Governmental Supportive Policies for Green Entrepreneurial Activity in Saudi Arabia: An Institutional Analysis

Wafa Alwakid, Sebastian Aparicio, and David Urbano

Abstract In this exploratory study, we analyzed the influence of governmental supportive policies on green entrepreneurial activity in Saudi Arabia, using institutional economics as a theoretical framework. Based on data from reports of the General Authority for Meteorology and Environmental Protection and the General Authority for Statistics, both fixed and random effects models were applied in 21 cities within Saudi Arabia (2014–2018). The main findings show that environmental, innovation, and entrepreneurship governmental supportive policies exert a significantly positive influence on green entrepreneurship. Future implications for policymaking and managerial decisions related to targeted awareness raising and environmental care can be derived from this study.

Keywords Green entrepreneurship · Governmental supportive policies · Institutional approach · Saudi Arabia

W. Alwakid
Universitat Autònoma de Barcelona, Bellaterra, Spain

Jouf University, Al Jouf, Saudi Arabia
e-mail: wafanaif.alwakid@e-campus.uab.cat

S. Aparicio (✉)
Durham University, Durham, UK

Fudanción ECSIM, Medellín, Colombia
e-mail: sebastian.aparicio@durham.ac.uk

D. Urbano
Universitat Autònoma de Barcelona, Bellaterra, Spain
e-mail: david.urbano@uab.cat

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1 Introduction

The current literature considers entrepreneurship as a key mechanism for long-term development (Bjørnskov and Foss 2016; Bosma et al. 2018; Urbano et al. 2019a). However, a consensus is lacking on whether different approaches to entrepreneurial activities have economic as well as ecological benefits (Pacheco et al. 2010). Sustainable or green entrepreneurship emerged as a possible solution to humanitarian, economic, and environmental issues while exploring, evaluating, and exploiting new opportunities (Dean and McMullen 2007; Meek et al. 2010). This activity involves a complex set of principles and practices, oriented toward the development of entrepreneurial patterns that lead to healthy ecological conditions for current and future generations (WCED 1987). As such, sustainability is universally adopted as a label for a development paradigm, paying close adherence to opportunities for future generations, particularly in terms of environmental care alongside social and economic development (Pacheco et al. 2010; WCED 1987). From this viewpoint, a focus on entrepreneurship can be used to further evaluate common processes through a green approach.

Building on the extant literature on green entrepreneurial activity, sustainable entrepreneurship practices need to be implemented not only toward economic aims but also social and environmental objectives. For example, researchers focused their attention on studying what drives sustainable entrepreneurship (Shepherd and Patzelt 2011; Cohen and Winn 2007; Crals and Vereeck 2004; Kuckertz and Wagner 2010; O'Neil et al. 2009; Rodgers 2010; Schaltegger and Wagner 2011). In particular, the influence of governmental policies on entrepreneurship was explored (Juma et al. 2017; Mohamad et al. 2013), as governments play an integral role in facilitating or hindering entrepreneurial development (Juma et al. 2017).

Dean and McMullen (2007) explained that an ecological initiative is derived from entrepreneurs who explicitly or implicitly seek solutions to market failures. They observed that certain entrepreneurial activities create novel goods and services that may solve an economic problem but leave various social and environmental issues standing. Meek et al. (2010) and Pacheco et al. (2010) suggested that governmental and social interventions, through policies and social norms, should encourage entrepreneurial activities with both commercial and sustainable purposes. Their evidence suggested a continued need to explore the importance of governmental initiatives to regulate and stimulate green entrepreneurship, guaranteeing gains beyond economic terms. This is a current goal in Saudi Arabia. However, since entrepreneurship in Saudi Arabia is risk averse, combined with being an emerging market, similarities in the challenges and opportunities faced by other developing countries such as Mexico, Indonesia, Nigeria, or South Africa are anticipated (Nader and Faghih 2015). These challenges and opportunities may involve the state's capacity to create a significant number of entrepreneurs, enhancing development by solving unemployment, and technological and ecological issues.

