Master Thesis U.S.E.

Configurations of Sustainable Entrepreneurial Ecosystems: How To Support Entrepreneurship for Environmental and Social Development

Utrecht University

Joep Janssen

5034310

Supervisor: Drs. Mirella Schrijvers

Abstract

This paper is about Sustainable Entrepreneurial Ecosystems, which combines the Entrepreneurial Ecosystem concept with the Sustainable Entrepreneurship concept, and looks at how a geographical region can support entrepreneurs interested in sustainable entrepreneurship. This paper researches which conditions combine in a region to have either a high output or a high share of environmental or social start-ups. The conditions looked at were incubators, sustainability education, impact investors, sustainability awareness, governmental sustainability and economic development. This was analyzed using the Qualitative Comparative Analysis (QCA) method on 273 NUTS-2 (European) regions. To have a high output of either environmental or social start-ups, incubators and impact investors need to be combined with either sustainability (environmental or social) awareness or GDP per capita. For the output of social start-ups, a combination of impact investors, social awareness, governmental sustainability and economic development is also sufficient. For a high percentage of environmental start-ups, the combination of sustainability education, incubators and impact investors need to be combined with a high GDP per capita, but also the absence of governmental sustainability. For a high percentage of social start-ups the social awareness and governmental sustainability conditions are the most important. These two conditions need to be combined with either the absence of incubators or the absence of sustainability education. This shows that policy makers need to focus on different conditions, depending on if they want to have more environmental or more social start-ups.

Key Words: Sustainable Entrepreneurship, Sustainable Entrepreneurial Ecosystems, Environmental Start-ups, Social Start-up

JEL Classification: L26, Q01, Q56

Table of Contents

Introduction

Sustainable Entrepreneurial Ecosystems is a concept that has recently been gaining attention, as it is of increasing importance that there are more entrepreneurs with a sustainability-orientation, and we need to know how to support this. From Schrijvers et al. (2021) we know which elements are needed for a higher entrepreneurial output, but it is important that the focus goes from entrepreneurship as a whole, to entrepreneurship that tackles the big problems we face today. Sustainable entrepreneurs likely need different kinds of support than commercial entrepreneurs (Volkmann et al., 2019). If these supportive conditions are unclear, it is unknown where the ecosystems that support sustainable entrepreneurship are and how to make entrepreneurial ecosystems more sustainable.

The Sustainable Entrepreneurial Ecosystem (SEE) research field connects two other fields of entrepreneurship research: Entrepreneurial Ecosystems and Sustainable Entrepreneurship (Volkmann et al, 2019). The entrepreneurial ecosystem (EE) concept looks at how an environment in a geographical region that supports entrepreneurs to innovate and form new enterprises can be created (Simatupang et al., 2015). When those entrepreneurs engage in sustainable entrepreneurship, they take their social and/or environmental value, and not only their economic value, into account when doing business. Their start-ups are central in the sustainable transition of the economy (Volkmann et al., 2019) and often align with one or more of the UN SDGs (Tiba et al, 2021). In this paper, the term sustainable entrepreneurs encompasses entrepreneurs that have started enterprises with an environmentally or socially sustainable goal. Combining the above, SEE research is about how a region can foster entrepreneurship that also has a social and/or environmental focus in their core business model. This will contribute to a more sustainable regional environment (Cohen, 2006). However, recognizing and developing sustainable opportunies is more difficult (Patzelt & Shepherd, 2011) and specific support and stakeholders that facilitate the opportunity development are needed (Volkmann et al., 2019; Bischoff & Volkmann, 2018).

In current literature, regional conditions that are thought to be supportive for sustainable entrepreneurship are the availability of incubators, sustainability education and impact investors, as well as the sustainability awareness in the region, the governmental sustainability and the economic development. However, most of the literature only looks at one of these condition and the way they could influence sustainable entrepreneurship. Bischoff and Volkmann (2019) theorizes that most of these conditions are part of an SEE, but there is a research gap of which of these conditions are the most important and how the different conditions interact to become a more sustainable entrepreneurial ecosystem.

This paper will attempt to fill this research gap, trough the QCA method on (at most) 273 NUTS-2 regions, and attempt to answer the following research question: what are the configurations of the most (environmentally or socially) sustainable entrepreneurial ecosystems? To answer this, the

following to sub-questions need to be answered: ‘what are the configurations of ecosystems with a high share or a high output of environmental start-ups?’ and ‘what are the configurations of ecosystems with a high share or a high output of social start-ups?’. This paper will look at which conditions combine in an entrepreneurial ecosystem to have a high output (absolute numbers) of sustainable (environmental or social) start-ups and which conditions combine to have a higher share of the entrepreneurial output be environmentally or socially sustainable.

This means that the thesis is relevant to regions and their representatives to see which conditions are the most important to focus on if they want to be a more sustainable entrepreneurial ecosystem, which leads to a more sustainable regional environment. This thesis also contributes to academic literature, as it looks at sustainable entrepreneurship conditions researched in previous papers and combines them to see which configurations of those conditions is best at supporting sustainable entrepreneurship.

For a high amount of environmental start-ups, the incubators and impact investors conditions are important, as they are present in both configurations. These two conditions are combined with either a high environmental awareness or a high GDP per capita. For a high amount of social start-ups these are also two important configurations (replacing environmental awareness for social awareness). However this analysis yielded another sufficient configuration: impact investors, social awareness, governmental sustainability and economic development all need to be present. For the percentage of environmental start-ups the combination of sustainability education-incubators-impact investors is important, combined with economic development, but with absence of governmental sustainability. On the other hand, for the social percentage, the combination of social awareness and governmental sustainability is important. The two conditions can be combined with either an absence of incubators or an absence of sustainable education.

The rest of the paper will look as follows: First, a literature review will be done on previous academic research on sustainable entrepreneurship, EEs, SEEs and its conditions, and a theoretical framework will be formulated. Next, the data collection is explained, as well as the methodology of data analysis. After that, the results are shown and discussed extensively. The last part concludes the paper, explains what contributions, but also what limitations the paper had and explores what future research could be based on this paper.

Literature review and Theoretical Framework

Sustainable Entrepreneurship

Low and MacMillan (2007) defined entrepreneurship as the creation of a new enterprise and proposes that the role of entrepreneurship research is to "explain and facilitate the role of new enterprise in furthering economic progress" (p. 141). Entrepreneurship is widely seen as having a key driver of economic growth (Leendertse et al., 2022a), as it introduces innovations into the system, which can break the current equilibrium (Schumpeter, 1934). Currently, there is a new wave in entrepreneurship research, which shifts the focus from only looking at entrepreneurship as a driver of economic growth, to also seeing it as a potential driver of environmental and social growth: sustainable entrepreneurship research (Volkmann et al., 2019). Sustainable entrepreneurship is often defined by the definition proposed by Patzelt and Shepherd (2011): "Sustainable entrepreneurship is the discovery, creation, and exploitation of opportunities to create future goods and services that sustain the natural and/or communal environment and provide development gain for others" (p. 632). Sustainable entrepreneurs do not only care about their economic value, but also take their environmental and social value into account in their core business model. Sustainable start-ups often address one or more of the United Nations Sustainable Development Goals (UN SDGs), a framework that encompasses both social and environmental goals (Tiba et al., 2021). See Appendix 1 for an overview and classification. The Sustainable Development Goals, adopted by the UN in 2015, are "a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity." (UNDP, n.d.). Sustainable entrepreneurship is seen as a key player in the transition to a sustainable economy (Volkmann et al, 2019), because they can translate scientific findings into actionable solutions that contribute to societal change (Tiba et al., 2021). Sustainable entrepreneurs are necessary in the fight against problems such as climate change, hunger and social inequality.

Entrepreneurial Ecosystems

Entrepreneurial Ecosystems (EEs) stem from the idea that entrepreneurs do not live in a vacuum and that firm-level competitive advantage is also influenced by factors outside of an organization (Spigel & Harrison, 2017). The two sources that started the interest in EEs, Isenberg (2010) and Feld (2012), both highlighted the importance of various actors that can support the entrepreneur financially and emotionally and the (education, policy and economic) environment that can provide resources for new venture creation (Spigel & Harrison, 2017). The EE concept looks at geographic regions and how an environment can be created that supports innovation, new (successful) firm formation and the subsequent employment growth (Simatupang et al., 2015).

One framework that tries to explain these EEs is by Stam and van de Ven (2021), which tries

to explain EEs through ten elements, and can be seen in Figure 1.

Leendertse et al. (2022a) has shown that this framework is robust, because a higher combined quality of the elements, leads to more entrepreneurial activity (measured by the number of CrunchBase firms). Schrijvers et al. (2021) researched which different element configurations led to (very) high entrepreneurial output, as the elements interact with each other. To be in the top 25% an ecosystem needed either strong human capital or knowledge combined with either strong leadership or strong institutional arrangements. To be in the top 10% all ten conditions need to be strong, with leadership and intermediate services as necessary conditions. It is thus important to have an ecosystem where all elements are strong and able to support entrepreneurs. The framework of Stam and van de Ven (2021) and the mentioned papers are important in understanding what is important for high entrepreneurial output in general. However the goal of this paper is to see what influences the entrepreneurs to have an environmental or social goal.

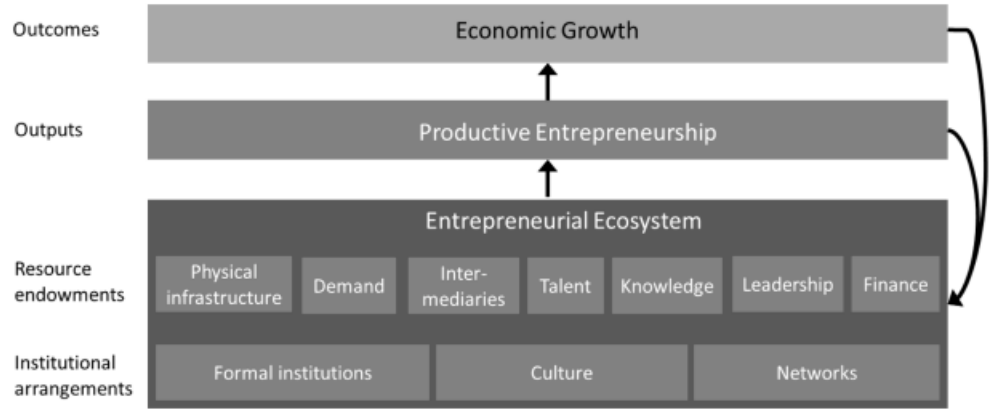

Figure 1. Entrepreneurial Ecosystem Framework (Stam & Van de Ven, 2021; Leendertse et al., 2022a)

Sustainable Entrepreneurial Ecosystems

Sustainable entrepreneurial ecosystem (SEE) research relates the EE concept to sustainability issues and how a region can foster sustainable entrepreneurship (Volkmann et al., 2019). Cohen (2006) describes SEEs as an interconnected set of stakeholders in a regional entrepreneurial environment that focus on fostering sustainable entrepreneurship, which contributes to the transition to a more sustainable regional environment. So, here the focus has also switched from only looking at the economic value to also looking at the environmental and social value. Current research is focusing on which conditions are important for sustainable entrepreneurship, as sustainable entrepreneurs may need different support than commercial entrepreneurs (Volkmann et al., 2019). If it is not clear which conditions are favorable for sustainability start-ups, it becomes harder for them to locate to a region that might be more supportive (Tiba et al., 2021). Regional policy makers also do not know which conditions they should focus on to increase the amount of sustainable start-ups. Recognizing and developing sustainable opportunities is more difficult than recognizing non-sustainable opportunities,

because next to entrepreneurial knowledge, the entrepreneur also must have knowledge of the natural or communal environment and recognize it is in danger (Patzelt & Shepherd, 2011). That is why they need specific support and relations to be successful, and it is important that their stakeholders facilitate sustainable opportunity development (Volkmann et al., 2019). Bischoff & Volkmann (2018) developed an SEE framework that describes the ways different stakeholders can be supportive. For example, it helps if there is awareness for environmental and social issues in the local community. For the complete overview, see Figure 2.

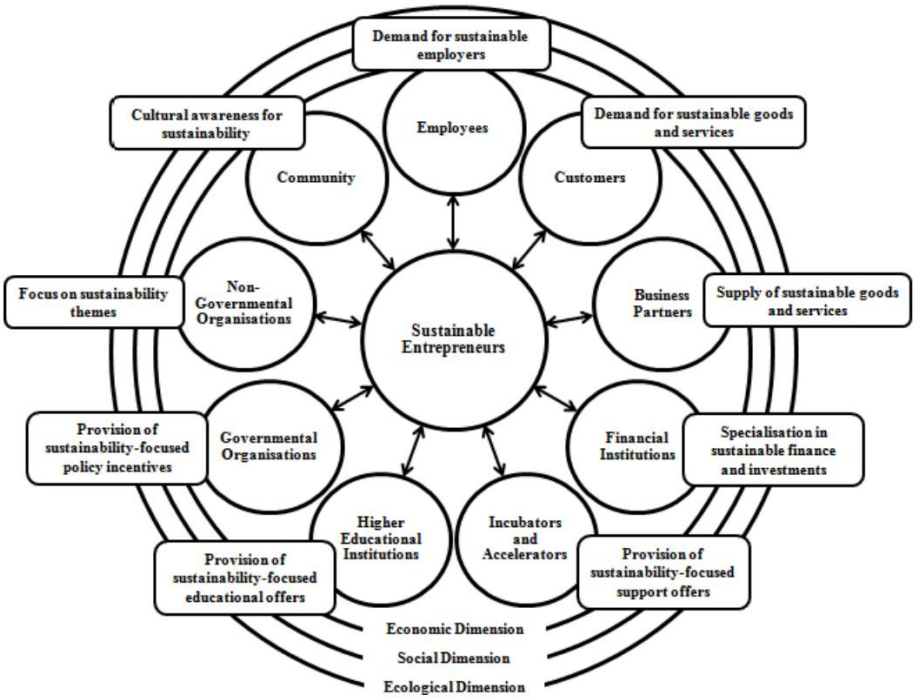

Figure 2. Sustainable Entrepreneurial Ecosystem Framework from Bischoff and Volkmann (2018)

Conditions for Sustainable Entrepreneurship.

This part will look deeper into the conditions that foster sustainable entrepreneurship in a region. These will be the conditions used in the analysis. Most of the conditions are based on the elements in Figure 2. However, not all elements are used. The Non-Governmental Organizations element is not used, because their main goal is to influence the political decision making process, by offering relevant information or to empower or represent a group that could be excluded from the political process (Lage & Brant, 2008). NGOs rarely are in direct contact with entrepreneurs. The governmental sustainability condition could be an indication of the success of their influence. The other element that is not used as a condition in the analysis is the Business Partners element. This is because this is hard to generalize for all start-ups. Sustainable start-ups are very diverse (even within

the social and environmental classifications) and require different goods and services. Furthermore, a sustainable business partner for a sustainable entrepreneur can also be a start-up themselves. A problem here is that this way such a business might be counted for both the condition and the outcome. There is one condition in the analysis that tries to cover three of the elements in Figure 2. The environmental/social awareness condition tries to capture the cultural awareness for sustainability, but also the demand for sustainable employers or for sustainable goods and services. In a culture that values sustainability, the amount of people with these demands are likely to be higher.
On the other hand, the condition of economic development is added, because this condition can show how important it is that the economy of a region is healthy before entrepreneurs also consider their environmental and social contribution. That captures something different than specific stakeholders that potentially have an influence on the entrepreneur.

Figure 3 is an overview of the theoretical framework of this paper and includes the chosen conditions. It also includes a feedback loop, as the sustainability-orientation of successful start-ups has an influence on their EE. They create an environment where more sustainable start-ups can be created and grow (Tiba et al., 2020). For example, they bring new talent and resources to the region, the founders can mentor new entrepreneurs, and they show investors that sustainability-oriented start-ups can be good investments (Tiba et al., 2020).

