	66.45	32.85	79.34	74.38	3.40	37.15	37.65	61.57	32.48	35.49	55.77	184.40
	Pacífico	75.41	65.77	73.38	34.35	82.98	83.78	2.91	44.32	45.03	65.32	40.03	33.66	39.90	160.32
	Orinoquía	60.48	70.75	75.12	43.01	66.03	70.68	3.01	31.30	42.11	52.63	36.84	37.59	57.60	219.24
	Amazonía (Colombia)	69.16	58.31	72.43	34.76	69.30	71.58	1.05	36.56	58.95	48.42	51.58	29.47	85.11	347.75
	Andina Urban	63.59	60.10	65.28	33.63	76.35	76.57	4.65	45.74	40.89	68.45	38.90	41.70	72.35	392.67
	Andina Rural	68.56	62.17	65.14	33.47	83.36	68.98	3.54	35.51	48.30	59.92	36.83	26.06	44.83	187.18
	Caribe Urban	75.38	65.65	73.67	36.58	81.07	70.29	2.98	45.17	44.42	66.74	41.04	34.92	41.04	161.18
	Caribe Rural	75.45	65.92	73.01	31.46	85.48	61.68	2.34	37.38	50.00	53.74	31.78	23.36	30.43	130.29
	Pacífico Urban	64.76	58.01	66.87	32.67	77.09	74.71	3.44	38.75	35.37	62.02	35.28	37.44	59.03	214.67
	Pacífico Rural	65.71	58.97	65.85	33.11	82.64	72.43	2.70	27.57	51.35	58.92	15.68	23.78	35.29	104.84
Ecuador	Sierra	48.18	70.05	63.01	36.28	69.53	66.03	1.90	24.58	45.54	35.82	21.18	7.87	17.83	209.10
	Costa	56.06	75.51	67.38	39.82	70.71	65.97	1.21	20.21	53.26	43.48	18.35	4.91	10.67	216.00
	Amazonía (Ecuador)	49.96	71.59	62.40	33.79	69.19	60.27	0.89	14.73	56.25	28.57	13.39	1.34	14.84	44.26
	Sierra Urban	49.27	72.55	64.93	38.53	68.55	69.31	2.13	30.46	40.84	38.02	24.13	8.44	20.02	306.38
	Sierra Rural	46.57	66.28	60.12	32.88	71.03	60.69	1.53	15.00	53.19	32.22	16.39	6.94	14.37	54.69
	Costa Urban	56.72	78.59	68.81	43.17	69.52	67.97	1.29	23.75	50.55	44.62	18.75	5.71	11.32	118.58
	Costa Rural	54.40	67.60	63.75	31.35	73.80	59.30	0.95	8.43	62.32	39.55	17.01	2.23	8.47	420.62
Uruguay	Montevideo	39.87	58.39	68.07	33.14	53.91	79.25	8.30	30.03	43.58	50.71	41.25	18.68	31.06	78.31
	Interior	39.29	60.53	63.63	36.42	60.32	74.87	2.86	22.94	44.13	47.50	35.34	15.63	28.25	72.75
	Interior Urban	39.41	60.41	64.38	35.96	60.66	76.26	3.65	23.47	44.60	47.95	36.38	15.37	28.62	83.23
	Interior Rural	38.92	60.91	61.27	37.87	59.25	72.05	1.24	21.88	43.17	46.58	33.23	16.15	27.49	43.78

Note. Data for Colombia is from 2010-2017, data for Ecuador is from 2008-2017 and data for Uruguay is from 2012-2018

** Opportunity Perception (1); Startup Skills (2); Non fear of Failure (3); Know entrepreneur (4); Career status (5); Opportunity Startup (6); Tech sector (7); Higher education (8); Competition (9); Product Innovation (10); Process Innovation (11); Gazelles (12); Internationalisation (13); Risk Capital (14).*

Source: Own elaboration

Table A 2: Institutional variable values for Colombian, Ecuadorian and Uruguayan regions

		1*	2*	3*	4*	5*	6*	7*	8*	9*	10*	11*	12*	13*	14*
Colombia	Andina	4919	255.03	4.00	307.99	37.00	28.14	3.71	296.41	12.95	3.40	0.67	8.86	0.52	61.20
	Caribe	4919	164.36	4.00	273.49	37.00	28.14	2.86	216.83	12.95	2.75	0.32	6.30	0.52	61.20
	Pacífico	4919	165.95	4.00	249.17	37.00	28.14	3.01	222.64	12.95	2.93	0.61	6.52	0.52	61.20
	Orinoquía	4919	88.06	4.00	267.63	37.00	28.14	2.63	208.11	12.95	2.05	0.51	5.36	0.52	61.20
	Amazonía (Colombia)	4919	195.40	4.00	208.70	37.00	28.14	1.90	208.11	12.95	2.36	0.89	4.20	0.52	61.20
	Andina Urban	4919	255.03	4.00	307.99	37.00	28.14	3.71	296.41	12.95	3.40	0.67	8.86	0.52	61.20
	Andina Rural	4919	255.03	4.00	307.99	37.00	28.14	3.71	296.41	12.95	3.40	0.67	8.86	0.52	61.20
	Caribe Urban	4919	164.36	4.00	273.49	37.00	28.14	2.86	216.83	12.95	2.75	0.32	6.30	0.52	61.20
	Caribe Rural	4919	164.36	4.00	273.49	37.00	28.14	2.86	216.83	12.95	2.75	0.32	6.30	0.52	61.20
	Pacífico Urban	4919	165.95	4.00	249.17	37.00	28.14	3.01	222.64	12.95	2.93	0.61	6.52	0.52	61.20
	Pacífico Rural	4919	165.95	4.00	249.17	37.00	28.14	3.01	222.64	12.95	2.93	0.61	6.52	0.52	61.20
Ecuador	Sierra	2144	200.20	2.00	229.60	32.00	25.85	3.70	167.73	9.90	2.37	1.48	4.97	0.36	46.70
	Costa	2144	128.48	2.00	299.30	32.00	25.85	3.22	143.60	9.90	1.91	1.48	3.48	0.36	46.70
	Amazonía (Ecuador)	2144	87.59	2.00	172.20	32.00	25.85	3.17	127.31	9.90	1.89	1.48	4.10	0.36	46.70
	Sierra Urban	2144	200.20	2.00	229.60	32.00	25.85	3.70	167.73	9.90	2.37	1.48	4.97	0.36	46.70
	Sierra Rural	2144	200.20	2.00	229.60	32.00	25.85	3.70	167.73	9.90	2.37	1.48	4.97	0.36	46.70
	Costa Urban	2144	128.48	2.00	299.30	32.00	25.85	3.22	143.60	9.90	1.91	1.48	3.48	0.36	46.70
	Costa Rural	2144	128.48	2.00	299.30	32.00	25.85	3.22	143.60	9.90	1.91	1.48	3.48	0.36	46.70
Uruguay	Montevideo	5156	292.17	5.00	465.02	70.00	42.41	5.49	216.83	11.88	2.75	1.79	10.02	0.54	16.50
	Interior	5156	120.48	5.00	431.41	70.00	42.41	4.76	231.47	11.88	2.34	1.79	10.02	0.54	16.50
	Interior Urban	5156	120.48	5.00	431.41	70.00	42.41	4.76	231.47	11.88	2.34	1.79	10.02	0.54	16.50
	Interior Rural	5156	120.48	5.00	431.41	70.00	42.41	4.76	231.47	11.88	2.34	1.79	10.02	0.54	16.50