Thus, in this chapter, we explore the influence of governmental supportive policies (i.e., environmental, innovation, and entrepreneurship) on green

entrepreneurial activity in Saudi Arabia. We draw on institutional economics (North 1990, 2005) to understand how these policies may affect the formation and existence of this type of entrepreneurship. Specifically, we utilized panel data from 21 Saudi Arabian cities during 2014–2018. The information was obtained from the annual reports of the General Authority for Meteorology and Environmental Protection as well as the reports of the General Authority for Statistics in Saudi Arabia. By analyzing these data, through the fixed and random effects models, we provide empirical evidence concerning the positive influence of governmental supportive policies on green entrepreneurship.

This chapter provides several contributions to the literature in the field of green entrepreneurship and government policy. Initially, we studied the influence of governmental supportive policies on green entrepreneurial activity by integrating further insights into the conversation involving institutions and sustainable entrepreneurship (Meek et al. 2010; Pacheco et al. 2010, Urbano et al. 2019b). Second, as a contribution to practitioners, we consider the Saudi Arabia context, where further evidence is required. In this situation, managers of green and non-green companies may benefit from the analysis of these results, which present discussions beyond public reports. Environmental strategies in Saudi Arabia may be derived from the existence and influence of particular policies focused on encouraging entrepreneurship that cares for the environment. Finally, the analysis related to the concept of green entrepreneurial activity implies that national and local governments should continue designing, implementing, and evaluating policies that lead the path to sustainable development through green entrepreneurship (Díez-Martín et al. 2016; Kshetri 2010).

Following on from this introduction, Sect. 2 outlines the context of Saudi Arabia. Section 3 presents the theoretical framework related to institutional economics and its link with green entrepreneurship. Section 4 introduces the methodology used in the empirical analysis. Section 5 provides and discusses the main results of the study. Finally, Sect. 6 concludes with implications, limitations, and future research.

2 The Case of Saudi Arabia

Currently, Saudi Arabia is witnessing a comprehensive social renaissance and is moving confidently toward its bright future, toward building a more diversified and sustainable economy with higher knowledge-based investors (Alessa and Alajmi 2017). As the economy expands, there is a call for the need to pay close attention to entrepreneurship. Given the global orientation toward the knowledge economy as a basis for supporting the country's competitive position, through dependence on youth creativity, the government of Saudi Arabia has supported entrepreneurship to create an advanced and sustainable Saudi society (Alessa and Alajmi 2017). According to Zaydane and Amro (2011), Saudi Arabia has been keen to encourage its young population to accelerate free business by offering several awards such as the Prince Salman Award for Entrepreneurship, the Fastest 100 Growing Companies

Award at the General Authority for Investment, and the Most Competitive Youth Award. The encouragement and initiatives were invested to motivate young entrepreneurs within creative and innovative companies. To implement this concept, several organizations were established, including the Prince Salman Institute for Entrepreneurship at King Saud University, the National Entrepreneurship Institute, and the establishment of the Entrepreneurship Association in Saudi Arabia (Alessa and Alajmi 2017).

Despite these efforts, entrepreneurship in Saudi Arabia faces many constraints, including the absence of an independent regulatory framework responsible for the development of enterprises, considered one of the most significant challenges facing entrepreneurship. Saudi Arabia's accession to the World Trade Organization failed with several projects that were unable to compete with foreign products and initiatives (Alessa and Alajmi 2017).

According to the Global Entrepreneurship Monitor 2019 report, almost 76.3% of the adult population in Saudi Arabia believes that the country offers more opportunities to start a business than ever (Ashri 2019). These opportunities may be related to environmental, innovation, and entrepreneurship policies. Part of this success can be attributed to the use of green entrepreneurship, which has allowed businesses to appreciate the environmental, economic, and social factors affecting the running of their businesses. Therefore, these businesses attempt to apply the government innovation policy to seek innovative solutions to products and services. Similarly, Saudi Arabia has scaled up its business operation models to assist greening the Saudi Arabian economy.

The Saudi Vision 2030 states that the Saudi Arabian economy should offer opportunities that can stimulate the economy while generating revenues for other sectors (Thompson 2017). It is for this reason that it embraces environmental, innovation, and entrepreneurship policies that can assist companies to promote green entrepreneurial activity in the country. Nonetheless, government policies have been implemented requiring businesses or companies to comply with the green standards within a period or risk the possibility of closure. The regulations are wide, but the reality is that businesses must use clean and green energy and minimize their carbon emissions to ensure the sustainability of the business (Thompson 2017). The aim of the environmental policy is that businesses operate in an environment that is safe and healthy, which is important for the sustainability of any business and guarantees a competitive advantage over others.