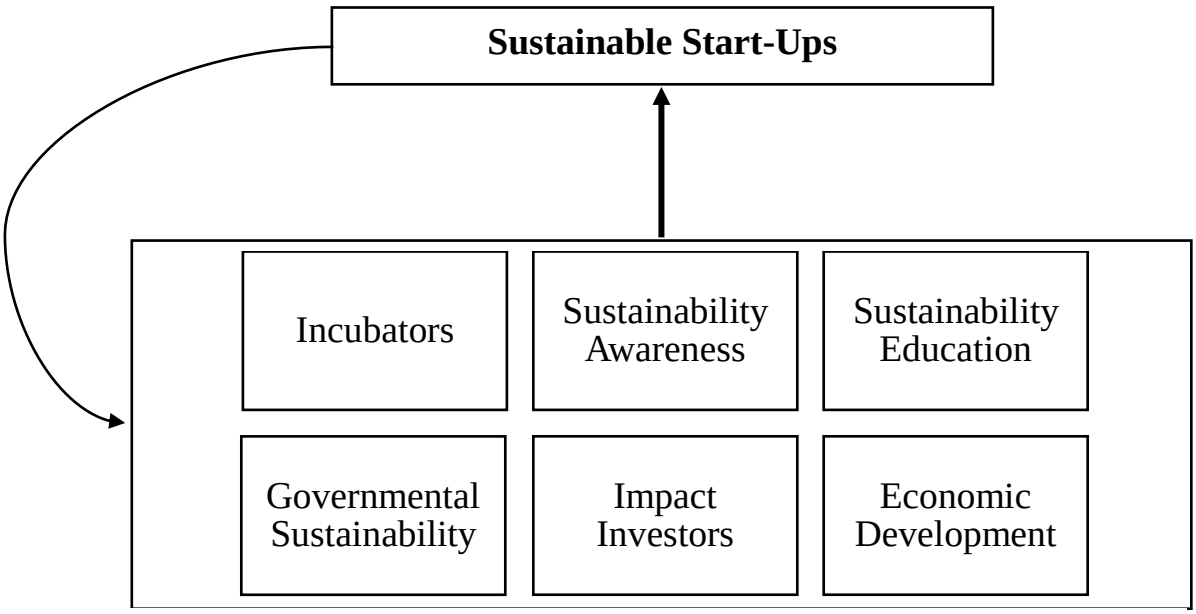

Figure 3. Theoretical Framework

Incubators

The first condition that fosters sustainable entrepreneurship in a region is the amount of incubators in that region. Incubators create the environment that supports entrepreneurs in realizing their business plan, because they guarantee the availability of essentials of starting a new enterprise, such as infrastructure, support services and financial support, are available to new entrepreneurs (Petrou et al., 2010). Incubators are mainly university-based. Utrecht University is also linked to an

incubator, UtrechtInc, which has supported companies such as Snappcar (UtrechtInc, n.d). Swedish, German and Finnish incubators showed a lot of interest in acting as catalyst for sustainable development (Klofsten et al., 2016). That could be through nudging commercially-minded enterprises in a more sustainable direction, but also supporting sustainability-oriented firms (Klofsten et al., 2016). An entrepreneurship training program, which consists of offering business expertise, coaching, mentoring and networking, is a (complementary) way through which sustainability-oriented entrepreneurs can be supported (Klofsten et al., 2016). UTG Augsburg is an example of an incubator that (partly) has a focus on sustainability, as they support entrepreneurs in the environmental technology domain (Wagner et al., 2019). They most important way they help entrepreneurs is through the life-cycle assessment tools entrepreneurs can use to assess and communicate their regional sustainability impact (Wagner et al, 2019).

Sustainability Awareness

The local community and its culture is important to the success of business operations as it shapes the public opinion and acceptance of the enterprise (Werther & Chandler, 2014, as cited in Bischoff & Volkmann, 2018). So, in order to be accepted, sustainability-related aspects are more often part in the decision-making process and play a more important role in (creating) a company's vision and mission in a culture where sustainability is important (Spence et al., 2011). From this it can be assumed that sustainability-focused cultures are more likely to engage in sustainable entrepreneurship (Bischoff, 2019). This hypothesis is also tested by Bischoff (2019) and partial support is found that the perceived awareness for sustainability in the region has a positive relation with the perceived strength of that SEE. Social norms (towards climate change), in which awareness plays a big part, positively affected firm formation in the clean-tech industry (Sunny & Shu, 2017). Awareness of sustainability, and potential threats for this sustainability, is essential to addressing it and taking action (Newell & Moore, 2010; Patzelt & Shepherd, 2011).

Sustainability Education

Next to being aware of sustainability and its challenges, enough knowledge on how to deal with these sustainability challenges in the region is also needed. Higher educational institutions, such as universities, can play an important role here by providing sustainability focused education offers (Bischoff & Volkmann, 2018). The MBA Sustainability Management full-degree programme at the Centre for Sustainability Management is a good example. The programme covered classes in sustainability management, innovation and entrepreneurship, as well as more specialized classes (Wagner et al., 2019). The (sustainability-oriented) environment and support systems of universities have an influence on the social, cultural and environmental responsibility of their students, which then

plays an important role in the sustainable entrepreneurial intention of the students (Bazan et al., 2019). The sustainability-oriented environment and support systems help students by, among others, creating awareness, providing knowledge, mentoring and arranging workshops regarding sustainable entrepreneurship (Bazan et al., 2019). Education in sustainability strengthens sustainability mindsets and empowers people to take action (Hörisch et al., 2014). The increased knowledge about the challenges in their natural and communal environment and how they can deal with them helps with recognizing entrepreneurial opportunities (Patzelt & Shepherd, 2011).

Governmental Sustainability

Governments are a key player in EEs and the same is the case for sustainable EEs, as it can support sustainable entrepreneurs through (non-)financial incentives and through advice services with a sustainability focus (Bischoff & Volkmann, 2018). Entrepreneurs face several challenges in their early stages, such as high risk and difficulty in accessing finance. They need the help of the government to overcome these challenges, which can come in the form of regulations, grants, subsidies and (fiscal) incentives (Abdellatif et al., 2022). The sustainability-orientation of governments is important, because sustainable entrepreneurs do not only need policies that promote entrepreneurship, but also policies that promote sustainability (in entrepreneurship). Some governments incentivize enterprises to behave sustainably by using instruments as eco-taxes and sustainability certification (Benijts, 2014). Sunny and Shu (2017) look at, among other factors, regulatory and incentive policies as a driver of firm formation in the clean technology sector. Here they find empirical evidence that (technology-push) regulative policies have a positive effect on firm formation at the regional level (Sunny & Shu, 2017). Incentive-based policies increase the effect of capital on firm formation, potentially because investors now find the opportunities more financially attractive (Sunny & Shu, 2017).

Impact Investors

Getting access to finance is one of the key challenges for entrepreneurs and is important for the creation, survival and growth of new enterprises (OECD, 2013). For sustainable entrepreneurs this challenge might even be greater, because their business model is to balance both social/environmental gain and financial gain (Hoogendoorn et al., 2017). They might not achieve all the financial gain possible and that can be a problem for investors. This means that it is important for new sustainable enterprises that there is a high acceptance and interest in sustainability topics in the financial institutions of their region (Bischoff & Volkmann, 2018). There needs to be an interest for impact investing. Institutional impact investors are asset owners such as pension funds or insurers that want to have measurable social and/or environmental impact with (part of) their portfolio, next to financial

returns (Wood et al., 2013). If an impact investor is interested in start-ups, they can also play some important roles outside the funding, such as improving the start-up's credibility, promoting them to external stakeholders and mentoring them (Holtslag et al., 2021).

Economic Development

This is not in the framework of Bischoff and Volkmann (2018), but still is an important condition in a SEE, as economic development in a region can have multiple effects on the sustainability-orientation of entrepreneurs. The first theory is that strong economic development in a region has a positive effect. Gelissen (2007) finds evidence that higher levels of economic growth is related to higher levels of support for environmental protection. People in economically developed regions have more room to care about the environment and others, which means it is likely that there is a greater share of entrepreneurs that take those factors into account when operating (Tiba et al, 2021). However, Tiba et al. (2021) also notes that there is a theory that counters this one. With less developed economies, governments are less likely to offer social goods and services, leaving market gaps, and to fill these gaps sustainability entrepreneurs enter (Matsunga et al., 2010). After empirical analysis, Tiba et al. (2021) concluded that, in combination with high shares of either female founders or non-religious people in the population, economic development has a positive effect on the percentage of sustainable entrepreneurs. It can be suggested that the sustainability-orientation arises in an entrepreneur when they can 'afford' it (Tiba et al, 2021). This can also hold for the customer population in the region. They can 'afford' to care about sustainability in their consumption, and buy products that might be more expensive than the conventional counterpart.

Empirical Strategy

Data Collection and Description

This research paper will use secondary data from multiple sources. The data will be collected for 273 NUTS-2 regions, divided over 28 European countries. NUTS-2 regions are a breakdown of the European Union in territorial units and are used for the production of statistics and the targeting of regional policies (Eurostat, 2022). A NUTS-2 region's population is between 800 thousand and 3 million people and based on existing national structures (In the Netherlands it is the provinces). The data for incubators, economic development, sustainability education and impact investors are the same for the Environmental and the Social analyses. However, the data on Sustainability Awareness and Governmental Sustainability differs. The data is collected at the NUTS-2 level, except for the governmental sustainability indicators, which are at country level. The goal was to collect data from around the 2017-2021 period. This was however not possible for the Sustainable Education and Impact Investors conditions. See Table 1 for an overview of the data.

Output	Indicator(s)	Description	Source	Year
Environmental Start-ups	Sum of start-ups working on the Environmental SDGs	Environmental SDGs: SDG 6, 7, 11, 12, 13, 14, 15	Adapted version of dataset used in Leendertse and Van Rijnsoever (2022)	2017-2021
Social Start-ups	Sum of start-ups working on the Social SDGs	Social SDGs: SDG 1, 2, 3, 4, 5, 16	Adapted version of dataset used in Leendertse and Van Rijnsoever (2022)	2017-2021
Total Start-ups	Total amount of Start-ups	The total amount of start-ups in the NUTS-2 region. This also includes the conventional, non-sustainable start-ups	Adapted version of dataset used in Leendertse and Van Rijnsoever (2022)	2017-2021
Condition	**Indicator(s)**	**Description**	**Source**	**Year**
Incubators	Number of Incubators	Number of incubators in the NUTS-2 region	(Data behind) Leendertse et al. (2022b)	2019
Sustainability Education	Number of Sustainable Masters	Number of sustainability masters provided by universities in the NUTS-2 region	Keystone Masterstudies (n.d.)	2023
Impact Investors	Number of Impact Investors	Amount of investors shown with the following filters: • SDGs experience: All environmental and social SDGs • HQ location: Cities of the NUTS-2 regions with impact investors	Dealroom (n.d.-a)	2023
Environmental Awareness	Percentage of the population that cares about protecting the environment and worried	*Average of*: • % Protecting the environment is 'Very Important' • *Average of*:	Eurobarometer (2020b)	2020 (Data gathered in 2019)

	about the environmental impact of everyday products	- % Worried about impact of plastics in everyday products on the environment ('Totally Agree') - % Worried about impact of chemicals in everyday products on the environment ('Totally Agree')		
Social Awareness	Percentage of the population that cares about a social Europe and find the lack of social rights a problem	*Average of*: • % Social Europe is 'Very Important' • % 'How much of a problem is lack of Social rights right now?' scored with an 8 or higher	Eurobarometer (2021b)	2021 (Data gathered in 2020)
Governmental Sustainability (Environmental)	→ SDG Implementation → % Environmental Tax	Average of the standardized values of: → Average of the scores for the 7 SDG implementation dimensions → Percentage of the total tax revenue that came from environmental taxes	→ European Parliament (2019) → OECD. (n.d.)	- 2019 - 2018 - 2021
Governmental Sustainability (Social)	SDG Implementation	Average of the scores for the 7 SDG implementation dimensions	European Parliament. (2019)	2019
Economic Development	GDP per Capita	Index of GDP per capita (European Average = 100)	(Data behind) Leendertse et al. (2022b)	2016
Extra Datapoint	**Indicator(s)**	**Description**	**Source**	**Year**
Population	Number of Inhabitants	Average of the population in 2017 and the population in 2021 of the NUTS-2 region	Eurostat (n.d.)	2017 & 2021

Table 1. Overview of the Indicators and Data Collection

Output

An adapted version of the dataset used in Leendertse and Van Rijnsoever (2022), provided by Mr. Leendertse, provided all the relevant datapoints for the outcome values of this paper. A per SDG overview of the amount of start-ups in a NUTS-2 region working on them was used to get the total amount of **Environmental Start-ups** and **Social Start-ups** in a region. **The Total Amount of Start-ups** in a NUTS-2 region were used to get the percentages of environmental and social start-ups in the region.

Conditions

The indicator for **Incubators** is straightforward and shows the amount of them in a NUTS-2 region. Sustainable Masters were chosen as an indicator for **Sustainability Education** as they are specialized education offers. This can include master programs focused on sustainability, but can also include specializations of more conventional master programs. Locations of universities offering such masters were linked to NUTS-2 regions. Investors were seen as **Impact Investors** if they have experience in investing in the (environmental and social) SDGs. This can seem broad, but the dataset goes from 178,622 investors to 13,866 investors when this filter is applied. To get the amount per region, an overview of cities where headquarters of impact investors were established was made and these cities were linked to NUTS-2 regions. **Sustainability Awareness** differs for environmental and social. For both Eurobarometer surveys were used, which are reports on European attitudes towards different issues. The datasets behind these reports are also published in their Open Data Portal. The datasets used for this paper provide the statistics on a regional level. This can be at NUTS-1, NUTS-2 and NUTS-3 level. If at NUTS-1 level, NUTS-2 region within them get the same score. If at NUTS-3 level, their NUTS-2 regions get the average score. Sometimes other regions were reported, but these could usually be linked to the NUTS-2 regions. If none of the above were possible, the NUTS-2 region got their countries' average. For ***Environmental Awareness***, one question was chosen that looked at the importance of protecting the environment overall, and two questions were chosen that looked at the environmental impact of everyday products, from Eurobarometer (2020a). The ***Social Awareness*** indicator was constructed from two questions of Eurobarometer (2021a). One question looked at how important the population finds a Europe that cares about issues such as equal opportunities and social inclusion and protection, while the other question looked at how urgent the population find the current social issues. Note that this data was collected after the Brexit, and that there is no data available for the United Kingdom. This means that the United Kingdom is excluded from the social analyses. SDG Implementation is used as an indicator for both of the **Governmental Sustainability** conditions. The European Parliament assessed the governments of their member states on how they implemented SDGs in their national strategies and governance frameworks. They were assessed on seven different

dimensions, on which they could get a score from 0 to 4: Commitment and strategy, Leadership & Horizontal Coordination, Stakeholder Participation, Monitoring & Review, Knowledge & Tools, Institutions for the long-term and Activities of parliaments for Agenda 2030. The indicator score is the average of the seven dimensions. The environmental analysis has an extra indicator: the share of total tax revenue that comes from environmental taxes. To get a singular score, both indicators were standardized (mean 0 and standard deviation 1) and the average was taken. There is no clear 'social tax' equivalent for the social analyses. Similar to Tiba et al. (2021), the indicator for **Economic Development** is the GDP per Capita. GDP is the sum of total value added of producers in the region. The GDP per Capita is the value added per member of the population. The higher the GDP per capita in a region, the higher the income per head of the population (UN, 2007)

Extra Datapoint

An extra analysis of this paper adjusts for the size of the NUTS-2 regions. To adjust for this, the **Population Size** of the NUTS-2 region is needed. Using this, the amount of environmental and social start-ups and the number of incubators, sustainable masters and impact investors can be transformed to a 'per capita' value.