Note. Data is from 2017-2018

** Freedom (1); Education (2); Business Risk (3); Agglomeration (4); Corruption (5); Governance (6); Tech absorption (7); Labour market (8); Competitiveness (9); Technology transfer (10); Science (11); Finance (12); Economic complexity (13); Depth of capital market (14).*

Source: Own elaboration

Table A 3: Sources and calculation for condition and outcome variables

fs/QCA conditions	GEI Pillars	Indicators	Definition
Entrepreneurial attitudes			
1. ENTREPRENEURIAL ATTITUDES	OPPORTUNITY PERCEPTION	Opportunity recognition	Percentage of population that sees good opportunities for starting a business in the next 6 months
		Freedom	**Economic freedom** is an overall indicator of the efficiency of government regulation of business. It is one of the components of the "index of Economic Freedom".
			The **property rights** component is an assessment of the ability of individuals to accumulate private property, secured by clear laws that are fully enforced by the state.
	STARTUP SKILLS	Skill perception	Percentage of population that perceives that has the required knowledge/skills to start a business
		Education	**Tertiary education** measured by the regional gross enrolment ration in higher education
			Quality of education: Indicator from the "Global Competitiveness report 2017-2018" In your country, how well does the education system meet the needs of a competitive economy?
	RISK ACCEPTANCE	Risk perception	Percentage of population that agree that fear of failure would not prevent them to start a business
		Country risk	OECD **Country risk** classification 2017-2018
	NETWORKING	Know entrepreneurs	Percentage of population that knows a person who started a business in the past 2 years
		Agglomeration	**Urbanisation**, percentage of the regional population living in urban areas
			Business association, percentage of business owners belonging a business group/association.
	CULTURAL SUPPORT	Career status	People estimating that pursuing entrepreneurship is a good career and provides high social status
		Starting Business	**Starting a Business.** Indicator part of the Ease of Doing Business Index 2017. (Replacement of corruption GEI original indicator)
Entrepreneurial abilities			
2.OPPORTUNITY STARTUP	OPPORTUNITY STARTUP	Opportunity motivation	Proportion of entrepreneurs Involved in Opportunity early-stage Entrepreneurial Activity
		Governance	**Good governance** measured by regional " local transparency' indicator"

3.TECHNOLOGY ADOPTION	TECHNOLOGY ADOPTION	Technology level	Proportion of entrepreneurs in the medium- or high-tech sector
		Technology absorption	**Access to latest technology of population:** % households with access to latest communication technology (telephone, mobile phone, desktop computer, laptop, and/or tablet). **Access to internet of population:** % households with internet access.
4. HUMAN CAPITAL-COMPETITION	HUMAN CAPITAL	Educational level	Proportion of entrepreneurs with post-secondary and/or graduate educational attainment
		Labour market	**Staff training.** Average of percentage of adult population that completed higher education, population literacy, accessibility to public university
			Labour freedom, sub indicator of "Index of Economic freedom"
	COMPETITION	Competitors	Proportion of businesses offer the same products
		Competitiveness	**Market dominance and Regulation** sub indicators from the Global Competitiveness Index
Entrepreneurial aspirations			
5. INNOVATION CAPACITY	PRODUCT INNOVATION	New product	Proportion of entrepreneurs' (potential) customers that consider the entrepreneur's product new or unfamiliar.
		Technology transfer	Percentage of **innovative business** and percentage **creative industrie**s from the total regional business
	PROCESS INNOVATION	New technology	Proportion of entrepreneurs employing very latest technology (newer than one year) or new technology (one to 5 years) or procedures for production
		Science	Regional gross domestic expenditure on R&D (**GERD**)
			Average of quality **of scientific institutions, availability of scientists** and engineers both are sub indicators from the 12th pillar of the Global Competitiveness Index
6. INTERNATIONALISATION	INTERNATIONALISATION	Export	Proportion of entrepreneurs that export at least some products (25% or under to more than 75%)
		Economic complexity	OECD **Economic Complexity** Index (ECI)
		Business sophistication	Indicator for Ecuador: percentage of firms that performed market research and/or organisational innovation in the last year (2014).
			Colombia: sub index "business sophistication" from the Departmental Innovation Index, 2018
7.FINANCE	HIGH GROWTH	Informal investment	Proportion of entrepreneurs that in the past three years, personally provided funds for a new business started by someone else, excluding any purchases of stocks or mutual funds.