Certainly, these types of policies may impose barriers for entrepreneurial activity, at least initially. Nevertheless, entrepreneurship requires a continuous movement out of the comfort zone, which may encourage people to discover new ideas that can be used to make the business flourish over time. Through it, new business ideas are created while the firm experiences exponential growth. Alongside these environmental initiatives, Saudi Arabia now has innovation policies that are intended to help entrepreneurs while stimulating growth for a competitive edge (Nalband et al. 2016). To support innovation and entrepreneurship policies, the country uses Saudi Arabia Vision 2030 as a mechanism through which it promotes the growth of small- and medium-sized enterprises (SMEs), as they play a critical role in the

economy. Another policy mechanism that has recently been used is the Saudi Fast Growth 100, which was applied nationally and promotes innovation and entrepreneurship (Alamoudi and Bagaaifar 2017). Therefore, the entities that grow more in the country in terms of revenues are offered the needed support.

The government also has a platform referred to as the Meras program that offers government and private sector services to would-be entrepreneurs. The General Authority for SMEs has implemented strategies that remove obstacles, facilitating company funding. Therefore, the positive changes inspired by Saudi Vision 2030 help different sectors to initiate programs aimed at attaining accelerated growth (Thompson 2017). As part of encouraging entrepreneurship in the SME sector, the Saudi Arabian government established venture capital companies that have stimulated the private sector to ensure that they have access to funds and reduce the gap in equity (Pillai 2012). Additionally, the Saudi Arabian entrepreneurship ecosystem appreciates that the systems may be changing. For instance, it now allows equity crowdfunding platforms that essentially increase people's access to financing. Further, the Saudi General Investment Authority (SAGIA) is now accepted as playing a critical role in ensuring that entrepreneurship is more inclusive for all, which is consistent with recent results by Aparicio et al. (2020). This study supports the idea that certain institutions (i.e., culture and policies) help entrepreneurial activity contribute to inclusive growth.

It seems, therefore, that initiatives supporting entrepreneurial activity are highly required. In this regard, entrepreneurship policies in Saudi Arabia also include the government efforts aimed at strengthening e-commerce, e-payments, and e-customs projects (Suboh 2015). This proactive approach has played a critical role in simplifying and digitizing the procedures used for customs, which have, in turn, improved the supply chain; businesses find it easier to procure the goods. An important part of this includes policies for the creation of Information and Communication Technology (ICT) business incubators that came under the Badir program (Suboh 2015). The growth of these incubators and accelerators has encouraged innovation and growth of businesses within the green entrepreneurship strategy adopted by the country.

Saudi Arabia has recently introduced entrepreneurship policies that are coordinated through the Ministry of Education to develop programs for SMEs as well as start-ups. Under such programs, Saudi Arabia, through some of its organizations such as King Abdullah University of Science and Technology (KAUST), has intensified scientific research and innovation with a view of making its workforce and businesses competitive within and outside the country. It has also established quasi-government institutions that have helped with defining and implementing the programs aimed at transforming businesses (Khan 2013). These bespoke entrepreneurship policies and training now play a critical role in enhancing the entrepreneurs' skills. This has created a culture that is applied by these entities even when they join the workplace. However, the most compelling position is that the programs embrace universally accepted best practices that may help in ensuring that the businesses are sustainable.