Descriptive Statistics

Condition	Indicator	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Incubators	Number of Incubators	273	3.48	12.14	0.00	0.00	1.00	3.00	171.00
Sustainability Education	Number of Sustainability Masters	273	1.22	2.52	0.00	0.00	0.00	1.00	15.00
Impact Investors	Number of Impact Investors	273	15.75	41.34	0.00	0.00	3.00	11.00	383.00
Environmental Awareness	Survey on Environmental Issues	273	50.94%	11.90%	10.75%	43.25%	50.00%	61.25%	90.25%
Governmental Sustainability (Environmental)	*SDG Implementation*	*28*	*1.93*	*0.87*	*0.43*	*1.14*	*2.00*	*2.29*	*3.71*
	Percentage of Environmental Tax	*28*	*6.83%*	*1.61%*	*3.90%*	*4.99%*	*6.63%*	*7.09%*	*10.82%*
	Average Value after Standardization	28	-0.15	0.55	-1.02	-0.64	-0.22	0.30	1.71
Economic Development	GDP per Capita (index)	273	96.40	35.63	29.41	71.77	90.34	114.61	262.02
Output	**Indicator**	**N**	**Mean**	**St. Dev.**	**Min**	**Pctl(25)**	**Median**	**Pctl(75)**	**Max**
Environmental Start-ups	Number of Environmental Start-ups	273	11.24	35.05	0.00	1.00	3.00	9.00	490.00
Environmental Percentage (Regions with ≥20 start-ups)	(Environmental Start-ups / Total Start-ups)	203	7,23%	4,93%	0,00%	4,12%	6,38%	8,99%	29,03%

Table 2. Descriptive Statistics of the Environmental Conditions

Condition	Indicator	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Incubators	Number of Incubators	233	3.07	7.14	0.00	0.00	1.00	3.00	62.00
Sustainability Education	Number of Sustainability Masters	233	1.17	2.40	0.00	0.00	0.00	1.00	12.00
Impact Investors	Number of Impact Investors	233	14.22	36.28	0.00	0.00	3.00	11.00	383.00
Social Awareness	Survey on Social Issues	233	39.17%	12.16%	3.50%	31.00%	39.00%	47.00%	87.00%
Governmental Sustainability (Social)	SDG Implementation	27	2.11	0.82	0.43	1.57	2.14	2.43	3.71
Economic Development	GDP per Capita (index)	233	95.36	36.28	29.41	68.53	89.64	114.68	262.02
Output	**Indicator**	**N**	**Mean**	**St. Dev.**	**Min**	**Pctl(25)**	**Median**	**Pctl(75)**	**Max**
Social Start-ups	Number of Social Start-ups	233	20.57	44.82	0.00	2.00	7.00	18.00	358.00
Social Percentage (Regions with ≥20 start-ups)	(Social Start-ups / Total Start-ups)	164	15.52%	6.78%	0.00%	11.27%	14.35%	18.67%	40.74%

Table 3. Descriptive Statistics of the Social Conditions

Methodology

The research method used in this paper is (fuzzy set) Qualitative Comparative Analysis (QCA) from Rogin and Rihoux (2009). QCA looks for different configurations (combination of conditions) that can produce a specific outcome, which fits this research question, as top performers might not all have the same conditions available. This is also called equifinality and is an important characteristic of the method: there are multiple ways to get to one outcome (Schneider & Wagemann, 2012). Two other important characteristics are multiple conjunctural causation (several elements can combine to have an outcome it wouldn't produce on its own) and causal asymmetry (absence of a combination that would produce high output in a region does not automatically mean that that region produces a low output) (Schneider & Wagemann, 2012). Multiple conjunctural causation takes into account the interdependencies of the elements in the regions. Schrijvers et al. (2021) is an example of the use of QCA in EE research. Tiba et al. (2021) used the method in SEE research, but their elements mainly captured information (gender or religion) about the population and the entrepreneurs. The QCA method usually follows four steps: calibration of the values, necessary condition analysis, making the truth table and the sufficient configuration analysis.

Calibration

The data is calibrated before it is analyzed, which means that for each region the membership to the conditions and to the outcome set is assigned. Both the conditions and the outcomes were calibrated. During calibration, all the regions got a score between 0 and 1 for all the variables. It shows how (relatively) strong the region is for a certain condition. If all variables have similar scores, an analysis can be done. In a fuzzy set QCA, there are three datapoints needed to calibrate variables: the inclusion threshold, the exclusion threshold and the crossover point. If a region has a value above the inclusion threshold it is fully-in and will get a score of around 1. If the value is below the exclusion threshold it is fully-out and get a score of around 0. The crossover point will be used to give a calibrated value to the values between the two thresholds. Similar to Schrijvers et al. (2021), the exclusion threshold will be the 25^{th} percentile (of the variable), the crossover point the 50^{th} (the median) and the inclusion threshold the 75^{th}. This gives the top 25% most (environmentally of socially) sustainable ecosystems a score of around 1. An exception here is the variable for sustainable education for the main analyses. There, both the 25^{th} and the 50^{th} percentile have the same score (0.00). The exclusion threshold, crossover point and inclusion threshold for that variable will be 0.00, 1.00 and 2.00 respectively. The same problem is found in the per capita analyses. There, half of the 75^{th} percentile value is used as the 50^{th} percentile value.

For the analysis of very high (top 10%) environmental or social start-ups rate, the thresholds of membership to the outcome value bacame the 50^{th}, 75^{th} and 90^{th} percentile. This calibration was done in R using the QCA package (Dusa, 2019). A script was written that calibrated all the conditions and

outcomes. Note that for each analysis different values were used as percentiles (the 25th, 50th and 75th percentiles of the dataset used in the analysis). After all the data was calibrated, it could be analyzed.

Necessary Condition Analysis

The first analysis is to find necessary conditions. This analysis showed if a condition is necessary on its own for the outcome. If the outcome is present, the condition is also likely to be present. A condition was considered a necessary condition if it had a consistency score of 0.9 or higher (Leppänen, 2019). This analysis was done using the fsQCA package (Ragin & Davey, 2022) in R.

Truth Table

Next, a truth table was constructed. A truth table is an overview of every possible combination of absent and present conditions. There are 2^6 (64) possible combinations, but it is not probable that all different combinations have an observation. An observation is in this case a NUTS-2 region. Combinations with a small amount of observations were excluded from the truth table and analysis. See Table 4 of the frequency cut-offs of the different analyses. The cut-offs were chosen in a way that there are still enough combinations, also called rows, left in the table to have a proper analysis, but that the amount of cases in a row did not get too small (compared to the amount of regions in the dataset). For each row the truth table also show the raw consistency of that row. This shows how consistently the regions that have the configuration of that row will be in the outcome set (so have a score of around 1 for the outcome variable). If this consistency score was above a certain value, the row was assigned a 1 for the outcome variable. See Table 4 for the consistency thresholds chosen for the different analyses. The usual consistency threshold used in QCA is 0.8 (Schneider & Wagemann, 2012). However, some analyses did not have a score above 0.8, but did have scores above 0.75. For those analysis 0.75 was chosen as the consistency thresholds, even though the significance of those analysis will be lower. The construction of the truth table will also be done by using the fsQCA package (Ragin & Davey, 2022). The truth tables of all the analyses can be found in the Appendix.

Sufficient Configuration Analysis

The constructed truth tables were used for the analysis of sufficient configurations. The QCA method is made to analyze which combination of conditions are consistently in the outcome set. Here, the analysis is done using the fsQCA package (Ragin & Davey, 2022). The output shows combinations of present or absent conditions, that, if present (or not) in a region, will likely lead to a (relatively) high share or output of environmental or social start-ups. The configurations also get a

consistency and a coverage score. The consistency score shows the degree to which membership in a configuration is a subset of being a membership of the outcome (Ragin & Davey, 2022). The coverage score explains how much of the outcome set is explained by the configuration (Ragin & Davey, 2022). The output also gives the overall consistency and coverage scores of the analysis. Next to these scores, the output also provides which regions are (partly) members of a configuration.

Types of Analysis

This paper consists of two main types of analysis, for both the environmental and the social start-ups. The two different types of analysis come from the two ways an Entrepreneurial Ecosystem can be viewed as a Sustainable Entrepreneurial Ecosystem. The first way is to look at the **Absolute Number of Social or Environmental Start-ups**. In regions with a higher number of those start-ups, there are more (new) enterprises working towards one or more of the SDGs and thus more enterprises working on the sustainable development of the region. Another way to look at a Sustainable Entrepreneurial Ecosystem is a region that has a high **Percentage of Environmental or Social Start-ups**. In these regions entrepreneurs are more likely to have an environmental or social goal in mind when starting their new enterprise. For this analysis it was important to only look at regions with enough start-ups, so that one sustainable start-ups did not have too much of an influence. This paper chose to have the cut-off at regions with less than 20 start-ups in the 2017-2021 period. A reason for this is that the 25th percentile of the total amount of start-ups in the region is 19, and Schrijvers et al. (2021) had this percentile as the exclusion point. Every country in the dataset had a region with at least 20 start-ups, so they were all represented.

Previous empirical research has looked at Sustainable Entrepreneurial Ecosystems from both these perspectives. For example, Sunny and Shu (2017) analyzed the effects of different conditions on the absolute number of firms formed in the clean technology sector, while Tiba et al. (2021) analyzed the influence of certain conditions on the proportion of sustainable start-ups in the 28 largest entrepreneurial ecosystems.

These two main analyses also had extra analyses with which the results were compared. The main analysis for the Absolute Number of Start-ups had the top 25% in the outcome set, but this is still a large amount of regions. To make the outcome set smaller, there is also an analysis done that analyzed what is needed to be in the ***Top 10% of the Absolute Number of Environmental or Social Start-ups***. NUTS-2 regions are said to be between 800 thousand and 3 million people, however there are still 91 regions that fall outside this boundary. To adjust for this difference in size, an analysis of ***Environmental or Social Start-ups per Capita*** was conducted. The Incubators, Sustainability Education and Impact Investors conditions will also be per capita. The last extra analysis was for comparison with the percentage analysis, but now the ***Percentage of Environmental or Social Start-ups for Regions with More Than 100 Start-ups*** is analyzed.

The necessary conditions and sufficient configurations of the two main analyses are shown and discussed in the main text, but for the extra analyses these are in the appendix and only the comparison will be discussed. The truth table for all analyses can be found in the appendix.

It is important to note that the (40) United Kingdom regions were excluded from the Social analyses, as there was no Social Awareness indicator for the United Kingdom. The Social analyses thus consistently had less regions compared to the environmental analyses. Table 4 gives an overview of the different analyses.

Analysis		**N**	**Outcome Set**	**Frequency Cut-off**	**Consistency Threshold**
Absolute Number of Start-ups	Environmental	273	Top 25%	4	0.8
	Social	233	Top 25%	4	0.8
Percentage of Start-ups	Environmental	203	Top 25%	3	0.75
	Social	164	Top 25%	3	0.75
Absolute Number of Start-ups (Top 10%)	Environmental	273	Top 10%	4	0.75
	Social	233	Top 10%	4	0.75
Start-ups per Capita	Environmental	273	Top 25%	4	0.8
	Social	233	Top 25%	4	0.8
Percentage of Start-ups (Regions with ≥100 start-ups)	Environmental	89	Top 25%	3	0.8
	Social	67	Top 25%	2	0.8

Table 4. Frequency Cut-offs and Consistency Thresholds Used for Sufficient Configurations

Results and Interpretation

Necessary Conditions

First, the results of the necessary condition analysis. This analysis shows if a condition is necessary on its own for an outcome to happen. If the outcome is present, the condition will also (very likely) be present. Here this would mean that if a region is in the top 25 (or 10) percent of (environmentally or socially) sustainable entrepreneurial ecosystems, the necessary conditions found are very likely to also be present. The analysis gives two values: consistency and coverage. Consistency indicates the degree to which the condition is part of the outcome set, while the coverage indicates the empirical relevance of the condition (Ragin, 2017). A condition is seen as necessary if the consistency score is above 0.9. Below, tables of the main analyses are shown.

Environmental

	Absolute Number of Environmental Start-ups		**Percentage of Environmental Start-ups**	
Condition	**Consistency**	**Coverage**	**Consistency**	**Coverage**
Incubators	0.754	0.808	0.553	0.603
Sustainability Education	0.513	0.798	0.444	0.553
Impact Investors	0.812	0.790	0.552	0.549
Environmental Awareness	0.580	0.582	0.565	0.581
Governmental Sustainability (Environmental)	0.522	0.488	0.531	0.520
Economic Development	0.694	0.684	0.518	0.530

Table 5. Necessary Conditions for the Environmental Analyses

Table 5 shows the results of the necessary conditions analysis for the main environmental analyses. For neither of the analyses there is a value that exceeds the 0.9 threshold. Compared to the other values, the consistency scores of the incubators and the impact investors condition are relatively high, and also have high coverage scores, but still below the threshold. However, the environmental top 10% necessary condition analysis, as seen in Appendix 6.1, shows that these two conditions become necessary to be in the top 10% of regions with a high environmental start-up rate. But a reason that these two conditions have a high value can be because these two conditions make sure that there are a lot of start-ups in total. Incubators provide support services and relevant infrastructure for all kinds of entrepreneurs. If there are a lot of impact investors in a region, it can be because there are a lot of investors in total in that region and investors are the most important source of funding for kinds of entrepreneurs. The per capita analysis (Appendix 7.1) and the percentage analysis of regions with more than 100 start-ups (Appendix 8.1) do not show any necessary conditions.

Social

	Absolute Number of Social Start-ups		Percentage of Social Start-ups	
Condition	**Consistency**	**Coverage**	**Consistency**	**Coverage**
Incubators	0.772	0.818	0.526	0.549
Sustainability Education	0.520	0.821	0.433	0.543
Impact Investors	0.877	0.861	0.568	0.561
Social Awareness	0.510	0.515	0.551	0.560
Governmental Sustainability (Social)	0.560	0.553	0.624	0.654
Economic Development	0.747	0.703	0.537	0.552

Table 6. Necessary Conditions for the Social Analyses

Similar to the environmental analysis, there is no condition that is seen as necessary for the social analysis, seen in Table 6, but the impact investor condition comes close. The incubators and impact investors condition for the absolute number of social start-ups are also the two highest, and again, these two conditions are seen as necessary for the Top 10% analysis (Appendix 9.1). However, this can again be because the two conditions also make sure that there are more start-ups in the region in total. The per capita analysis (Appendix 10.1) and the percentage analysis of regions with more than 100 start-ups (Appendix 11.1) do not show any necessary conditions.

Sufficient Configurations

The sufficient configuration analysis shows which combinations of conditions are consistently present in regions with a high environmental or social start-up rate or a high share of environmental or social start-ups. The first step of this analysis is the making of truth tables. The truth tables for all the analyses are in the Appendices. When analyzing the truth table, assumptions of if conditions are likely to be present or absent to get to the outcome are asked. For these analyses, almost all the conditions are assumed to be present, except economic development, as it is also theorized that in regions with less economic development, as the literature (review) gives two opposing theories. The intermediate solution of the output was used to get the sufficient configurations, while the parsimonious solution was used to see if a condition in a configuration was a core or a peripheral condition. Core conditions indicate that a condition has a strong relationship with the outcome, while a peripheral condition has a weaker relationship (Fiss, 2011).

The configuration tables are made using the method proposed by Fiss (2011). Black circles represent that the condition is present in the configuration, while a box with a cross means that a condition is absent. The absence of a circle or cross means indifference for that condition. A large circle indicates a core condition and a smaller circle indicates a peripheral condition.

The first thing to notice is that the results for the environmental analyses are more easily

interpreted and more consistent compared to the social analyses. The conditions are more tailored towards environmental start-ups and interact more clearly to have a high environmental start-up rate or share of environmental start-ups. (Sustainability-oriented) incubators are usually more interested in start-ups with an environmental goal and the sustainability masters are more often only about environmental sustainability or about both than only about social sustainability. It is also unfortunate that the social analysis does have an extra indicator for the governmental sustainability, but a social tax is more difficult to conceptualize.

First the environmental configurations are discussed, and after that the social. The sufficient configuration tables of the main analysis are shown in the text, while the tables for the extra analyses are in the appendix.

Environmental Start-ups

Absolute Number of Environmental Start-ups (Top 25%)		
	Configurations	
	A	**B**
Incubators	●	●
Sustainability Education		
Impact Investors	•	•
Environmental Awareness	●	
Governmental Sustainability (Environmental)		
Economic Development		●
Consistency	0.879	0.901
Raw Coverage	0.396	0.539
Unique Coverage	0.089	0.232
Overall Solution Consistency	**0.887**	
Overall Solution Coverage	**0.628**	

Table 7. Sufficient Configurations for Absolute Number of Environmental Start-ups

Table 7 shows two sufficient configurations (combinations of conditions) that are consistently found in regions with a high number of environmental start-ups. The first thing to notice here is that both the sufficient configurations include the incubator and the impact investor conditions. Having a high number of both of those will likely increase the total amount of start-ups in a region. However, what can be interpreted from this configuration is that environmental start-ups also make use of incubators and investors, and that these services are not only used by conventional start-ups. But, the combination of those two conditions is not strong enough on its own to have a high number of environmental start-ups. To make sure that a lot of the start-ups in a region have an environmental goal, these two conditions need to be combined with other conditions. In the first configuration incubators and impact investors are combined with a high amount of awareness of environmental

issues in a region. Entrepreneurs and the population in the regions that are part of this configuration are aware of the current environmental issues and are aware of the effects that plastics and chemicals of everyday products have on the environment. In the second configurations the two conditions are combined with a high GDP per capita. Here the population and the entrepreneurs can afford to not only see the financial side of products or services, but also the environmental impact of them. There are some regions that are in both configurations and combine a high amount of incubators and impact investors with both high environmental awareness and a high GDP per capita. Such a region is Stockholm (SE11). Stockholm is home to 10 incubators, among them is Sting, which is interested in climate technology (Sting, n.d.-a). If a climate tech start-up is successful as a part of Sting, they can receive investment from Propel Capital, which only invests in start-ups from Sting (Sting, n.d.-b). Stockholm also has the eight highest GDP per capita of the dataset, so the entrepreneurs and population can definitely 'afford' to care about environmental issues. The following environmental issues are important to the people in Stockholm: climate change, but also biodiversity loss and the pollution of water (Eurobarometer, 2020b). Furthermore, 86% of the population thinks that big companies and the industry is currently not doing enough to protect the environment (Eurobarometer, 2020b). Entrepreneurs who are doing what they can to protect the environment might attract the part of the population who thinks the industry should do more. See Table 8 for an overview of all the regions that are part of the configurations and the top 25%, and Figure 4 for a map of the regions.