		Depth of capital market	Second sub-index of the Venture Capital and Private Equity index.
		Finance	Financial inclusion**,** regional % of adults with financial products.
Outcome measure variables			
TEA		Total early-stage Entrepreneurial Activity	Percentage of 18–64-year-old regional population who are either a nascent entrepreneur or owner-manager of a new business.
Buss.Dens		Business Density	Total firms per region/ the regional working-age population (own calculation)
Gazelle		High growth companies	Percentage of the TEA businesses having high job expectation average (over 10 more employees and 50% employment growth in 5 years). (GEM databases 2010-2017)
Creative		Creative industries	Total firms in creative industries / economically active regional population (own calculation)

Note. Individual indicators are marked in white while institutional ones are marked in grey background. Individual indicators calculated from pooled GEM raw databases 2010-2017

Source: own elaboration

Table A 4: Raw values for fs/QCA model's conditions for 42 regions

	*1	*2	*3	*4	*5	*6	*7	*a (0-1)	* b (0-1)	*c (1-100)	*d (0-10)
Predominantly Urban regions											
Antioquia	27.188	62.872	1.926	21.135	14.468	42.122	3.953	0.033	0.357	17.108	1.540
Santander	29.179	62.085	1.817	21.403	13.738	22.961	3.688	0.033	0.323	19.709	1.278
Valle del Cauca	26.637	53.718	2.007	18.984	12.943	26.770	4.746	0.030	0.364	18.797	1.380
Cundinamarca	31.085	55.736	2.631	23.904	12.049	32.663	6.757	0.051	0.368	24.453	2.745
Atlántico	29.588	45.434	1.885	22.583	10.822	28.971	4.347	0.036	0.387	21.71	1.772
Pichincha	28.767	48.352	0.645	16.002	9.536	4.131	4.312	0.094	0.085	23.599	3.063
Bolívar (Colombia)	27.016	35.640	0.777	23.123	7.725	15.450	4.384	0.025	0.330	20.871	1.172
Tolima	26.145	54.804	0.271	19.558	4.607	20.240	4.053	0.018	0.333	22.131	0.587
Guayas	27.519	10.235	0.285	15.326	4.378	2.131	3.076	0.057	0.065	32.729	1.448
Meta	25.226	60.398	0.400	17.039	4.122	21.785	5.678	0.029	0.325	27.208	0.950
Norte de Santander	26.372	43.874	1.029	23.331	3.746	26.708	4.059	0.020	0.295	21.084	0.646
Azuay	26.495	8.926	0.926	11.312	3.799	3.619	3.903	0.092	0.066	20.336	1.398
min	25.226	8.926	0.271	11.312	3.746	2.131	3.076	0.018	0.065	17.11	0.587
max	31.085	62.872	2.631	23.904	14.468	42.122	6.757	0.094	0.387	32.73	3.063
average	27.601	45.173	1.217	19.475	8.494	20.629	4.413	0.043	0.275	22.477	1.498
Intermediate regions											
Santo Domingo	24.007	43.458	0.190	11.859	2.177	0.618	2.516	0.087	0.047	27.877	0.943
Esmeraldas	23.992	9.143	0.000	13.689	1.577	4.349	3.414	0.055	0.050	36.061	0.589
Imbabura	25.052	9.834	0.218	15.393	2.662	4.140	4.440	0.095	0.091	34.473	1.084
Carchi	23.236	43.269	0.136	15.184	0.928	4.381	4.222	0.091	0.043	26.641	0.509
Manabí	26.836	39.869	0.195	15.690	2.751	1.860	1.740	0.077	0.023	28.047	1.327
El Oro	23.296	44.000	0.231	15.804	2.150	2.467	2.642	0.092	0.042	36.932	0.995
Los Ríos	24.914	43.153	0.260	16.095	1.918	2.506	1.605	0.054	0.017	30.944	0.450
Santa Elena	25.068	58.623	0.416	17.038	1.815	1.593	1.753	0.049	0.026	33.772	0.550
Loja	33.679	52.494	0.148	18.204	4.260	2.202	3.292	0.082	0.026	32.218	2.137
Huila	25.572	46.377	0.208	19.273	3.870	18.863	4.098	0.019	0.237	21.965	0.657
Risaralda	27.887	46.528	1.999	19.659	8.463	23.838	5.643	0.024	0.265	15.752	0.998
Putumayo	20.224	44.609	0.401	20.321	13.875	21.699	3.424	0.023	0.111	18.493	0.434
Caldas	26.830	48.446	2.268	22.111	18.706	28.565	3.903	0.019	0.258	18.738	0.970
Sucre	27.015	34.785	0.716	22.563	8.927	10.287	3.107	0.015	0.353	19.340	0.482
Magdalena	24.532	37.375	0.608	24.117	9.538	17.766	4.812	0.018	0.300	19.133	0.779
Nariño	21.994	45.181	1.429	23.817	22.575	24.736	5.139	0.012	0.360	21.937	0.309
min	20.224	9.143	0.000	11.859	0.928	0.618	1.605	0.012	0.017	15.752	0.309
max	33.679	58.623	2.268	24.117	22.575	28.565	5.643	0.095	0.360	36.9320	2.137
average	25.258	40.447	0.589	18.176	6.637	10.617	3.484	0.051	0.141	26.395	0.826
Predominantly Rural regions											
Cañar	24.360	60.973	0.125	14.727	1.675	7.878	2.476	0.096	0.000	22.835	0.850
Sucumbíos	19.827	57.171	0.057	15.689	2.271	3.753	2.486	0.080	0.000	21.569	1.427
Chimborazo	27.159	58.895	0.140	14.823	2.990	7.150	2.589	0.083	0.018	30.000	1.317
Morona Santiago	20.339	8.606	0.048	15.755	2.063	3.330	2.808	0.068	0.000	25.118	1.224
Zamora Ch.	19.665	9.221	0.084	15.858	1.426	3.024	2.843	0.106	0.000	25.000	1.682
Orellana	20.039	10.451	0.059	15.687	2.503	4.040	2.944	0.090	0.021	25.134	0.983
Bolívar (Ecuador)	24.681	10.393	0.079	14.732	2.755	6.910	3.098	0.099	0.333	15.000	0.868
Napo	20.289	37.499	0.058	15.946	2.595	3.563	3.113	0.091	0.000	26.582	0.969
Cauca	24.210	42.078	0.320	20.733	11.752	17.397	3.263	0.011	0.279	21.608	0.391
Guajira	23.837	24.877	0.369	22.498	3.512	7.912	3.522	0.010	0.317	21.503	0.337
Pastaza	25.435	57.171	0.077	16.145	2.978	3.486	3.552	0.093	0.000	20.000	1.369
Amazonas	20.301	34.308	0.225	20.282	9.531	20.323	3.780	0.017	0.315	27.969	0.324
Cotopaxi	24.443	40.213	0.385	14.922	3.791	4.337	4.801	0.087	0.048	18.421	0.570
Tungurahua	26.528	39.670	0.578	15.012	3.892	3.906	4.904	0.105	0.071	31.365	1.229
min	19.665	8.606	0.048	14.727	1.426	3.024	2.476	0.010	0.000	31.365	0.324
max	27.159	60.973	0.578	22.498	11.752	20.323	4.904	0.106	0.333	15.000	1.682
average	22.937	35.109	0.186	16.629	3.838	6.929	3.298	0.074	0.100	23.721	0.967