The sufficient configurations for the Top 10% (Appendix 6.3) do not differ a lot from the sufficient configurations of the top 25% analysis. The basis is the same, but now the configurations combine incubators and impact investors with multiple other conditions. What is noticeable is that now both the configurations has the sustainability education condition present, while it was indifferent for both top 25% configurations. What this shows is that sustainability education is a condition that, if improved by a region, can make that region go from being a region with a high environmental start-up rate, to a region with a very high start-up rate. It is thus interesting for regions in the top 25%, but not in the top 10%, to push for more sustainability masters in their universities. For both configurations, a high GDP per capita is also needed. These four conditions are combined with either the presence of environmental awareness or the absence of governmental sustainability. Why the latter is absent will be explained in the discussion of the percentage analysis.

The only difference between the main configuration and the 'Per Capita' configuration (Appendix 7.3) is that the sustainability education condition is now present in configuration A.

Regions	Region Name	A	B	Number of Environmental Start-ups
AT13	Vienna		x	19
BE10	Brussels		x	26
BG41	Southwestern (Bulgaria)	x		13
DE21	Upper Bavaria		x	94
DE60	Hamburg	x	x	34
DE71	Darmstadt		x	16
DEA1	Düsseldorf		x	23
DEA2	Cologne		x	29
DK01	Capital Region of Denmark	x	x	51
EL30	Attica	x		11
FI1B	Helsinki-Uusimaa		x	42
FR10	Île-de-France/Paris Region	x	x	151
FRK2	Rhône-Alpes	x		19
IE06	Eastern and Midland (Ireland)		x	46
ITC4	Lombardy		x	48
NL32	North Holland		x	113
NL33	South Holland		x	99
NL41	North Brabant		x	28
PL91	Warsaw		x	20
SE11	Stockholm	x	x	80
SE22	South Sweden	x		20
SE23	West Sweden	x		27
UKD3	Greater Manchester	x		21
UKG3	West Midlands	x		14
UKH1	East Anglia	x		16
UKI3&4	Inner London	x	x	490
UKJ1	Berkshire, Buckinghamshire and Oxfordshire		x	38
UKK1	Gloucestershire, Wiltshire and Bristol/Bath area	x		29
UKM7	Eastern Scotland	x		31
UKM8	West Central Scotland	x		10

Table 8. NUTS-2 Regions with the configurations and in the Top 25%

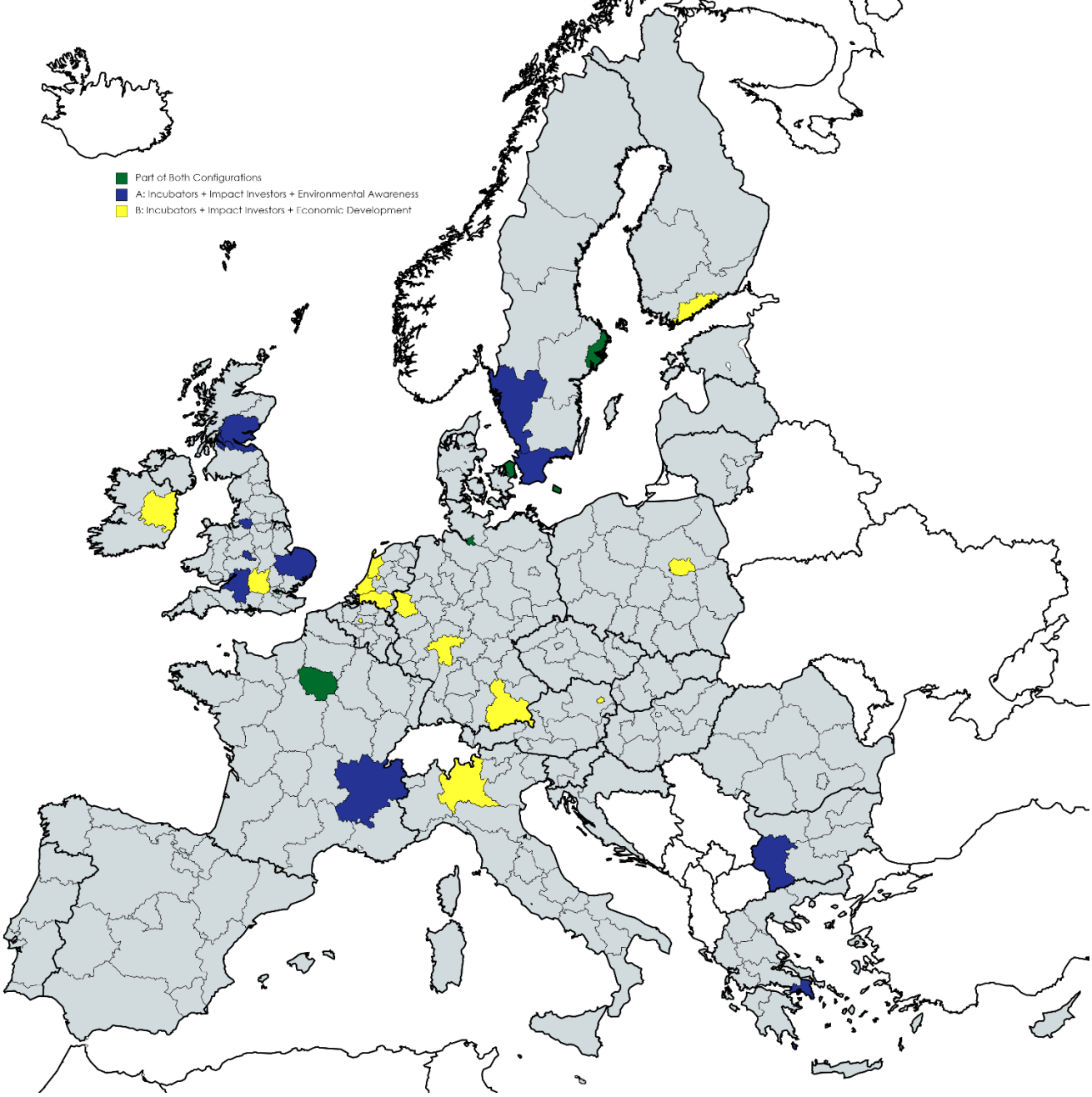

Figure 4. Configuration Map of the Absolute Number of Environmental Start-ups

Percentage of Environmental Start-ups (Regions with more than 20 start-ups)	
	Configuration
	A
Incubators	●
Sustainability Education	●
Impact Investors	●
Environmental Awareness	
Governmental Sustainability (Environmental)	⊗
Economic Development	●
Consistency	0.755
Raw Coverage	0.179
Unique Coverage	0.179
Overall Solution Consistency	**0.755**
Overall Solution Coverage	**0.179**

Table 9. Sufficient Configurations for Percentage of Environmental Start-ups

Next to looking at the absolute number, it is also interesting to see which configurations are sufficient to have a high share of environmental start-ups. As seen above, in Table 9, there is only one configuration found that consistently leads to a higher share of environmental start-ups. The first thing that can be noticed is that the Governmental Sustainability condition is absent. So, in regions with a high share of environmental start-ups, the entrepreneurs do not get any support from their government. The governments did not implement the SDGs well and the share of environmental taxes are not high. The lack of SDG implementation could also be an indicator of the projects the government has started to help advance the SDGs. For example, projects that protect the natural environment. If the governmental sustainability condition is low, there is a chance that the government has not started many projects. Matsunga et al. (2011) noted that a lack of social goods and services could lead to market gaps for entrepreneurs. This could also be the case for environmental start-ups. An important role of enterprises driven by sustainability is to attend environmental (and social) issues that others, such as the government, have neglected (Parrish & Foxon, 2006). If the government does not undertake any action to protect the environment, it could leave market gaps for entrepreneurs interested in the protection, and more people that care about the environment might want to become entrepreneurs to help with the issue. The regions that are part of both the configuration and the top 25% regions with the highest share of social start-ups are from Sweden and the United Kingdom. Both these countries have below average values for the SDG implementation and the percentage of environmental tax. The United Kingdom even has the third lowest SDG implementation score.

However, this also means that there is a lack of support from the government and that the entrepreneur needs the support of the other conditions, except environmental awareness, to succeed. The entrepreneurs need support from the incubators and impact investors in the region and there needs

to be sustainable education, as well as enough money to spend, in the region. The four regions in the configuration and in the outcome set all have an above average GDP per capita, so the entrepreneurs can 'afford' to also care about the environmental impact of their start-up, and the population can also 'afford' to care about other aspects than the monetary value of the products or services they purchase. The interaction between the sustainable education, incubators and impact investors conditions is the most interesting part of the configuration. Incubators are usually tied to a university or have an office on a university campus. Students or graduates of one of the sustainable masters at the university, and who have entrepreneurial ambition, can go to the incubator that is tied to their university. If a university has sustainability masters it is likely they are quite sustainability-focused, and the incubators might share this focus on sustainability, and want to help entrepreneurs interested in environmental solutions. If the start-up is seen as valid has the potential for high-growth, the incubators can use their connection to investors, and in particular impact investors, in their region

The four regions that are both in this configuration and in the top 25% of regions with the highest share of environmental start-ups: two Swedish regions, **SE22** (South Sweden) and **SE23** (West Sweden), and two regions from the United Kingdom, **UKJ1** (Berkshire, Buckinghamshire, and Oxfordshire) and **UKM7** (Eastern Scotland). All of these regions show a clear interaction between sustainable education, incubator and investor conditions. The universities in the regions are usually linked to business incubators, while the business incubators usually (co-)invest or have partnerships with investors interested in early-stage sustainable enterprises. Below examples for each of the regions are given.

South Sweden is home of Lund University and Malmö University, which offer masters in Energy-Efficient and Environmental Building Design (Lund) and Leadership for Sustainability (Malmö), both interesting for environmental start-ups. Lund University is also a collaborator for the Ideon Science Park, which houses the incubator Ideon Innovation and has an history of creating innovation in energy and new materials (Lund University, n.d.). The region is also home to 24 impact investors, of which one is Pale Blue Dot, a venture capital investor interested in reducing and reversing the effects of climate change by investing in seed stage climate tech enterprises (Dealroom, n.d.-b).

Chalmers University of Technology and the University of Gothenburg are the universities of ***West Sweden***, offering master programs such as Infrastructure and Environmental Engineering. An incubator of the Chalmers University of Technology is Chalmers Ventures, which, among others, help entrepreneurs interested in Sustainable Tech and Energy Tech (Chalmers Ventures, n.d.). This region also shows how the combination between incubators and impact investors can work: Klimatet Invest, relatively early investors in cleantech to contribute to a more sustainable society (Crunchbase, n.d.), co-invests with Chalmer Ventures, the previously mentioned incubator (Klimatet Invest, n.d.). So if a student of one of the sustainable masters is interested in entrepreneurship, they could try join Chalmer Ventures, and if a potentially successful and environmentally sustainable enterprise comes out of that,

it could get investment from Klimatet Invest (together with Chalmer Ventures).

Moving on to the United Kingdom, ***Oxfordshire*** is home to the Oxford Brookes University, which offers sustainable masters in Infrastructure Planning and Sustainable Development and in Sustainable Architecture. Oxford is a well-known university city, with students following courses at the several universities in the region, and it is not abnormal that it is also home to some business incubators. One of the incubators interested in environmentally sustainable start-ups is Oxfordshire GreenTech, which has a focus on environmental tech (Adopter, n.d.). Although this incubator is not directly related to Oxford Brookes University, it is open for their students. To raise funding for entrepreneurs from Oxfordshire GreenTech, a partnership with Stakeholderz, an equity funding platform interested in innovative business that prioritize sustainability, was formed (UKBAA, 2023). The region also has an incubator interested in climate tech, Creative Destruction Lab – Oxford, which is located at the Saïd Business School of the University of Oxford, another university in the region.

The last region which is both in the configuration and in the outcome set is ***Eastern Scotland***. This is the region with the most sustainability masters of the entire dataset. These sustainability masters are given at the University of Edinburgh, the University of St. Andrews, the University of Stirling and the University of the Highlands and Islands. Some of the programs are in Global Strategy & Sustainability, Circular Economy, Sustainable Lands and Cities, Conservation Studies and Aquaculture. A person in this region interested in a following a sustainable master has a lot of options. The University with the most sustainability masters is the University of Edinburgh. If one of the students or recent graduates of the University of Edinburgh is interested in starting their entrepreneurial journey, Edinburgh Innovations can help them (The University of Edinburgh, n.d.). A program that is of particular interest for sustainable entrepreneurs is the Startup Summer Accelerator, in partnership with the Edinburgh Earth Initiative, which is primarily aimed at businesses with a climate focus or trying to advance the SDGs (The University of Edinburgh, 2013). The university also has its own in-house venture investment fund, which is managed by Edinburgh Innovations: Old College Capital (Edinburgh Innovations, n.d.). According to Dealroom, they are one of the investors in the region that is interested in investing in the SDGs. The University of St. Andrews and the University of Stirling also both offer support for entrepreneurs with a sustainability focus (Sint Andrews Innovation, n.d.; University of Stirling, n.d.).

The configuration of the analysis for regions with more than 20 start-ups also holds for the analysis of regions with more than 100 start-ups (Appendix 8.3). So the absence of governmental sustainability, but a high GDP per capita and the sustainability education-incubators-impact investors combination are also important if an advanced entrepreneurial ecosystem wants to have a high environmental start-up share compared to the other advanced ecosystems

Social Start-ups

Absolute Number of Social Start-ups (Top 25%)			
	Configurations		
	A	**B**	**C**
Incubators	●	●	
Sustainability Education			
Impact Investors	●	●	●
Social Awareness	●		●
Governmental Sustainability (Social)			●
Economic Development		●	●
Consistency	0.939	0.937	0.926
Raw Coverage	0.397	0.577	0.247
Unique Coverage	0.100	0.279	0.049
Overall Solution Consistency		**0.915**	
Overall Solution Coverage		**0.726**	

Table 10. Sufficient Configurations for Absolute Number of Social Start-ups

Table 10 shows the sufficient configurations for regions with a high absolute number of social start-ups. The first two configurations are the same as the configurations for the absolute number of environmental start-ups: The incubator and impact investor conditions get combined with either high social awareness or a high GDP per capita. The combination of the incubators and the impact investors again suggest that in regions with a lot of start-ups in total, the amount of social start-ups is also larger. Incubators provide the relevant infrastructure and support for start-ups, while investors help entrepreneurs overcome one of the barriers to success: access to funding. However, just as for the environmental start-ups, the configurations show that start-ups with a social goal also make use of these services. However, the combination is again not strong enough on their own and needs another condition to be present. That condition is either high social awareness or high GDP per capita. The population needs to either be aware of social issues and the seriousness of them, or need to have enough money to 'afford' to care. The difference with the environmental analysis is that in this case the impact investor condition is a core condition for social start-ups, while the others are peripheral. This shows that impact investors are more important to have a social start-up rate, while incubators are more important to have an environmental start-up rate. The importance of the impact investors is also shown in the third configuration, where incubators can be either present or absent, while impact investors is the core condition. This configuration shows how regions can be in the top 25% of social start-up rate even if they might not have a large amount of incubators. The impact investor condition needs to be combined with a high social awareness, high governmental sustainability orientation and a high GDP per capita. So, instead of having incubators to help the start-up, these regions now have environmental start-ups through the help of the population (through awareness and GDP) and the

support from their government. An example of a region with this configuration that is in the top 25% regions is **Arnsberg** (DEA5). This region is located in Germany and Germany is the country with the second highest SDG implementation score, creating an environment that can support socially sustainable entrepreneurs. Combining this with a region which is aware of current social issues and has an above average GDP per capita, as well as having impact investors, a significant amount of start-ups will have a social goal. The population in the Arnsberg region find equal opportunities and access to the labor market, the standard of living of people in the EU and fair working conditions the most important elements for the EU's social development (Eurobarometer, 2021b). These are topics social start-ups can help improve, especially the access to the labor market. An example of an impact investor in Arnsberg is GLS Bank, located in Bochum. It is known as a sustainable bank, which prefers to invest as an early venture capitalist (Dealroom, n.d.) and combines their professional financial services with fairness and diversity, topics of interest for social entrepreneurs (GLS Bank, n.d.). They also report on their social impact.

The three configurations are not mutually exclusive, so it is possible for a region to be part of two or even all three configurations. The regions that are part of configuration A & B combine the incubators and impact investors with both social awareness and GDP per capita, but the governmental sustainability condition is indifferent. Regions that are part of A & C, B & C, or even all three combine the four conditions with support from the government. Table 11 shows which regions are part of which configurations, and Figure 5 shows a map of the regions.

To be in the top 10% of regions with a high absolute number of social start-ups one configuration is sufficient, as seen in Appendix 9.3. This configuration looks like Configuration B of the main analysis: incubators and impact investors get combined with a high GDP per capita, but now there also need to be enough sustainability masters available in the region. So, just like for the environmental analysis, education goes from being indifferent in the top 25% analysis to being needed to be in the top 10%. It is even the core condition of that configuration. This again shows it is important for regions to invest in masters with a sustainability focus.

When adjusted for the size of the population of the region, Appendix 10.3 shows that Configuration B & C remain sufficient, but that Configuration A is not sufficient anymore.

Regions	Region Name	A	B	C	Number of Social Start-ups
AT13	Vienna		x		60
BE10	Brussels	x	x	x	30
BG41	Southwestern (Bulgaria)	x			32
CZ01	Prague		x		36
DE21	Upper Bavaria		x	x	134
DE30	Berlin	x		x	314
DE60	Hamburg		x		64
DE71	Darmstadt		x		42
DEA1	Düsseldorf		x	x	48
DEA2	Cologne		x	x	38
DEA5	Arnsberg			x	21
DK01	Capital Region of Denmark		x		109
ES21	Basque Community		x		28
ES30	Madrid	x	x		162
ES51	Catalonia	x			197
ES61	Andalusia	x			34
FI1B	Helsinki-Uusimaa		x		83
FR10	Île-de-France/Paris Region	x	x	x	358
FRH0	Brittany	x			20
FRK2	Rhône-Alpes	x		x	47
FRL0	Provence-Alpes-Côte d'Azur	x		x	43
IE06	Eastern and Midland (Ireland)	x	x		118
ITC4	Lombardy	x	x		112
NL32	North Holland		x		281
NL33	South Holland		x		176
NL41	North Brabant		x		77
PL91	Warsaw		x		52
PT11	Northern Portugal	x			20
PT17	Lisbon Metropolitan Area	x			36
SE11	Stockholm		x		133

Table 11. NUTS-2 Regions with the configurations and in the Top 25%

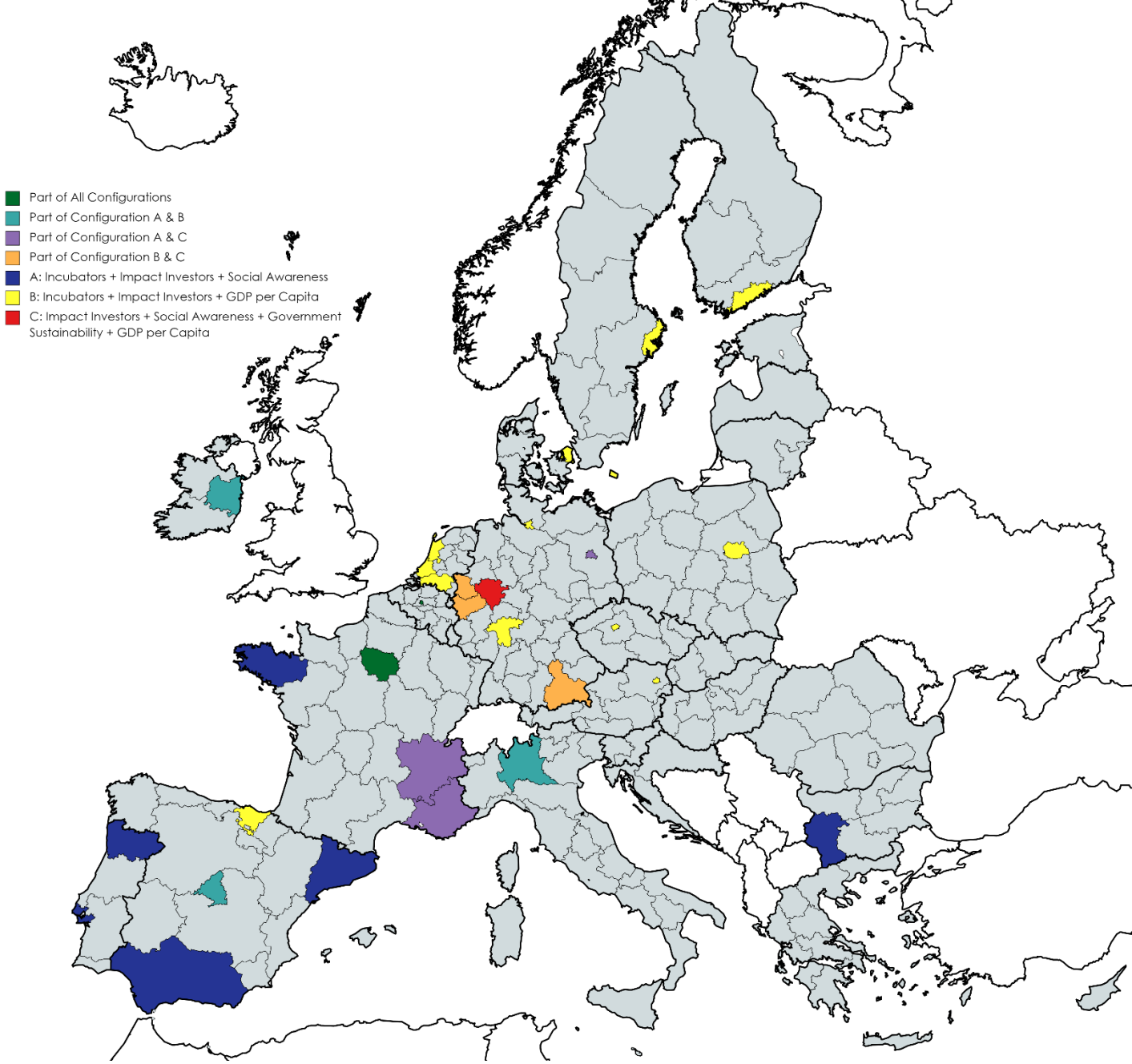

Figure 5. Configuration Map of the Absolute Number of Social Start-ups

Percentage of Social Start-ups (Regions with more than 20 start-ups)			
	Configurations		
	A	**B**	**C**
Incubators		☒	●
Sustainability Education	☒		●
Impact Investors			•
Social Awareness	●	●	☒
Governmental Sustainability (Social)	●	●	●
Economic Development			•
Consistency	0.760	0.717	0.770
Raw Coverage	0.242	0.242	0.110
Unique Coverage	0.029	0.028	0.072
Overall Solution Consistency		**0.721**	
Overall Solution Coverage		**0.352**	

Table 12. Sufficient Configurations for Percentage of Social Start-ups

This analysis yields three sufficient configurations for regions to have a high share of their start-ups being start-ups with a social goal, as seen is in Table 12. The first two configurations have the same core conditions: social awareness and governmental sustainability. So, for regions to have a high social start-up share, conditions outside the business atmosphere are more important. This is different from the environmental start-ups, where the business atmosphere (incubators and impact investors, and also education) is an important factor. An explanation for this difference is that environmental sustainability is more often technical. The average person does not understand how for example a solar panel exactly works and why exactly it is more sustainable. The entrepreneurs there need to interact more with people in their field who do understand. Social sustainability is less technical and more targeted towards the people in their population. So, if they want to be successful, these people need to be aware of the social issues that are current problems in their region. The governments also need to understand that there are issues in their country and be willing to implement the SDGs in their work. This way they can support entrepreneurs in their country that are willing (to collaborate) to try to solve social issues. The two configurations with these conditions present combine it with an absent condition. The first and most consistent configurations combines it with the absence of sustainable masters and the second combines it with the absence of incubators. The configurations have an overlap of regions that are part of both of them, but also regions that are part of only one of them. The interesting part is that the regions that are also in the top 25% of regions with a high share of social start-ups are the same for both regions: **BE32** (Hainaut), **BE33** (Liège), **DE14** (Tübingen), **DE40** (Brandenburg), **DEA5** (Arnsberg), **FRF1** (Alsace) and **HU23** (Southern Transdanubia). These regions have a population that is aware of social issues, a government that implemented the SDGs well, but do not have sustainable masters and incubators. Looking at the sustainable masters, most of

them are about environmental sustainability, so regions with those might be more interested in sustainable start-ups. Incubators also help conventional start-ups and if they are interested in sustainability, it is more often about environmental issues. So, there is more room for more social start-ups in regions without incubators, because there is less competition from conventional or environmental start-ups. All of the aforementioned regions are either Belgian, French, German or Hungarian. The governments all have implemented the SDGs well, because all of the regions have a score of above 2.2 and are in the top 10 countries. All countries score very well for the Leadership & Horizontal Coordination and Stakeholder Participation dimensions. Entrepreneurs of these countries are supported by their government. But, to have a high share of entrepreneurial entrepreneurs, the region itself also needs to be aware of social issues. Alsace (FRF1) is the region with the fifteenth highest social awareness score. 56% of the population finds the lack of social rights a problem currently, and the same percentage finds a Social Europe important. The issues they find most important are equal opportunities and access to quality healthcare (Eurobarometer, 2021b).

There is also a third configuration, which has social awareness absent, but all the other conditions present. This configuration shows what support entrepreneurs need if the population is not aware that there are social issues in their region. The sustainability of the government is still an important condition, but also the previously mentioned incubators and sustainable masters, which contradicts the previous two configurations. There are no regions that are in this configuration and in the top 25%, but FI1B (Helsinki-Uusimaa) is relatively close to the threshold.

The only configuration that holds for the analysis of the advanced entrepreneurial ecosystems with more than 100 start-ups in total is Configuration C of the main analysis, as seen in Appendix 11.3. In comparison to these regions, Helsinki-Uusimaa is now in the top 25%. This analysis also shows a second configuration. In this configuration the governmental sustainability is absent, but the incubators, sustainability education, impact investors and social awareness conditions all need to be present. The difference between the analysis for more than 20 regions and for more than 100 regions is interesting, because for the main analysis the social awareness and governmental sustainability seems to be the most important, but for the extra analysis they are the two conditions that are absent (in different configurations). When one condition is absent, the other condition is present and a core condition. So, it could be that one condition compensates for the absence of the other condition.

Discussion and Conclusion

The goal of this paper was to investigate which conditions are important for the sustainability-orientation of an entrepreneurial ecosystem. The sustainable entrepreneurial ecosystem concept combines two different research fields: entrepreneurial ecosystems and sustainable entrepreneurship. The entrepreneurial ecosystem concept looks at how the geographical region of an entrepreneur can support them and support new enterprise creation (Simatupang, 2015). This paper looks at how the geographical region can support entrepreneurs interested in sustainable entrepreneurship. Sustainable entrepreneurship is done by entrepreneurs that take the environmental and/or social goal of their business into account, and often work on progressing one or more of the Sustainable Development Goals (SDGs). The start-ups working on one of the environmental SDGs will be classified as an 'Environmental Start-up', while an entrepreneur working on a social one will be seen as a 'Social Start-up'. There are five conditions that could help sustainable entrepreneurs identified, with the help of Bisschoff and Volkmann (2018): incubators, sustainable education, impact investors, social or environmental awareness, and a sustainability-oriented government. Economic development has also been added as a condition. These conditions will be analyzed using the QCA method, which also analyzes the interaction between the conditions. There are two main analyses, for both the social and environmental start-ups. One analysis looks at a sustainable entrepreneurial ecosystem as an ecosystem that has a high number of environmental or social start-ups and analyses the absolute number of environmental start-ups. The other analysis adjusts for the size of the entrepreneurial ecosystem and analyzes the percentage of start-ups in a region that has an environmental or social goal.

To have a high environmental start-up rate, it is important for a region to have incubators and impact investors, as they are found in both configurations. This fits with the theories that (impact) investors are crucial to the survival of start-ups, as access to funding is a key challenge (OECD, 2013), and that incubators help start-ups by guaranteeing the availability of essentials for starting up a company (Petrou et al., 2010). However, incubators and (impact) investors also make sure that there is a higher start-up rate overall and that can be a reason why there are also more environmental start-ups. But, to make sure that the environmental start-ups grow with the total start-up rate, the two conditions need to be combined with one of the following conditions: a high environmental awareness or a high GDP per capita. Awareness of environmental issues is needed to see potential threats that need to be addressed (Patzelt & Shepherd, 2011), and in a culture were environmental issues are important they are more likely to be in an entrepreneur's decision-making. In economically developed regions, entrepreneurs and their customers can 'afford' to care about more than the economic and financial aspects. Sustainable education is not a condition needed to be in the top 25%, as both configurations are indifferent towards that condition. However, the condition is present in both the configurations to be in the top 10%. This is interesting for policy makers and academia in the region. The amount of

sustainability masters in a region is the difference in being a region with a high environmental start-up rate and a very high environmental start-up rate. So, if a region wants to improve even more as an environmentally sustainable entrepreneurial ecosystem, they should focus on providing masters about sustainability or sustainability specializations in their universities. Education in sustainability empowers people to take action (Hörisch et al., 2014) and teaches them how to deal with environmental issues, which helps to recognize entrepreneurial opportunities (Patzelt & Shepherd, 2011). So, to get more environmental start-ups in a region, policy makers need to look into policies that attract incubators and impact investors to their region, as well as looking into how they can increase the environmental awareness in their population. If a region does already have a lot of environmental start-ups, but wants to grow further, policy makers and universities need to invest more in starting master programs with a sustainability focus or have sustainability specializations for existing masters programs.

Adjusting for the size of the entrepreneurial ecosystem, and looking at the percentage of environmental start-ups, one configuration is found. In this configuration market the governmental sustainability is absent. The government of that region did not implement the SDGs well, which could mean there were market gaps left that environmentally minded entrepreneurs could fill. Attending environmental (or social) issues that others have neglected is one of the roles sustainability-driven enterprises, so also new enterprises, play. To be a successful ecosystem without the support of the government, the region does need several conditions to be present. A high GDP per capita is needed, but also the combination of sustainable education, incubators and impact investors. This combination is interesting, as incubators are usually tied to a university in a region. So graduates or students of one of the sustainable masters has an opportunity to join an incubator if they have entrepreneurial ambitions. Next, if the idea of the entrepreneur is seen as valid and has potential for high growth, incubators can help raise funding by making use of the connections they have with (impact) investors. So, if a region wants to have a higher share of their entrepreneurs be interested in environmental topics, the region needs to focus on the incubators and the connections the incubators have with both the universities and the impact investors. If this relationship is strong, more environmentally-minded entrepreneurs have the opportunity of starting a business.

Similar to the absolute number of environmental start-ups, two of the configurations of the absolute number of social start-ups combine the incubators and impact investors conditions with either a high social awareness or a high GDP. However, this analysis also has an additional configuration where impact investors have a central role, but incubators do not play a part of. If a region does not have many incubators, the entrepreneur can be helped by the social awareness of the population, the sustainability orientation of the government and a high GDP per capita. So, here, the sustainability of the government has a positive role. Again, sustainable education is not part of the top 25% analysis, but when looking at the top 10%, it is the core condition of the only configuration. So this is again a reason why policy makers and academia in a region need to focus more on education in sustainability.

The other conditions are incubators, impact investors and GDP per capita.

Adjusted for the size of the entrepreneurial ecosystem, there are three sufficient configurations. Two combine social awareness and governmental sustainability with either the absence of sustainable education or the absence of incubators. A reason for the absence of these conditions can be because incubators also help conventional entrepreneurs, and if they are sustainability focused, the focus is more on environmental start-ups. Education in sustainability also has a greater focus on environmental aspects than on social aspects. Here, policy makers need to focus on implementing the SDGs into their own work and on how they can increase the social awareness of their population if they want to have more of their entrepreneurs considering social aspects into their work.

This paper has contributed to the existing literature in several ways. Firstly, it quantified conditions for sustainable entrepreneurship which were mostly talked about in theory or in case studies. Using these values for the conditions, this paper has also shown that some conditions are more important than others for sustainable start-ups. Looking at the percentage analyses, it has also shown that the conditions that are important for a high share of environmental start-ups differs from the conditions needed for a high share of social start-ups. So, policy makers need to know what kind of sustainable entrepreneurship they are interested in increasing. The quantification of the impact investors and the sustainability education is also a contribution of this paper. For both the conditions extensive research was undertaken. The biggest part of the making of these conditions was seeing in which cities the impact investors or sustainability masters were, mapping the cities to NUTS-2 regions and then again seeing how many there were per NUTS-2 region.