*Note. Conditions are measured in a range of 0-100, being 100 the best. * Entrepreneurial attitudes (1); Opportunity startup (2); Technology absorption (3); human capital-competition (4); Innovation capacity (5);* Internationalisation *(6); Finance (7); Business density (a); Gazelles (b); TEA rate (c); Creative industries (d). Raw values for conditions are in a 1-100 scale being 100 the best. Outcome variables have their own scale (i.e., USD, 0-100 or 0-1). Different scales are not an issue as these values are calibrated into a data matrix in the next stage of QCA.*

Source: own elaboration

Table A 5: Descriptive statistics and thresholds for datasets calibration.

	Predominantly Urban						Intermediate						Predominantly Rural					
	Descriptives			Fuzzy set calibrations			Descriptives			Fuzzy set calibrations			Descriptives			Fuzzy set calibrations		
	max	min	STDEV	Fully in	Crossover	Fully out	max	min	STDEV	Fully in	Crossover	Fully out	max	min	STDEV	Fully in	Crossover	Fully out
Input conditions																		
att	31.085	25.226	1.702	28.870	27.102	26.464	33.679	20.224	2.987	26.832	24.983	23.818	27.159	19.665	2.72	24.622	24.023	20.292
opp	62.872	8.926	18.453	56.902	51.035	41.816	58.623	9.143	13.285	46.415	43.729	39.246	60.973	8.606	19.62	53.398	38.584	14.058
techadop	2.631	0.271	0.798	1.895	0.978	0.584	2.268	0.001	0.692	0.635	0.246	0.194	0.578	0.048	0.165	0.296	0.104	0.0635
HcandComp	23.904	11.312	3.885	22.718	20.347	16.780	24.117	11.859	3.688	20.769	17.621	15.616	22.498	14.727	2.549	16.095	15.722	14.945
innocap	14.468	3.746	4.248	12.273	8.631	4.314	22.575	0.928	6.618	9.080	3.311	2.092	11.752	1.426	3.003	3.721	2.866	2.329
international	42.122	2.131	12.389	27.320	22.373	12.620	28.565	0.618	10.065	19.572	4.365	2.401	20.323	3.024	5.382	7.696	4.188	3.610
finance	6.757	3.076	0.966	4.475	4.186	3.941	5.643	1.605	1.227	4.277	3.419	2.611	4.904	2.476	0.768	3.5445	3.105	2.816
Outcome conditions																		
TEA rate	32.73	17.11	4.18	26.933	23.813	21.397	36.932	15.75	7.118	35.267	32.607	27.259	31.365	15.000	4.49	29.391	26.220	23.918
Buss. Dens	0.094	0.018	0.026	0.089	0.053	0.033	0.095	0.012	0.032	0.092	0.083	0.052	0.106	0.010	0.035	0.103	0.0952	0.088
Gazelles	0.387	0.065	0.125	0.368	0.359	0.328	0.360	0.017	0.130	0.327	0.260	0.071	0.333	0.000	0.140	0.316	0.227	0.019
Creative Industries	3.063	0.587	0.746	2.647	1.598	1.389	2.137	0.309	0.453	1.205	0.996	0.718	1.682	0.324	0.435	1.409	1.295	0.975