This research has had several limitations. The first one is that there was no access to the start-ups that were classified as working towards an SDG. The only access was to the total amount per SDG in a region. It is thus possible that some start-ups were counted double if they contributed to multiple SGDs. The research would be even more significant if start-ups were classified as either environmental or social beforehand. Another limitation is that for some of the data is gathered after the time period of the outcome. For most of the indicators, data from around the 2017-2021 time period is gathered, but this was not possible for the sustainable education and impact investors condition. The last limitation is that the conditions seemed to be more tailored towards environmental start-ups than towards social start-ups. For example, incubators with an interest in sustainability are often interested in environmental start-ups, and the sustainable masters are more often about environmental sustainability than towards social sustainability.

However, this is also already an opportunity for future research. Further research could look at conditions in a region that are tailored more towards social entrepreneurs and see how these conditions interact. Other opportunities for future research stem from the conclusions of this paper. First, more research can be done into the role of sustainable education. In this paper, sustainable education is not present in the top 25% analyses, but is present in the top 10% analyses. Why is this condition the condition that is the difference between a high and a very high sustainable start-up rate? Another

conclusion that is interesting to investigate more is the education-incubators-investors combination. In my results part I have given some examples of how it can work, but more investigation of why it yields a high environmental start-up percentage would be beneficial.

This paper has tried to contribute to the discussion of what is needed in a region for more environmental and social start-ups. Hopefully this helps entrepreneurial ecosystems to become more focused on sustainable development, and to care about the environmental and social goals of their start-ups.

References

Abdellatif, M. M., Tran-Nam, B., Ranga, M., & Hodžić, S. (2022). *Government incentives for Innovation and Entrepreneurship: An international experience*. Springer International Publishing AG.

Adopter. (n.d.). *The UK Green-tech Accelerators and Incubators Map v1.0*. Retrieved, June 24, 2023, from The UK Green-tech Accelerators and Incubators Map (adopter.net)

Bazan, C., Gaultois, H., Shaikh, A., Gillespie, K., Frederick, S., Amjad, A., Yap, S., Finn, C., Rayner, J. and Belal, N. (2020). Effect of the university on the social entrepreneurial intention of students. *New England Journal of Entrepreneurship*, *23*(1), 3-24. https://doi-org.proxy.library.uu.nl/10.1108/NEJE-05-2019-0026

Benijts, T. (2013). A business sustainability model for government corporations. A Belgian case study. *Business Strategy and the Environment*, *23*(3), 204–216. https://doi.org/10.1002/bse.1784

Bischoff, K. (2019). A study on the perceived strength of sustainable entrepreneurial ecosystems on the dimensions of stakeholder theory and culture. *Small Business Economics*, *56*(3), 1121–1140. https://doi.org/10.1007/s11187-019-00257-3

Bischoff, K., & Volkmann, C. K. (2018). Stakeholder support for sustainable entrepreneurship - A framework of sustainable entrepreneurial ecosystems. *International Journal of Entrepreneurial Venturing*, *10*(2), 172. https://doi.org/10.1504/ijev.2018.092714

Bosma, N., Content, J., Sanders, M., & Stam, E. (2018). Institutions, entrepreneurship, and economic growth in Europe. *Small Business Economics*, *51*(2), 483–499. https://doi.org/10.1007/s11187-018-0012-x

Chalmers Ventures. (n.d.). *Startups*. Retrieved, June 24, 2023, from Startups - Chalmers Ventures

Cohen, B. (2006). Sustainable Valley Entrepreneurial Ecosystems. *Business Strategy and the Environment*, *15*(1), 1–14. https://doi.org/10.1002/bse.428

Crunchbase. (n.d.). *Klimatet Invest*. Retrieved, June 24, 2023, from Klimatet Invest – Crunchbase Investor Profile & Investments

Dealroom. (n.d.-a). *Investors*. Retrieved, June 23, 2023, from Investors | Dealroom.co

Dealroom. (n.d.-b). *Pale blue dot*. Retrieved, June 24, 2023, from Pale blue dot investor portfolio, rounds & team | Dealroom.co

Dusa, A. (2019) *QCA with R. A Comprehensive Resource*. Springer International Publishing.

Edinburgh Innovations. (n.d.). *Old College Capital*. Retrieved, June 25, 2023, from Edinburgh Innovations | Old College Capital

Eurobarometer. (2020a). *Attitudes of Europeans towards the Environment*. Retrieved, June 23, 2023, from Attitudes of Europeans towards the Environment - maart 2020 - - Eurobarometer survey (europa.eu)

Eurobarometer. (2020b). *Attitudes of Europeans towards the Environment, Volume C* [Dataset]. Retrieved, June 23, 2023, from https://data.europa.eu/data/datasets/s2257_92_4_501_eng?locale=en

Eurobarometer. (2021a). *Social Issues*. Retrieved, June 23, 2023, from https://europa.eu/eurobarometer/surveys/detail/2266

Eurobarometer. (2021b). *Social Issues, Volume C* [Dataset]. Retrieved, June 23, 2023, from https://data.europa.eu/data/datasets/s2266_94_2_509_eng?locale=en

European Central Bank. (2023). *Experimental indicators on sustainable finance*. Retrieved, April 3, 2023, from Experimental indicators on sustainable finance (europa.eu)

European Parliament. (2019). *Europe's approach to implementing the Sustainable Development Goals: good practices and the way forward*. Retrieved, April 3, 2023, from Europe's approach to implementing the Sustainable Development Goals: Good practices and the way forward (europa.eu)

European Union. (2018). *Eurobarometer: Attitudes of Europeans towards the Environment*. Retrieved, April 3, 2023, from https://europa.eu/eurobarometer/surveys/detail/2257

European Union. (2021). *Eurobarometer: Social Issues*. Retrieved, April 3, 2023, from https://europa.eu/eurobarometer/surveys/detail/2257

Eurostat. (2022). *Statistical regions in the European Union and partner countries: Nuts and Statistical regions 2021*. Retrieved, April 3, 2023, from https://www.oecd.org/cfe/smes/2013_flyer_scoreboard.pdf

Eurostat. (n.d.). *Population on 1 January by NUTS 2 region* [Data set]. Retrieved, June 23, 2023, from https://ec.europa.eu/eurostat/databrowser/view/TGS00096/default/table?lang=en

Fiss, P. C. (2011). Building better causal theories: A fuzzy set approach to typologies in Organization Research. *Academy of Management Journal*, *54*(2), 393–420. https://doi.org/10.5465/amj.2011.60263120

Feld, B. (2012). *Startup communities: Building an entrepreneurial ecosystem in your city*. Wiley.

Fiss, P. C. (2011). Building Better Causal Theories: A Fuzzy Set Approach to Typologies in Organization Research. *Academy of Management Journal*. https://doi.org/10.5465/AMJ.2011.60263120.

Gelissen, J. (2007). Explaining popular support for environmental protection. *Environment and Behavior*, *39*(3), 392–415. https://doi.org/10.1177/0013916506292014

GLS Bank. (n.d.). Stiftungskapital. Wirkungsvoll einsetzen. Retrieved, June 28, 2023, from https://www.gls.de/unternehmen-institutionen/anlegen/impact-investing/

Holtslag, M., Chevrollier, N., & Nijhof, A. (2021). Impact investing and sustainable market transformations: The Role of Venture Capital Funds. *Business Ethics, the Environment & Responsibility*, *30*(4), 522–537. https://doi.org/10.1111/beer.12371

Hoogendoorn, B., van der Zwan, P., & Thurik, R. (2017). Sustainable entrepreneurship: The role of perceived barriers and risk. *Journal of Business Ethics*, *157*(4), 1133–1154. https://doi.org/10.1007/s10551-017-3646-8

Hörisch, J., Freeman, R. E., & Schaltegger, S. (2014). Applying stakeholder theory in Sustainability Management. *Organization & Environment*, *27*(4), 328–346. https://doi.org/10.1177/1086026614535786

ICMA. (2023). *Sustainable Bonds Database*. Retrieved, April 3, 2023, from Sustainable bonds database » ICMA (icmagroup.org)

Isenberg, D. J. (2010). The big idea: How to start an entrepreneurial revolution. *Harvard Business Review*, *88*, 40–50.

Keystone Masterstudies. (n.d.). *345 Master Programs in Sustainability Studies in Europe 2023*. Retrieved, June 23, 2023, from Best Master Degrees in Sustainability Studies in Europe 2023 (masterstudies.com)

Klimatet Invest. (n.d.). *Investeringsmodell*. Retrieved, June 24, 2023, from https://klimatetinvest.se/investeringsmodell/

Klofsten, M., Bank, N., & Bienkowska, D. (2016). *The Role of Incubators in Supporting Sustainable Entrepreneurship. Work Package 3*. Linköping: SHIFT

Lage, D. A., & Brant, L. N. C. (2008). The Growing Influence of Non-Governmental Organizations : Chances and Risks. *Anuario Brasileiro De Direito Internacional*, *3*(1), 79–93.

Leendertse, J., Schrijvers, M., & Stam, E. (2022a). Measure twice, cut once: Entrepreneurial Ecosystem Metrics. *Research Policy*, *51*(9), 104336. https://doi.org/10.1016/j.respol.2021.104336

Leendertse, J., Schrijvers, M., & Stam, Erik (2022b). *Regional metrics for entrepreneurial ecosystems in Europe* [Dataset], Mendeley Data, V1, doi: 10.17632/ptryw5wnws.1

Leendertse, J., & van Rijnsoever, F.J. (2022). Greening Pastures: Entrepreneurial Ecosystems for Sustainable Entrepreneurship. *Innodays Conference paper*.

Leibenstein, H. (1968). Entrepreneurship and Development. *The American Economic Review*, *58*(2), 72-83.

Leppänen, P. T., McKenny, A. F., & Short, J. C. (2019). Qualitative comparative analysis in entrepreneurship: Exploring the approach and noting opportunities for the future. *Giants Research Methodology in Strategy and Management*., 155–177. https://doi.org/10.1108/s1479-838720190000011010

Low, M. B., & MacMillan, I. C. (2007). Entrepreneurship: Past research and future challenges. *Entrepreneurship*, 131–154. https://doi.org/10.1007/3-540-48543-0_6

Lund University. (n.d.). *Innovative Environments*. Retrieved, June 24, 2023, from Innovative environments | Lund University

Matsunaga, Y., Yamauchi, N., & Okuyama, N. (2010). What determines the size of the nonprofit sector?: A cross-country analysis of the government failure theory. *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations*, *21*(2), 180–201. https://doi.org/10.1007/s11266-010-9125-9

Newell, C. J., & Moore, W. B. (2010). Creating Small Business Sustainability Awareness. *International Journal of Business and Management*, *5*(9). https://doi.org/10.5539/ijbm.v5n9p19

OECD. (2013). *Financing SMEs and Entrepreneurs 2013: An OECD Scoreboard*. Retrieved, April 3, 2023, from https://www.oecd.org/cfe/smes/2013_flyer_scoreboard.pdf

OECD. (n.d.). *Environmental Tax* [Dataset]. Retrieved, June 23, 2023, from https://data.europa.eu/data/datasets/s2266_94_2_509_eng?locale=en

Paoli, A.D., & Addeo, F. (2019). Assessing SDGs: A Methodology to Measure Sustainability. *Athens Journal of Social Sciences, 6*(3), 229-250. https://doi.org/10.30958/ajss.6-3-4

Parrish, B. D., & Foxon, T. J. (2006). Sustainability Entrepreneurship and equitable transitions to a low-carbon economy. *Greener Management International, 2006*(55), 47–62. https://doi.org/10.9774/gleaf.3062.2006.au.00006

Patzelt, H., & Shepherd, D. A. (2011). Recognizing opportunities for sustainable development. *Entrepreneurship Theory and Practice*, *35*(4), 631–652. https://doi.org/10.1111/j.1540-6520.2010.00386.x

Petrou, A., Daskalopoulou, I., & Liarnkobas Panagiōtēs. (2010). *Entrepreneurship incubators and economic growth: An across-countries empirical analysis*. Nova Science Publ.

Ragin, C. (2017). *USER'S GUIDE TO Fuzzy-Set / Qualitative Comparative Analysis*. Irvine, California: Department of Sociology, University of California.

Ragin, C., & Davey, S. (2022). *Fuzzy-Set/Qualitative Comparative Analysis 4.0*. Irvine, California: Department of Sociology, University of California.

Ragin, C., & Rihoux, B. (2009). *Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques*. SAGE

Schneider, C.Q., & Wagemann, C. (2012). *Set-Theoretic Methods for the Social Sciences: A Guide to Qualitative Comparative Analysis*. Cambridge University Press.

Schrijvers, M., Stam, E., & Bosma, N. (2021). Figuring it out: Configurations of high-performing entrepreneurial ecosystems in Europe. *U.S.E. Working Paper Series. 21*(5)

Schumpeter, J.A. (1934). *The Theory Of Economic Development*. Harvard Univ. Press.

Sint Andrews Innovation. (n.d.). *Sint Andrews Innovation For Impact*. Retrieved, June 25, 2023, from St Andrews Innovation (st-andrews.ac.uk)

Simatupang, T.M., Schwab, A., & Lantu, D.C. (2015). Building sustainable entrepreneurship ecosystems. *International Journal of Entrepreneurship and Small Business, 26*(4), 389–398.

Spence, M., Ben Boubaker Gherib, J., & Ondoua Biwolé, V. (2011). Sustainable entrepreneurship: Is entrepreneurial will enough? A north–south comparison. *Journal of Business Ethics*, *99*(3), 335–367. https://doi.org/10.1007/s10551-010-0656-1

Spigel, B., & Harrison, R. (2017). Toward a process theory of entrepreneurial ecosystems. *Strategic Entrepreneurship Journal*, *12*(1), 151–168. https://doi.org/10.1002/sej.1268

Stam, E., & van de Ven, A. (2019). Entrepreneurial Ecosystem Elements. *Small Business Economics*, *56*(2), 809–832. https://doi.org/10.1007/s11187-019-00270-6

Sting. (n.d.-a). *Focus Areas: ClimateTech*. Retrieved, June 29, 2023, from https://www.sting.co/focus-areas

Sting. (n.d.-b). *Investors*. Retrieved, June 29, 2023, from https://www.sting.co/investors

Sunny, S. A., & Shu, C. (2017). Investments, incentives, and innovation: Geographical clustering dynamics as drivers of sustainable entrepreneurship. *Small Business Economics*, *52*(4), 905–927. https://doi.org/10.1007/s11187-017-9941-z

The University of Edinburgh. (n.d.). *Edinburgh Innovations FOR STUDENTS*. Retrieved, June 25, 2023, from For students | The University of Edinburgh

Tiba, S., van Rijnsoever, F. J., & Hekkert, M. P. (2020). The lighthouse effect: How successful entrepreneurs influence the sustainability-orientation of entrepreneurial ecosystems. *Journal of Cleaner Production*, *264*, 121616. https://doi.org/10.1016/j.jclepro.2020.121616

Tiba, S., van Rijnsoever, F. J., & Hekkert, M. P. (2021). Sustainability startups and where to find them: Investigating the share of sustainability startups across entrepreneurial ecosystems and the causal drivers of differences. *Journal of Cleaner Production*, *306*, 127054. https://doi.org/10.1016/j.jclepro.2021.127054

UKBAA. (2023, June 1). *Stakeholderz announces new partnership with Oxfordshire Greentech*. Retrieved, June 24, 2023, from Stakeholderz announces new partnership with Oxfordshire Greentech - UK Business Angels Association (ukbaa.org.uk)

UN. (2007). GROSS DOMESTIC PRODUCT PER CAPITA. Retrieved June 24, 2023, from https://www.un.org/esa/sustdev/natlinfo/indicators/methodology_sheets/econ_development/gdp_percapita.pdf

UNDP. (n.d.) *Sustainable development goals: United Nations Development Programme*. Retrieved April 3, 2023, from https://www.undp.org/sustainable-development-goals

University of Stirling. (n.d.). *Support for start-ups and entrepreneurs*. Retrieved, June 25, 2023, from Support for start-ups and entrepreneurs | About | University of Stirling

UtrechtInc. (n.d.). *Graduates*. Retrieved April 3, 2023, from https://utrechtinc.nl/graduates/

Volkmann, C., Fichter, K., Klofsten, M., & Audretsch, D. B. (2019). Sustainable entrepreneurial ecosystems: An emerging field of research. *Small Business Economics*, *56*(3), 1047–1055. https://doi.org/10.1007/s11187-019-00253-7

Wagner, M., Schaltegger, S., Hansen, E. G., & Fichter, K. (2019). University-linked programmes for Sustainable Entrepreneurship and Regional Development: How and with what impact? *Small Business Economics*, *56*(3), 1141–1158. https://doi.org/10.1007/s11187-019-00280-4

Werther, W. B., & Chandler, D. (2014). *Strategic corporate responsibility: Stakeholders, globalization, and sustainable value creation*. SAGE.