Source: own elaboration

Table A 6: Calibrated fuzzy-set values

	fs/att	fs/opp	fs/tech	fs/HcandComp	fs/innocap	fs/internat	fs/finance	fs/bussden	fs/gazelle	fs/TEA	fs/creative
Predominantly Urban regions											
Antioquia	0.54	1.00	0.96	0.73	0.99	1.00	0.05	0.05	0.45	0.00	0.30
Santander	0.97	1.00	0.94	0.79	0.99	0.59	0.00	0.05	0.03	0.010	0.01
Valle del Cauca	0.10	0.80	0.97	0.24	0.97	0.94	1.00	0.03	0.84	0.000	0.04
Cundinamarca	1.00	0.92	1.00	0.99	0.94	1.00	1.00	0.43	0.95	0.650	0.96
Atlántico	0.99	0.14	0.95	0.94	0.86	0.98	0.84	0.07	1.00	0.070	0.62
Pichincha	0.94	0.29	0.07	0.03	0.68	0.00	0.79	0.97	0.00	0.430	0.99
Bolivar (COL)	0.40	0.01	0.18	0.97	0.35	0.11	0.89	0.01	0.06	0.030	0.00
Tolima	0.01	0.87	0.00	0.34	0.06	0.34	0.16	0.01	0.07	0.110	0.00
Guayas	0.67	0.00	0.01	0.01	0.05	0.00	0.00	0.58	0.00	1.000	0.10
Meta	0.00	0.99	0.01	0.06	0.04	0.45	1.00	0.03	0.04	0.960	0.00
Norte de Santander	0.03	0.09	0.54	0.98	0.03	0.93	0.17	0.01	0.00	0.030	0.00
Azuay	0.05	0.00	0.40	0.00	0.03	0.00	0.03	0.96	0.00	0.010	0.05
Intermediate regions											
Santo Domingo	0.07	0.45	0.04	0.00	0.06	0.00	0.03	0.79	0.03	0.070	0.36
Esmeraldas	0.07	0.00	0.00	0.00	0.01	0.49	0.50	0.06	0.03	0.980	0.01
Imbabura	0.53	0.00	0.17	0.03	0.17	0.41	0.97	0.98	0.06	0.890	0.78
Carchi	0.01	0.42	0.00	0.03	0.00	0.50	0.94	0.94	0.03	0.030	0.01
Manabí	0.95	0.07	0.05	0.05	0.20	0.02	0.00	0.36	0.02	0.070	0.99
El Oro	0.01	0.58	0.30	0.06	0.05	0.05	0.05	0.95	0.03	0.990	0.50
Los Ríos	0.46	0.40	0.53	0.09	0.03	0.06	0.00	0.06	0.02	0.280	0.00
Santa Elena	0.53	1.00	0.79	0.29	0.02	0.01	0.00	0.04	0.02	0.790	0.01
Loja	1.00	1.00	0.00	0.64	0.62	0.04	0.38	0.48	0.02	0.450	1.00
Huila	0.72	0.95	0.10	0.83	0.57	0.95	0.91	0.00	0.41	0.000	0.02
Risaralda	0.99	0.96	1.00	0.88	0.94	0.98	1.00	0.00	0.56	0.000	0.51
Putumayo	0.00	0.73	0.77	0.93	1.00	0.97	0.50	0.00	0.09	0.000	0.00
Caldas	0.95	0.99	1.00	0.99	1.00	0.99	0.84	0.00	0.49	0.000	0.43
Sucre	0.96	0.00	0.97	0.99	0.95	0.76	0.24	0.00	0.98	0.000	0.00
Magdalena	0.24	0.01	0.94	1.00	0.96	0.93	0.99	0.00	0.86	0.000	0.09
Nariño	0.00	0.84	1.00	1.00	1.00	0.98	1.00	0.00	0.99	0.000	0.00
Predominantly Rural regions											
Cañar	0.84	0.99	0.58	0.02	0.00	0.96	0.00	0.59	0.04	0.010	0.02
Sucumbíos	0.03	0.98	0.03	0.47	0.03	0.09	0.00	0.00	0.04	0.000	0.97
Chimborazo	1.00	0.98	0.63	0.03	0.61	0.93	0.00	0.00	0.05	0.970	0.64
Morona Santiago	0.05	0.02	0.02	0.57	0.01	0.01	0.04	0.00	0.04	0.190	0.34
Zamora	0.03	0.03	0.18	0.75	0.00	0.00	0.06	0.98	0.04	0.170	1.00
Orellana	0.04	0.03	0.03	0.47	0.12	0.32	0.16	0.08	0.05	0.200	0.05
Bolivar (ECU)	0.96	0.03	0.13	0.02	0.35	0.91	0.48	0.82	0.97	0.000	0.02
Napo	0.05	0.47	0.03	0.86	0.18	0.04	0.51	0.12	0.04	0.580	0.04
Cauca	0.72	0.67	0.97	1.00	1.00	1.00	0.74	0.00	0.85	0.000	0.00
Guajira	0.46	0.16	0.98	1.00	0.91	0.96	0.94	0.00	0.95	0.000	0.00
Pastaza	1.00	0.98	0.11	0.97	0.60	0.03	0.95	0.27	0.04	0.000	0.88
Amazonas	0.05	0.37	0.87	1.00	1.00	1.00	0.99	0.00	0.95	0.840	0.00
Cotopaxi	0.89	0.58	0.99	0.04	0.96	0.53	1.00	0.02	0.07	0.000	0.00
Tungurahua	1.00	0.55	1.00	0.06	0.97	0.19	1.00	0.98	0.09	0.990	0.35

Source: own elaboration

Table A 7: Truth tables summary

	Cases (Regions)	att	opp	tech	comp.hc	inno.cap	internat	finance	Number of cases > 0.8 membership	Outcome	raw consistency	PRI consistency
	Urban Regions											
Business density	Pichincha	1	0	0	0	1	0	1	1	1	0.963	0.956
	Guayas	1	0	0	0	0	0	0	1	1	0.881	0.745
	Azuay	0	0	0	0	0	0	0	1	1	0.873	0.797
	Cundinamarca	1	1	1	1	1	1	1	1	0	0.480	0.000
	Meta	0	1	0	0	0	0	1	1	0	0.190	0.042
	Atlántico	1	0	1	1	1	1	1	1	0	0.172	0.000
	Antioquia, Santander	1	1	1	1	1	1	0	2	0	0.145	0.000
	Tolima	0	1	0	0	0	0	0	1	0	0.143	0.043
	Valle del Cauca	0	1	1	0	1	1	1	1	0	0.140	0.000
	Bolívar (Colombia)	0	0	0	1	0	0	1	1	0	0.125	0.000
	Norte de Santander	0	0	1	1	0	1	0	1	0	0.045	0.000
TEA rate	Guayas	1	0	0	0	0	0	0	1	1	0.960	0.944
	Meta	0	1	0	0	0	0	1	1	1	0.905	0.864
	Pichincha	1	0	0	0	1	0	1	1	0	0.634	0.000
	Cundinamarca	1	1	1	1	1	1	1	1	0	0.608	0.380
	Azuay	0	0	0	0	0	0	0	1	0	0.483	0.351
	Tolima	0	1	0	0	0	0	0	1	0	0.286	0.000
	Bolivar CO	0	0	0	1	0	0	1	1	0	0.250	0.000
	Atlántico	1	0	1	1	1	1	1	1	0	0.181	0.000
	Norte de Santander	0	0	1	1	0	1	0	1	0	0.106	0.000
	Antioquia, Santander	1	1	1	1	1	1	0	2	0	0.092	0.000
	Valle del Cauca	0	1	1	0	1	1	1	1	0	0.058	0.000
Gazelle	Valle del Cauca	0	1	1	0	1	1	1	1	1	0.977	0.968
	Cundinamarca	1	1	1	1	1	1	1	1	1	0.976	0.971
	Atlántico	1	0	1	1	1	1	1	1	1	0.931	0.916
	Antioquia, Santander	1	1	1	1	1	1	0	2	0	0.481	0.171
	Bolívar (Colombia)	0	0	0	1	0	0	1	1	0	0.205	0.014
	Meta	0	1	0	0	0	0	1	1	0	0.190	0.014
	Tolima	0	1	0	0	0	0	0	1	0	0.130	0.015
	Pichincha	1	0	0	0	1	0	1	1	0	0.110	0.027
	Norte de Santander	0	0	1	1	0	1	0	1	0	0.106	0.017
	Azuay	0	0	0	0	0	0	0	1	0	0.093	0.009
	Guayas	1	0	0	0	0	0	0	1	0	0.059	0.021
creative Industries	Pichincha	1	0	0	0	1	0	1	1	1	0.927	0.918
	Cundinamarca	1	1	1	1	1	1	1	1	1	0.920	0.898
	Atlántico	1	0	1	1	1	1	1	1	0	0.638	0.400
	Guayas	1	0	0	0	0	0	0	1	0	0.376	0.241
	Antioquia, Santander	1	1	1	1	1	1	0	2	0	0.344	0.000
	Azuay	0	0	0	0	0	0	0	1	0	0.186	0.050
	Meta	0	1	0	0	0	0	1	1	0	0.119	0.063
	Valle del Cauca	0	1	1	0	1	1	1	1	0	0.116	0.000
	Tolima	0	1	0	0	0	0	0	1	0	0.104	0.068
	Bolívar (Colombia)	0	0	0	1	0	0	1	1	0	0.080	0.024
	Norte de Santander	0	0	1	1	0	1	0	1	0	0.015	0.000

	Intermediate Regions											
Business density	Imbabura	1	0	0	0	0	0	1	1	1	0.901	0.879
	Loja	1	1	0	1	1	0	0	1	0	0.747	0.000
	El Oro	0	1	0	0	0	0	0	1	0	0.689	0.579
	Santo Domingo	0	0	0	0	0	0	0	1	0	0.575	0.442
	Los Ríos	0	0	1	0	0	0	0	1	0	0.475	0.329
	Manabí	1	0	0	0	0	0	0	1	0	0.397	0.011
	Santa Elena	1	1	1	0	0	0	0	1	0	0.185	0.000
	Sucre	1	0	1	1	1	1	0	1	0	0.098	0.012
	Huila	1	1	0	1	1	1	1	1	0	0.079	0.000
	Magdalena	0	0	1	1	1	1	1	1	0	0.058	0.008

	Nariño	0	1	1	1	1	1	1	1	0	0.032	0.000
	Risaralda, Caldas	1	1	1	1	1	1	1	2	0	0.005	0.000
TEA rate	Imbabura	1	0	0	0	0	0	1	1	1	0.915	0.887
	Santa Elena	1	1	1	0	0	0	0	1	1	0.843	0.653
	Loja	1	1	0	1	1	0	0	1	0	0.709	0.000
	Los Rios	0	0	1	0	0	0	0	1	0	0.693	0.483
	El Oro	0	1	0	0	0	0	0	1	0	0.678	0.496
	Santo Domingo	0	0	0	0	0	0	0	1	0	0.645	0.539
	Manabí	1	0	0	0	0	0	0	1	0	0.358	0.049
	Sucre	1	0	1	1	1	1	0	1	0	0.098	0.000
	Huila	1	1	0	1	1	1	1	1	0	0.079	0.000
	Magdalena	0	0	1	1	1	1	1	1	0	0.058	0.030
	Nariño	0	1	1	1	1	1	1	1	0	0.032	0.026
	Risaralda, Caldas	1	1	1	1	1	1	1	2	0	0.005	0.000
Gazelle	Sucre	1	0	1	1	1	1	0	1	1	0.989	0.987
	Magdalena	0	0	1	1	1	1	1	1	1	0.855	0.798
	Nariño	0	1	1	1	1	1	1	1	0	0.724	0.659
	Huila	1	1	0	1	1	1	1	1	0	0.714	0.000
	Risaralda, Caldas	1	1	1	1	1	1	1	2	0	0.636	0.152
	Imbabura	1	0	0	0	0	0	1	1	0	0.282	0.000
	Loja	1	1	0	1	1	0	0	1	0	0.190	0.000
	Los Ríos	0	0	1	0	0	0	0	1	0	0.188	0.000
	Manabí	1	0	0	0	0	0	0	1	0	0.139	0.000
	Santa Elena	1	1	1	0	0	0	0	1	0	0.139	0.000
	Santo Domingo	0	0	0	0	0	0	0	1	0	0.117	0.000
	El Oro	0	1	0	0	0	0	0	1	0	0.111	0.000
creative Industries	Loja	1	1	0	1	1	0	0	1	1	0.911	0.904
	Imbabura	1	0	0	0	0	0	1	1	1	0.859	0.756
	Manabí	1	0	0	0	0	0	0	1	0	0.629	0.585
	Risaralda, Caldas	1	1	1	1	1	1	1	2	0	0.533	0.023
	El Oro	0	1	0	0	0	0	0	1	0	0.528	0.045
	Los Ríos	0	0	1	0	0	0	0	1	0	0.436	0.066
	Santo Domingo	0	0	0	0	0	0	0	1	0	0.421	0.031
	Magdalena	0	0	1	1	1	1	1	1	0	0.152	0.000
	Huila	1	1	0	1	1	1	1	1	0	0.127	0.068
	Santa Elena	1	1	1	0	0	0	0	1	0	0.120	0.040
	Sucre	1	0	1	1	1	1	0	1	0	0.109	0.012
	Nariño	0	1	1	1	1	1	1	1	0	0.090	0.000