Wood, D., Thornley, B., & Grace, K. (2013). Institutional impact investing: Practice and policy. *Journal of Sustainable Finance & Investment*, *3*(2), 75–94. https://doi.org/10.1080/20430795.2013.776256

Appendices

Appendix 1. Overview and Classification of SDGs

Back to the Main Text

SDG	Name	Environmental, Social or Economic
1	No Poverty	Social
2	Zero Hunger	Social
3	Good-Health and Well-Being	Social
4	Quality Education	Social
5	Gender Equality	Social
6	Clean Water and Sanitation	Environmental
7	Affordable and Clean Energy	Environmental
8	Decent Work and Economic Growth	Economic
9	Industry, Innovation and Infrastructure	Economic
10	Reduced Inequalities	Economic
11	Sustainable Cities and Communities	Environmental
12	Responsible Consumption and Production	Environmental
13	Climate Action	Environmental
14	Life below Water	Environmental
15	Life on Land	Environmental
16	Peace, Justice and Strong Institutions	Social
17	Partnership for the Goals	Economic

Appendix 2. Absolute Number of Environmental Start-ups – Top 25%

Appendix 2.1. Truth Table - Absolute Number of Environmental Start-ups – Top 25%

Incubators	Sustainability Education	Impact Investors	Environmental Awareness	Governmental Sustainability (Environmental)	Economic Development	Environmental Start-ups	N	Consistency	PRI	Cases
1	1	1	1	1	1	1	5	0.938	0.901	DE30, DE60, NL31, NL32, NL33
1	1	1	0	1	1	1	10	0.932	0.903	CZ01, DE71, DEA2, FI1B, FI1C, ITC1, ITC4, ITH5, ITI4, NL42
1	1	1	0	0	1	1	6	0.927	0.881	AT13, BE21, ES30, FRL0, IE06, PL91
1	1	1	1	0	1	1	15	0.917	0.889	ES51, FR10, FRG0, FRK2, SE11, SE12, SE21, SE22, SE23, UKF2, UKI3&4, UKJ1, UKJ2, UKM7, UKM8
1	0	1	0	1	1	1	9	0.901	0.841	DE11, DEA1, DED5, DK04, HU11, LT01, NL22, NL41, RO32
1	1	1	1	0	0	1	5	0.877	0.789	ES11, ES52, FRH0, UKE4, UKG3
1	0	1	1	0	1	1	4	0.869	0.775	ES22, UKD6, UKH1, UKM5
1	0	1	1	0	0	1	5	0.841	0.711	BG41, ES41, ES61, FRD2, PT11
1	0	1	0	0	1	1	4	0.817	0.636	AT12, AT31, IE05, SK01
0	0	1	1	0	0	0	5	0.750	0.460	FRK1, UKD4, UKD7, UKE3, UKF3
0	0	1	0	1	1	0	6	0.729	0.466	DE14, DE94, DEA3, DEA4, ITC3, NL21
1	0	1	0	0	0	0	4	0.717	0.385	IE04, PL21, PL63, PT16
0	0	0	1	0	1	0	5	0.694	0.421	ES23, SE31, SE32, UKH3, UKM6

0	0	0	1	1	1	0	4	0.603	0.232	DEB1, DEB2, DEC0, NL34
0	0	0	1	0	0	0	13	0.578	0.306	BG31, BG33, BG34, FRD1, FRF2, FRI2, PL52, SK04, ES13, ES43, UKG2, UKJ4, UKM9
0	0	0	0	1	1	0	6	0.536	0.168	CZ02, DE72, DE73, FI20, HU12, ITC2
0	0	0	0	0	0	0	21	0.414	0.087	AT11, BE34, BE35, BG32, BG42, FRC2 , FRF3, FRM0, PL42, PL43, PL61, PL62, PL72, PL81, PL84, PL92, PT15, PT20, PT30, SK02, SK03
0	0	0	0	1	0	0	15	0.338	0.074	HR03, CZ03, CZ04, CZ07, DE80, DED4, HU23, HU32, ITF2, ITF4, ITF6, ITI2, RO21, RO31, RO42
0	0	0	1	1	0	0	16	0.286	0.070	CZ03, CZ04, CZ07, DE80, DED4, HR03, HU23, HU32, ITF2, ITF4, ITF6, ITI2, RO21, RO31, RO42

Appendix 3. Percentage of Environmental Start-ups – ≥20 Total Start-ups

Appendix 3.1. Truth Table – Percentage of Environmental Start-ups – ≥20 Total Start-ups

Incubators	Sustainability Education	Impact Investors	Environmental Awareness	Governmental Sustainability (Environmental)	Economic Development	Environmental Start-ups	N	Consistency	PRI	Cases
1	1	1	1	0	1	1	9	0.792	0.645	ES51, FR10, FRK2, SE11, SE22, SE23, UKI3&4, UKJ1, UKM7
1	1	1	0	0	1	1	3	0.770	0.514	AT13, ES30, IE06

0	0	0	1	0	1	0	3	0.707	0.537	SE32, UKG1, UKH3
1	0	1	0	1	1	0	6	0.686	0.474	DE11, DEA1, HU11, LT01, NL41, RO32
1	1	1	0	1	1	0	10	0.686	0.493	CZ01, DE30, DE71, DEA2, FI1B, ITC1, ITC4, ITI4, NL42, PL91
1	0	0	0	1	0	0	3	0.679	0.497	CZ06, PL63, RO11
0	0	0	0	0	0	0	5	0.668	0.525	BE22, BE32, FRF1, FRF3, PT15
1	1	1	1	0	0	0	3	0.663	0.378	ES52, UKG3, UKM8
0	0	0	1	0	0	0	14	0.657	0.576	ES42, ES43, FRF2, FRI3, SE31, UKC1, UKD7, UKF1, UKF3, UKG2, UKJ4, UKK2, UKL1, UKM9
0	0	0	1	1	0	0	4	0.639	0.478	DK02, NL13, PL51, RO12
0	1	0	0	1	1	0	3	0.589	0.379	DE13, DE22, ITH3
0	0	0	0	1	1	0	8	0.572	0.414	DE23, DE26, DE27, DEF0, ITC3, ITH4, ITI1, NL23
0	0	1	0	1	1	0	8	0.568	0.346	DE12, DE14, DE25, DE92, DEA3, DEA4, DEA5, NL21
0	0	0	0	1	0	0	15	0.557	0.442	DE80, DEE0, DEG0, HR03, HU21, HU23, HU32, ITF1, ITF4, ITG2, ITI2, PL22, PL81, RO21, RO42

Appendix 4. Absolute Number of Social Start-ups – Top 25%

Appendix 4.1. Truth Table – Absolute Number of Social Start-ups – Top 25%

Incubators	Sustainability Education	Impact Investors	Social Awareness	Governmental Sustainability (Social)	Economic Development	Social Start-ups	N	Consistency	PRI	Cases
1	1	1	1	0	1	1	4	0.983	0.975	ES30, ES51, IE06, ITC4
1	1	1	1	1	1	1	7	0.962	0.944	BE21, DE30, DEA2, FR10, FRG0, FRK2, FRL0
1	1	1	0	1	1	1	5	0.942	0.913	CZ01, DE60, DE71, FI1B, FI1C
1	1	1	0	0	1	1	14	0.939	0.920	AT13, ITC1, ITH5, ITI4, NL31, NL32, NL33, NL42, PL91, SE11, SE12, SE21, SE22, SE23
1	0	1	1	0	0	1	8	0.920	0.842	BG41, ES41, ES61, HR04, PL21, PL63, PT11, PT16
1	0	1	0	0	1	1	6	0.910	0.835	AT12, AT31, IE05, NL22, NL41, SK01
1	0	1	0	1	1	1	5	0.884	0.811	DED5, DK01, DK04, DK05, HU11
0	0	1	1	1	1	1	6	0.847	0.639	DE14, DE25, DE27, DEA3, DEA4, FRF1
0	0	0	0	1	1	0	8	0.527	0.111	CZ02, DE72, DE73, DEB1, DEB2, DEC0, FI20, HU12
0	0	0	0	0	1	0	7	0.489	0.199	AT11, AT34, ES23, ITC2, NL34, SE31, SE32
0	0	0	0	1	0	0	10	0.418	0.101	CZ03, CZ04, CZ05, CZ07, CZ08, DE80, DED4, FRC2, FRF3, HU32

0	0	0	1	1	0	0	9	0.405	0.031	BE34, BE35, FRD1, FRF2, FRI2, FRM0, HU21, HU22, HU23
0	0	0	0	0	0	0	15	0.328	0.076	EL54, HR03, ITF2, ITI2, NL13, PL43, PL52, PL62, PL92, PT15, RO21, RO31, RO42, SK02, SK03
0	0	0	1	0	0	0	27	0.283	0.032	BG31, BG32, BG33, BG34, BG42, EL41, EL42, EL43, EL53, EL61, EL62, EL63, EL64, EL65, ES13, ES43, ITF4, ITF6, PL42, PL61, PL72, PL81, PL84, PT20, PT30, RO12, SK04

Appendix 5. Percentage of Social Start-ups – ≥20 Total Start-ups

Appendix 5.1. Truth Table – Percentage of Social Start-ups – ≥20 Total Start-ups

Incubators	Sustainability Education	Impact Investors	Social Awareness	Governmental Sustainability (Social)	Economic Development	Social Start-ups	N	Consistency	PRI	Cases
0	0	0	1	1	0	1	8	0.858	0.802	BE22, BE32, DEF0, FRF1, FRF2, FRI3, HU21, HU23
0	0	0	1	1	1	1	3	0.810	0.715	BG41, EL30, PT16
0	0	1	1	1	1	1	6	0.785	0.693	DE80, DEE0, DEG0, DK02, FRF3, HU32
1	1	1	0	1	1	1	4	0.770	0.637	ITI1, NL23, NL34, SE32
1	1	1	1	0	1	0	5	0.735	0.577	ES30, ES51, IE06, ITC4, NL32
1	1	1	1	1	1	0	4	0.716	0.516	BE25, BE31, DE92, DEB3
0	0	0	0	1	0	0	6	0.656	0.568	DE12, DE14, DE25, DEA3, DEA4, DEA5

0	0	0	1	0	0	0	7	0.632	0.505	ES43, HR03, ITF4, ITG2, PL51, PL81, RO12
0	0	1	0	1	1	0	4	0.617	0.497	CZ01, FI1B DE60, DE71
1	0	1	1	0	0	0	3	0.609	0.389	IE05, NL41, SK01
1	1	1	0	0	1	0	8	0.573	0.404	AT13, ITI4, NL33, NL42, PL91, SE11, SE22, SE23
1	0	1	0	0	1	0	3	0.537	0.395	DE23, DE26, DE17
0	0	0	0	0	1	0	4	0.534	0.411	FR10, FRK2, DE30, DEA2
0	0	0	0	0	0	0	9	0.492	0.350	ES42, ITF1, ITI2, NL13, PL22, PT15, RO21, RO42, SE31

Appendix 6. Absolute Number of Environmental Start-ups – Top 10%

Appendix 6.1. Necessary Conditions – Absolute Number of Environmental Start-ups – Top 10%

Back to the Main Text

Condition	Consistency	Coverage
Incubators	**0.910**	**0.526**
Sustainability Education	0.658	0.551
Impact Investors	**0.948**	**0.497**
Environmental Awareness	0.645	0.350
Governmental Sustainability (Environmental)	0.529	0.267
Economic Development	0.826	0.439

Appendix 6.2. Truth Table – <u>Absolute Number of Environmental Start-ups – Top 10%</u>

Incubators	Sustainability Education	Impact Investors	Environmental Awareness	Governmental Sustainability (Environmental)	Economic Development	Environmental Start-ups	N	Consistency	PRI	Cases
1	1	1	1	0	1	1	15	0.808	0.697	ES51, FR10, FRG0, FRK2, SE11, SE12, SE21, SE22, SE23, UKF2, UKI3&4, UKJ1, UKJ2, UKM7, UKM8
1	1	1	0	0	1	1	6	0.801	0.607	AT13, BE21, ES30, FRL0, IE06, PL91
1	1	1	1	1	1	1	5	0.763	0.600	DE30, DE60, NL31, NL32, NL33
1	1	1	0	1	1	0	10	0.743	0.580	CZ01, DE71, DEA2, FI1B, FI1C, ITC1, ITC4, ITH5, ITI4, NL42
1	0	1	1	0	1	0	4	0.660	0.365	ES22, UKD6, UKH1, UKM5
1	1	1	1	0	0	0	5	0.636	0.278	ES11, ES52, FRH0, UKE4, UKG3
1	0	1	1	0	0	0	5	0.626	0.339	BG41, ES41, ES61, FRD2, PT11
1	0	1	0	1	1	0	9	0.624	0.389	DE11, DEA1, DED5, DK04, HU11, LT01, NL22, NL41, RO32
1	0	1	0	0	1	0	4	0.572	0.171	AT12, AT31, IE05, SK01
1	0	1	0	0	0	0	4	0.509	0.096	IE04, PL21, PL63, PT16
0	0	0	1	0	1	0	5	0.453	0.051	ES23, SE31, SE32, UKH3, UKM6
0	0	1	1	0	0	0	5	0.434	0.047	FRK1, UKD4, UKD7, UKE3, UKF3
0	0	1	0	1	1	0	6	0.360	0.081	DE14, DE94, DEA3, DEA4, ITC3, NL21
0	0	0	1	1	1	0	4	0.355	0.040	DEB1, DEB2, DEC0, NL34
0	0	0	1	0	0	0	13	0.275	0.021	BG31, BG33, BG34, ES13, ES43, FRD1, FRF2, FRI2, PL52, SK04, UKG2, UKJ4, UKM9

0	0	0	0	1	1	0	6	0.268	0.021	CZ02, DE72, DE73, FI20, HU12, ITC2
0	0	0	0	0	0	0	21	0.213	0.006	AT11, BE34, BE35, BG32, BG42, FRC2, FRF3, FRM0, PL42, PL43, PL61, PL62, PL72, PL81, PL84, PL92, PT15, PT20, PT30, SK02, SK03
0	0	0	0	1	0	0	15	0.170	0.011	CZ03, CZ04, CZ07, DE80, DED4, HR03, HU23, HU32, ITF2, ITF4, ITF6, ITI2, RO21, RO31, RO42
0	0	0	1	1	0	0	16	0.162	0.022	CZ05, CZ08, EL41, EL42, EL43, EL53, EL54, EL61, EL62, EL63, EL64, EL65, HU21, HU22, NL13, RO12

Appendix 6.3. Sufficient Configurations - <u>Absolute Number of Environmental Start-ups – Top 10%</u>

Back to the Main Text

Absolute Number of Environmental Start-ups (Top 10%)

	Configurations	
	A	**B**
Incubators	●	●
Sustainability Education	⬤	⬤
Impact Investors	●	●
Environmental Awareness	⬤	
Governmental Sustainability (Environmental)		☒
Economic Development	⬤	⬤
Consistency	0.798	0.788
Raw Coverage	0.383	0.378
Unique Coverage	0.076	0.072
Overall Solution Consistency	**0.783**	
Overall Solution Coverage	**0.455**	

Appendix 7. Environmental Start-ups per Capita

Appendix 7.1. Necessary Conditions - Environmental Start-ups per Capita

Back to the Main Text

Condition	Consistency	Coverage
Incubators *(per capita)*	0.723	0.749
Sustainability Education *(per capita)*	0.533	0.741
Impact Investors *(per capita)*	0.782	0.772
Environmental Awareness	0.589	0.578
Governmental Sustainability (Environmental)	0.484	0.441
Economic Development	0.707	0.678