	Rural regions											
Business density	Bolívar (Ecuador)	1	0	0	0	0	1	0	1	1	0.926	0.872
	Cañar	1	1	1	0	0	1	0	1	0	0.619	0.283
	Tungurahua	1	1	1	0	1	0	1	1	0	0.600	0.535
	Pastaza	1	1	0	1	1	0	1	1	0	0.514	0.000
	Morona Santiago, Zamora	0	0	0	1	0	0	0	2	0	0.417	0.348
	Cotopaxi	1	1	1	0	1	1	1	1	0	0.388	0.246
	Napo	0	0	0	1	0	0	1	1	0	0.354	0.070
	Orellana	0	0	0	0	0	0	0	1	0	0.352	0.200
	Sucumbíos	0	1	0	0	0	0	0	1	0	0.305	0.017
	Cauca	1	1	1	1	1	1	1	1	0	0.174	0.042
	Chimborazo	1	1	1	0	1	1	0	1	0	0.156	0.000
	Guajira, Amazonas	0	0	1	1	1	1	1	2	0	0.064	0.000
TEA rate	Napo	0	0	0	1	0	0	1	1	1	0.939	0.643
	Chimborazo	1	1	1	0	1	1	0	1	1	0.883	0.866
	Tungurahua	1	1	1	0	1	0	1	1	0	0.539	0.505
	Orellana	0	0	0	0	0	0	0	1	0	0.500	0.000
	Morona, Zamora	0	0	0	1	0	0	0	2	0	0.451	0.051
	Guajira, Amazonas	0	0	1	1	1	1	1	2	0	0.443	0.348
	Cañar	1	1	1	0	0	1	0	1	0	0.416	0.353
	Cotopaxi	1	1	1	0	1	1	1	1	0	0.306	0.234
	Sucumbíos	0	1	0	0	0	0	0	1	0	0.280	0.000

	Bolivar	1	0	0	0	0	1	0	1	0	0.176	0.000
	Cauca	1	1	1	1	1	1	1	1	0	0.164	0.052
	Pastaza	1	1	0	1	1	0	1	1	0	0.122	0.000
Gazelle	Guajira, Amazonas	0	0	1	1	1	1	1	2	1	1.000	1.000
	Bolívar (Ecuador)	1	0	0	0	0	1	0	1	1	1.000	1.000
	Cauca	1	1	1	1	1	1	1	1	1	1.000	1.000
	Cotopaxi	1	1	1	0	1	1	1	1	0	0.341	0.000
	Sucumbíos	0	1	0	0	0	0	0	1	0	0.280	0.000
	Chimborazo	1	1	1	0	1	1	0	1	0	0.273	0.000
	Napo	0	0	0	1	0	0	1	1	0	0.268	0.000
	Tungurahua	1	1	1	0	1	0	1	1	0	0.252	0.000
	Pastaza	1	1	0	1	1	0	1	1	0	0.230	0.000
	Cañar	1	1	1	0	0	1	0	1	0	0.221	0.000
	Orellana	0	0	0	0	0	0	0	1	0	0.169	0.008
	Morona Santiago, Zamora	0	0	0	1	0	0	0	2	0	0.102	0.000
creative Industries	Chimborazo	1	1	1	0	1	1	0	1	1	0.987	0.962
	Pastaza	1	1	0	1	1	0	1	1	1	0.946	0.922
	Sucumbíos	0	1	0	0	0	0	0	1	1	0.841	0.803
	Morona Santiago, Zamora	0	0	0	1	0	0	0	2	0	0.523	0.401
	Orellana	0	0	0	0	0	0	0	1	0	0.514	0.266
	Cañar	1	1	1	0	0	1	0	1	0	0.496	0.050
	Tungurahua	1	1	1	0	1	0	1	1	0	0.409	0.000
	Cotopaxi	1	1	1	0	1	1	1	1	0	0.365	0.000
	Bolívar (Ecuador)	1	0	0	0	0	1	0	1	0	0.265	0.000
	Napo	0	0	0	1	0	0	1	1	0	0.256	0.090
	Cauca	1	1	1	1	1	1	1	1	0	0.164	0.000
	Guajira, Amazonas	0	0	1	1	1	1	1	2	0	0.057	0.000

Source: own elaboration

Table A 8: Alternative values used in the calibration into set membership scores

Predominantly urban regions dataset			
	Full membership	Cross-over point	No membership
att (i)	28.870	27.102	26.464
att (ii)	29.097	27.102	26.397
att (iii)	29.547	28.870	27.102
opp (i)	56.902	51.035	41.816
opp (ii)	59.466	51.035	37.287
opp (iii)	61.916	56.902	51.035
techadop (i)	1.895	0.978	0.584
techadop (ii)	1.918	0.978	0.449
techadop (iii)	1.999	1.895	0.978
HcandComp (i)	22.718	20.347	16.780
HcandComp (ii)	23.015	20.347	16.209
HcandComp (iii)	23.310	22.718	20.347
innocap (i)	12.273	8.631	4.314
innocap (ii)	12.764	8.631	4.173
innocap (iii)	13.659	12.273	8.631

international (i)	27.320	22.373	12.620
international (ii)	28.531	22.373	6.395
international (iii)	32.294	27.320	22.373
finance(i)	4.475	4.186	3.941
finance (ii)	4.674	4.186	3.913
finance (iii)	5.585	4.475	4.186
TEA rate	26.933	23.813	21.397
Buss. Dens	0.089	0.053	0.033
Gazelles	0.368	0.359	0.328
Creative Industries	2.647	1.598	1.389
Intermediate regions dataset			
att (i)	26.832	24.983	23.818
att (ii)	26.836	24.983	23.296
att (iii)	27.451	26.832	24.983
opp (i)	46.415	43.729	39.246
opp (ii)	46.528	43.729	37.375
opp (iii)	50.470	46.415	43.729
techadop (i)	0.635	0.246	0.194
techadop (ii)	0.716	0.246	0.190
techadop (iii)	1.714	0.635	0.246
HcandComp (i)	20.769	17.621	15.616
HcandComp (ii)	22.111	17.621	15.393
HcandComp (iii)	23.190	20.769	17.621
innocap (i)	9.080	3.311	2.092
innocap (ii)	9.538	3.311	1.918
innocap (iii)	16.291	9.080	3.311
international (i)	19.572	4.365	2.401
international (ii)	21.699	4.365	2.202
international	24.287	19.572	4.365
finance(i)	4.277	3.419	2.611
finance (ii)	4.440	3.419	2.516
finance (iii)	4.976	4.277	3.419
TEA rate	35.267	32.607	27.259
Buss. Dens	0.092	0.083	0.052
Gazelles	0.327	0.260	0.071
Creative Industries	1.205	0.996	0.718
Predominantly rural regions dataset			
att (i)	24.622	24.023	20.292
att (ii)	24.983	24.023	20.189
att (iii)	26.200	24.622	24.023
opp (i)	53.398	38.584	14.058
opp (ii)	57.171	38.585	10.428
opp (iii)	58.378	53.398	38.585
techadop (i)	0.296	0.104	0.064

techadop (ii)	0.339	0.105	0.059
techadop (iii)	0.380	0.296	0.105
HcandComp (i)	16.095	15.722	14.945
HcandComp (ii)	17.800	15.722	14.882
HcandComp (iii)	20.597	16.095	15.722
innocap (i)	3.721	2.866	2.329
innocap (ii)	3.831	2.867	2.188
innocap (iii)	7.839	3.721	2.867
international (i)	7.696	4.188	3.610
international (ii)	7.892	4.189	3.532
international (iii)	14.551	7.696	4.189
finance(i)	3.545	3.105	2.816
finance (ii)	3.643	3.106	2.720
finance (iii)	4.495	3.545	3.106
TEA rate	29.391	26.220	23.918
Buss. Dens	0.103	0.095	0.088
Gazelles	0.316	0.227	0.019
Creative Industries	1.409	1.295	0.975

Note: Original anchors (i), first alternative (ii), and second alternative (iii).

Source: own elaboration

Appendix B

The process of GEI scores calculation (Ács et al., 2017)

Step 1: The selection of variables

The calculation starts with the variables that come directly from the original sources for selected regions. The variables are at the individual level (personal or firms) that are coming from the GEM Adult Population Survey, or the institutional level that are coming from various other sources.

$$z_{i,j} = IND_{i,j} * INS_{i,j} \quad (1)$$

for all j= 1 ... k, the number of individual, institutional variables and pillars
$IND_{i,j}$ is the original score value for country i and variable j individual variable
$INS_{i,j}$ is the original score value for country i and variable j institutional variable
$z_{i,j}$ is the calculated pillar value for country i and pillar j

Step 2: The construction of the pillars

Pillars are built from the variables using the interaction variable method (i.e., multiplying the individual variable with the proper institutional variable).

Step 3: Normalisation

Pillar values are first normalized to a range from 0 to 1, according to the equation 1.

$$x_{i,j} = \frac{z_{i,j}}{\max z_{i,j}} \quad (2)$$

For all j = 1…k, the number of pillars

Where $x_{i,j}$ is the normalised score value for country *i* and pillar *j*

$\max z_{i,j}$ is the maximum value for pillar *j*

Step 4: Capping

Based on a benchmarking principle, the GEI selects the 95th percentile score adjustment, meaning that any observed values higher than the 95th percentile are lowered to the 95th 90 percentiles. For the 22 regions in the present dataset, the calculation used the benchmarks values from the full dataset, which contains all the observations made over the 2006-2017 time period.

Step 5: Average pillar adjustment

Since GEI aims to be applied for public policy purposes, the additional resources for the same marginal improvement of the indicator values should be the same for all indicators. Therefore, transformation is needed to equate the average values of the components. Equation 2 shows the calculation of the average value of pillar j:

$$\bar{x}_j = \frac{\sum_{i=1}^{n} x_{i,j}}{n} \qquad (3)$$

To transform the $x_{i,j}$, values such that the potential minimum value is 0 and the maximum value is 1:

$$y_{i,j} = x_{i,j}^{k} \qquad (4)$$

where *k* is the "strength of adjustment", the *k* -th moment of *X j is* exactly the needed average, y_j. The root of the following equation for *k must be found.*

$$(5) \qquad \sum_{i=1}^{n} x_{i,j}^{k} - n\bar{y}_j = 0$$

Step 6: Penalising

After these transformations, the PFB methodology was used to create indicator adjusted PFB values. GEI penalty function is defined as follows:

$$h_{(i),j} = min\, y_{(i),j} + (1 - e^{-(y_{(i)j} - min\, y_{(i),j})}) \qquad (6)$$

where $h_{i,j}$ is the modified, post-penalty value of pillar j in country *i*, $y_{i,j}$ is the normalized value of index component j in country *I* and *yym*in is the lowest value of $y_{i,j}$ for country *i*.

i = 1, 2……n = the number of countries
j = 1, 2,…….m= the number of pillars

Step 7: Sub-indices

The value of a sub-index for any region is the arithmetic average of its PFB adjusted pillars for that sub-index, multiplied by 100. The maximum value of the sub-indices is 100, and the potential minimum is 0, both of which reflect the relative position of a region in a particular sub-index.

$$ATT_i = 100 \sum_{j=1}^{5} h_j \qquad (7a, 7b,7c)$$
$$ABT_i = 100 \sum_{j=6}^{9} h_j$$
$$ASP_i = 100 \sum_{j=10}^{14} h_j$$

where *hi,j* is the modified, post-penalty value of pillar j in country i
i = 1, 2,……n = the number of countries
j = 1, 2,…….14 = the number of pillars

Step 8: The super-index

The GEI is simply the average of the three sub-indices. Since 100 represents the theoretically available limit, the GEI points can also be interpreted as a measure of the efficiency of the entrepreneurship resources.

$$GEI_i = \frac{1}{3}(ATT_i + ABT_i + ASP_i) \quad (8)$$

where i = 1, 2……n = the number of countries