Appendix 7.2. Truth Table – Environmental Start-ups per Capita

Incubators *(per capita)*	Sustainability Education *(per capita)*	Impact Investors *(per capita)*	Environmental Awareness	Governmental Sustainability (Environmental)	Economic Development	Environmental Start-ups	N	Consistency	PRI	Cases
1	1	1	1	1	1	1	9	0.914	0.862	DE30, DE50, DE60, DK03, MT00, NL31, NL32, NL33, SI04
1	1	1	0	0	1	1	10	0.902	0.834	AT13, AT22, BE10, BE21, BE23, BE24, FRL0, IE06, PL91, ES30
1	1	1	1	0	1	1	18	0.901	0.856	ES21, ES51, FR10, FRG0, FRK2, LU00, SE11, SE12, SE21, SE22, SE23, UKF2, UKH2, UKI3&4, UKI5, UKJ1, UKM7, UKM8
1	1	1	0	1	1	1	11	0.900	0.851	CZ01, DE71, DEA2, DED2, FI19, FI1B, FI1C, ITC1, ITC4, ITI4, NL42
1	0	1	0	1	1	1	10	0.858	0.770	DK04, DE11, DE92, DEA1, DED5, HU11, LT01, NL22, NL41, RO32

1	1	1	1	0	0	1	8	0.852	0.722	CY00, FRC1, FRH0, ES52, UKC2, UKG3, UKK3, UKN0
1	0	1	0	0	1	1	6	0.825	0.680	AT12, AT31, AT33, BE31, IE05, SK01
1	0	1	1	0	1	1	11	0.807	0.703	ES22, FRJ2, PT17, UKD3, UKD6, UKH1, UKI7, UKJ3, UKK1, UKL2, UKM5
1	1	0	1	0	0	0	5	0.794	0.572	ES11, ES12, ES62, UKE4, UKK4
1	0	1	1	0	0	0	4	0.791	0.612	BG41, FRD2, FRE1, PT11
0	0	1	1	0	1	0	4	0.775	0.569	ES23, SE32, UKG1, UKM6
1	0	0	1	0	0	0	10	0.749	0.525	ES41, ES42, ES61, FRB0, FRI3, UKC1, UKE1, UKF1, UKK2, UKL1
0	0	1	1	0	0	0	6	0.690	0.427	FRI2, FRK1, UKD4, UKD7, UKE3, UKF3
0	0	1	0	1	1	0	10	0.670	0.387	DE12, DE14, DE40, DE94, DEA3, DEA4, ITC3, ITH4, NL21, NL23
1	0	1	0	0	0	0	4	0.659	0.325	BE33, IE04, PL21, PT16
0	1	0	0	1	1	0	4	0.645	0.297	DE13, ITH1, ITH3, ITI3
0	0	0	1	0	0	0	13	0.582	0.362	BG31, BG33, BG34, ES13, ES43, FRD1, FRF2, PL51, PL52, SK04, UKG2, UKJ4, UKM9
1	0	0	1	1	0	0	4	0.520	0.135	EL51, HR04, HU31, HU33
1	0	0	0	1	0	0	7	0.506	0.148	CZ06, DEG0, ITF1, ITF5, ITG2, RO11, RO41
0	0	0	0	1	1	0	9	0.444	0.118	CZ02, DE72, DE73, DEA5, DEF0, FI20, HU12, ITC2, ITI1
0	0	0	0	0	0	0	23	0.394	0.136	AT11, BE35, BG32, BG42, FRC2, FRF3, FRM0, PL22, PL41, PL42, PL43, PL61, PL62, PL71, PL72, PL81, PL84, PL92, PT15, PT20, PT30, SK02, SK03
0	0	0	0	1	0	0	17	0.290	0.059	CZ03, CZ04, CZ07, DE80, DED4, DEE0, HR03, HU23, HU32, ITF3, ITF4, ITF6, ITG1, ITI2, RO21, RO31, RO42

0	0	0	1	1	0	0	16	0.283	0.062	CZ05, CZ08, EL41, EL42, EL43, EL53, EL53, EL54, EL61, EL62, EL63, EL64, EL65, HU21, HU22, NL13, RO12

Appendix 7.3. Sufficient Configurations - Environmental Start-ups per Capita

Back to the Main Text

Environmental Start-ups per Capita

	Configurations	
	A	**B**
Incubators *(per capita)*	●	⬤
Sustainability Education *(per capita)*	⬤	
Impact Investors *(per capita)*	⬤	●
Environmental Awareness	●	
Governmental Sustainability (Environmental)		
Economic Development		⬤
Consistency	0.885	0.876
Raw Coverage	0.279	0.279
Unique Coverage	0.042	0.042
Overall Solution Consistency	**0.865**	
Overall Solution Coverage	**0.575**	

Appendix 8. Percentage of Environmental Start-ups – ≥100 Total Start-ups

Appendix 8.1. Necessary Conditions – Percentage of Environmental Start-ups – ≥100 Total Start-ups

Back to the Main Text

Condition	Consistency	Coverage
Incubators	0.562	0.575
Sustainability Education	0.607	0.555
Impact Investors	0.613	0.628
Environmental Awareness	0.586	0.602
Governmental Sustainability (Environmental)	0.488	0.514
Economic Development	0.571	0.572

Appendix 8.2. Truth Table – Percentage of Environmental Start-ups – ≥100 Total Start-ups

Incubators	Sustainability Education	Impact Investors	Environmental Awareness	Governmental Sustainability (Environmental)	Economic Development	Environmental Start-ups	N	Consistency	PRI	Cases
1	1	1	1	0	1	1	4	0.852	0.732	FRG0, FRI1, UKF2, UKN0
1	1	1	0	0	1	1	3	0.835	0.698	AT13, IE06, ES30
1	0	1	0	1	1	0	3	0.709	0.527	ITH3, ITH5, NL11
0	0	0	1	0	0	0	7	0.640	0.497	PT11, UKD7, UKF1, UKG1, UKJ3, UKJ4, UKL2
0	0	0	0	1	0	0	5	0.619	0.428	DEA5, LV00, NL13, NL21, PL21
1	1	1	0	1	1	0	9	0.617	0.483	CZ01, DE71, DEA2, FI1B, ITC4, ITI4, NL32, NL33, PL91
0	1	0	1	0	0	0	4	0.556	0.356	FR10, SE11, UKI3&4, UKJ1
0	1	0	0	1	1	0	3	0.496	0.167	DEA1, LT01, NL41

Appendix 8.3. Sufficient Configurations - Percentage of Environmental Start-ups – ≥100 Total Start-ups

Back to the Main Text

Percentage of Environmental Start-ups (Regions with more than 100 start-ups)	
	Configuration
	A
Incubators	●
Sustainability Education	•
Impact Investors	●
Environmental Awareness	
Governmental Sustainability (Environmental)	⊠
Economic Development	●
Consistency	0.829
Raw Coverage	0.213
Unique Coverage	0.213
Overall Solution Consistency	**0.829**
Overall Solution Coverage	**0.213**

Appendix 9. Absolute Number of Social Start-ups – Top 10%

Appendix 9.1. Necessary Conditions – Absolute Number of Social Start-ups – Top 10%

Back to the Main Text

Condition	Consistency	Coverage
Incubators	**0.920**	**0.528**
Sustainability Education	0.679	0.580
Impact Investors	**0.984**	**0.523**
Social Awareness	0.553	0.303
Governmental Sustainability (Social)	0.538	0.287
Economic Development	0.865	0.441

Appendix 9.2. Truth Table – Absolute Number of Social Start-ups – Top 10%

Incubators	Sustainability Education	Impact Investors	Social Awareness	Governmental Sustainability (Social)	Economic Development	Social Start-ups	N	Consistency	PRI	Cases
1	1	1	1	0	1	1	4	0.842	0.720	ES30, ES51, IE06, ITC4
1	1	1	1	1	1	1	7	0.822	0.681	BE21, DE30, DEA2, FR10, FRG0, FRK2, FRL0
1	1	1	0	0	1	1	14	0.819	0.721	AT13, ITC1, ITH5, ITI4, NL31, NL32, NL33, NL42, PL91, SE11, SE12, SE21, SE22, SE23
1	1	1	0	1	1	1	5	0.759	0.554	CZ01, DE60, DE71, FI1B, FI1C
1	0	1	0	0	1	0	6	0.634	0.418	AT12, AT31, IE05, NL22, NL41, SK01
1	0	1	0	1	1	0	5	0.583	0.311	DED5, DK01, DK04, DK05, HU11
1	0	1	1	0	0	0	8	0.536	0.189	BG41, ES41, ES61, HR04, PL21, PL63, PT11, PT16

0	0	1	1	1	1	0	6	0.353	0.038	DE14, DE25, DE27, DEA3, DEA4, FRF1
0	0	0	0	0	1	0	7	0.273	0.017	AT11, AT34, ES23, ITC2, NL34, SE31, SE32
0	0	0	0	1	1	0	8	0.219	0.001	CZ02, DE72, DE73, DEB1, DEB2, DEC0, FI20, HU12
0	0	0	0	1	0	0	10	0.178	0.000	CZ03, CZ04, CZ05, CZ07, CZ08, DE80, DED4, FRC2, FRF3, HU32
0	0	0	1	1	0	0	9	0.173	0.000	BE34, BE35, FRD1, FRF2, FRI2, FRM0, HU21, HU22, HU23
0	0	0	0	0	0	0	15	0.143	0.005	EL54, HR03, ITF2, ITI2, NL13, PL43, PL52, PL62, PL92, PT15, RO21, RO31, RO42, SK02, SK03
0	0	0	1	0	0	0	27	0.119	0.000	BG31, BG32, BG33, BG34, BG42, EL41, EL42, EL43, EL53, EL61, EL62, EL63, EL64, EL65, ES13, ES43, ITF4, ITF6, PL42, PL61, PL72, PL81, PL84, PT20, PT30, RO12, SK04

Appendix 9.3. Sufficient Configurations - <u>Absolute Number of Social Start-ups – Top 10%</u>

Back to the Main Text

Absolute Number of Social Start-ups (Top 10%)

	Configuration
	A
Incubators	●
Sustainability Education	⬤
Impact Investors	●
Social Awareness	
Governmental Sustainability (Social)	
Economic Development	●
Consistency	0.785
Raw Coverage	0.597
Unique Coverage	0.597
Overall Solution Consistency	**0.785**
Overall Solution Coverage	**0.597**

Appendix 10. Social Start-ups per Capita

Appendix 10.1. Necessary Conditions – Social Start-ups per Capita

Back to the Main Text

Condition	Consistency	Coverage
Incubators	0.727	0.772
Sustainability Education	0.522	0.765
Impact Investors	0.827	0.822
Social Awareness	0.502	0.521
Governmental Sustainability (Social)	0.546	0.553
Economic Development	0.773	0.746

Appendix 10.1. Truth Table – Social Start-ups per Capita

Incubators *(per capita)*	Sustainability Education *(per capita)*	Impact Investors *(per capita)*	Social Awareness	Governmental Sustainability (Social)	Economic Development	Social Start-ups	N	Consistency	PRI	Cases
1	1	1	1	0	1	1	7	0.974	0.959	ES21, ES30, ES51, IE06, ITC4, MT00, SI04
1	0	1	1	1	1	1	6	0.957	0.892	DE11, DE12, DE21, DE40, DEA1, FRJ2
1	1	1	0	0	1	1	15	0.949	0.930	AT13, AT22, ITC1, ITH5, ITI4, NL31, NL32, NL33, NL42, PL91, SE11, SE12, SE21, SE22, SE23
1	1	1	0	1	1	1	10	0.920	0.882	BE23, BE24, CZ01, DE60, DE71, DED2, DK03, FI19, FI1B, FI1C
1	1	1	1	1	1	1	10	0.918	0.867	BE10, BE21, DE30, DE50, DEA2, FR10, FRG0, FRK2, FRL0, LU00
1	0	1	0	1	1	1	7	0.913	0.845	BE31, DE92, DED5, DK01, DK04, DK05, HU11

1	0	1	0	0	1	1	6	0.897	0.832	AT12, AT31, IE05, NL22, NL41, SK01
1	0	1	1	0	1	1	4	0.897	0.806	AT33, EL30, ES22, PT17
0	0	1	1	1	1	1	7	0.837	0.561	DE14, DE25, DE27, DEA3, DEA4, DEA5, FRF1
0	0	0	1	1	1	0	4	0.786	0.294	DE23, DE24, DE26, DEF0
1	0	1	1	0	0	0	6	0.767	0.435	BG41, ES41, PL21, PL63, PT11, PT16
0	0	1	0	1	1	0	4	0.766	0.448	BE25, DE94, DEB3, DEC0
0	0	1	0	0	1	0	7	0.727	0.571	AT34, ES23, NL21, NL23, NL34, SE31, SE32
0	1	0	1	0	0	0	4	0.626	0.130	ES70, PT18, RO22, SI03
1	0	0	1	0	0	0	7	0.622	0.120	EL51, ES61, HR04, ITF5, ITG2, PL51, RO41
0	0	0	0	1	1	0	7	0.549	0.150	CZ02, DE72, DE73, DEB1, DEB2, FI20, HU12
0	0	0	1	1	0	0	7	0.531	0.128	BE35, FRD1, FRF2, FRM0, HU21, HU22, HU23
1	0	0	0	0	0	0	6	0.453	0.028	ES42, ITF1, ITG1, PL71, PL82, RO11
0	0	0	0	1	0	0	11	0.383	0.110	CZ03, CZ04, CZ05, CZ07, CZ08, DE80, DED4, DEE0, FRC2, FRF3, HU32
0	0	0	1	0	0	0	27	0.345	0.085	BG31, BG32, BG33, BG34, BG42, EL41, EL42, EL43, EL53, EL61, EL62, EL63, EL64, EL65, ES13, ES43, ITF4, ITF6, PL42, PL61, PL72, PL81, PL84, PT20, PT30, RO12, SK04
0	0	0	0	0	0	0	17	0.281	0.090	HR03, EL54, ITF3, ITI2, NL13, PL22, PL41, PL43, PL52, PL62, PL92, PT15, RO21, RO31, RO42, SK02, SK03

Appendix 10.3. Sufficient Configurations - Social Start-ups per Capita

Back to the Main Text

Social Start-ups per Capita		
	Configurations	
	A	**B**
Incubators *(per capita)*	●	
Sustainability Education *(per capita)*		
Impact Investors *(per capita)*	•	●
Social Awareness		●
Governmental Sustainability (Social)		•
Economic Development	●	●
Consistency	0.928	0.881
Raw Coverage	0.567	0.225
Unique Coverage	0.391	0.049
Overall Solution Consistency	**0.910**	
Overall Solution Coverage	**0.616**	

Appendix 11. Percentage of Social Start-ups – ≥100 Total Start-ups

Appendix 11.1. Necessary Conditions – Percentage of Social Start-ups – ≥100 Total Start-ups

Back to the Main Text

Condition	Consistency	Coverage
Incubators	0.627	0.660
Sustainability Education	0.600	0.616
Impact Investors	0.578	0.614
Social Awareness	0.523	0.554
Governmental Sustainability (Social)	0.663	0.653
Economic Development	0.565	0.541

Appendix 11.2. Truth Table – Percentage of Social Start-ups – ≥100 Total Start-ups

Incubators	Sustainability Education	Impact Investors	Social Awareness	Governmental Sustainability (Social)	Ecomomic Development	Social Start-ups	N	Consistency	PRI	Cases
1	1	1	1	0	0	1	2	0.943	0.894	ES51, ES52
1	1	1	1	0	1	1	2	0.844	0.744	ES30, IE06
1	1	1	0	1	1	1	4	0.816	0.725	CZ01, DE60, DE71, FI1B
1	1	1	1	1	1	0	3	0.755	0.588	DEA2, FR10, ITC4
1	0	1	1	1	1	0	2	0.750	0.591	BE10, DE21
0	0	0	1	1	0	0	2	0.701	0.607	FRE1, DEA5
0	0	1	1	1	1	0	2	0.695	0.559	DEA1, LU00
1	1	1	0	0	1	0	2	0.681	0.532	NL32, SE11
0	1	0	1	1	0	0	2	0.654	0.520	FRG0, ITH3
0	1	0	0	0	1	0	2	0.624	0.368	NL11, NL42
0	1	1	0	0	1	0	2	0.494	0.285	NL31, SE23

0	0	0	1	0	0	0	7	0.411	0.237	BG41, CY00, ES61, HR04, MT00, PL21, PT11
0	0	0	0	0	0	0	4	0.219	0.095	NL12, NL13, NL21, NL22

Appendix 11.3. Sufficient Configurations - <u>Percentage of Social Start-ups – ≥100 Total Start-ups</u>

Back to the Main Text

Percentage of Social Start-ups
(Regions with more than 100 start-ups)

	Configurations	
	A	**B**
Incubators	●	•
Sustainability Education	●	•
Impact Investors	●	•
Social Awareness	●	☒
Governmental Sustainability (Social)	☒	●
Economic Development		•
Consistency	0.840	0.816
Raw Coverage	0.148	0.152
Unique Coverage	0.114	0.118
Overall Solution Consistency	**0.814**	
Overall Solution Coverage	**0.266**	