3 Theoretical Framework

3.1 Institutional Economics and Green Entrepreneurship

To comprehend possible mechanisms behind the relationship between governmental supportive policies and green entrepreneurship in Saudi Arabia, we used institutional economics (North 1990, 2005). In this sense, North (1990) explained how institutions are vital in understanding the developmental differences across regions and countries, rooted in the formal and informal rules that exist in every society. According to this theory, formal institutions consist of contracts, regulations, and procedures, whereas informal factors are related to culture, values, or social norms within a particular society. Both formal and informal institutions, as well as their interdependencies, create a context that can be decisive in determining and directing organizational behavior, setting the business agenda and practices of corporate social responsibility and green-openness (Peng et al. 2009). This institutional context shapes the conditions and constraints for business, and it is hindered by higher levels of corruption as well as by weaker property rights (Urbano et al. 2019a). From these perspectives, in terms of institutions, we draw on this approach since it enables an understanding of the differences across regions and countries, which explain the formation and growth of green entrepreneurial activity (Alwakid et al. 2020; Meek et al. 2010), as well as other types of entrepreneurship (Urbano et al. 2019b).

Institutional economics is an increasingly used theoretical lens for entrepreneurship research (Bruton et al. 2010; Thornton et al. 2011; Urbano et al. 2019b; Welter 2011). Elaborating on this viewpoint, scholars explored institutions as antecedents of entrepreneurial activity and their relationship with economic growth (Aparicio et al. 2016; Bjørnskov and Foss 2016; Bosma et al. 2018; Urbano and Aparicio 2016). Generally, extant literature suggests that entrepreneurship acts within a concrete institutional landscape and its behavior is shaped by this context (Aidis et al. 2008; Urbano et al. 2019c). Even though informal institutions act on a deeper level and are more pervasive than formal bodies, the latter may heavily influence and shape the former (Williamson 2000).

Although it is suggested that informal institutions may be more conducive to entrepreneurial activity than formal ones (Aparicio et al. 2020, 2021), policy and regulatory changes may constitute a first step to encourage a particular activity. In this regard, an initial exploratory approach may suggest that formal institutions are expected to be contingent on green entrepreneurship. Since the government undertakes the responsibility of boosting entrepreneurial development, several scholars considered that providing resources is also part of the government's function (Obaji and Olugu 2014). Government policies include regulations conducive to an environment that is capable of promoting green entrepreneurship. From this perspective, the issue becomes more complex when competing institutions are formed around sustainability issues. In this regard, government policies may refer to setting up conditions for boosting entrepreneurship that is environmentally friendly, but may simultaneously include provisions for funding policies (Dai and Si 2018). Therefore,

the need for development, which is boosted by entrepreneurship, must be balanced with the need to preserve the opportunity for future generations to produce a high quality of life and environment. This is what the Saudi Arabian government is trying to achieve.

3.2 Hypotheses Development

In general, there are several types of government policies with a variety of primary goals that converge to increasing the standard of living. For example, governments need to find legitimate means to generate and endorse user-friendly policies devoted to entrepreneurial activity (Papia 2006). Legitimacy is key, since such policies need to be implemented, irrespective of the changes of parties in power, and it should transcend political divergences to boost entrepreneurship (Papia 2006). A policy provides the basic structure for any governmental program; it guides the rationale of the government and defines direction. A policy can be ambitious yet achievable on paper, but it may lack proper implementation (Obaji and Olugu 2014). This realization, in turn, has generated a significant degree of interest in how government policies may be instrumental in fostering entrepreneurial activity, and whether their effects are consistent across countries (Minniti 2008). As a plan for sustainable development, the government needs to ensure that all entrepreneurs observe government policies (Obaji and Olugu 2014). However, governments are unable to predict the type of entrepreneurial activity that will emerge, how to make it emerge, or how entrepreneurship will observe these policies (Minniti 2008). Governments can create a reliable set of policies that are implemented to facilitate the environmental and sustainable development of entrepreneurship (Obaji and Olugu 2014). For example, during the previous two decades, many governments paid increasing attention to entrepreneurship and implemented policies aimed at fostering innovative ideas within their countries (Minniti 2008), since those policies ensure institutional transparency and protect the environment (Minniti 2008). According to Nehrt (1998), adopting environmentally progressive policies may enable firms to develop strategic competencies and reap first-mover advantages, with the assumption that all firms will eventually face these new regulations (Barrett 1991). However, the historical problems with implementing these policies are due to several factors of governance and the willpower to accomplish them. The most important factor to consider is the implementation of an environmental policy, since it positively influences green entrepreneurship. Based on these ideas, we suggest the following hypothesis:

Hypothesis 1: Environmental policy has a positive influence on green entrepreneurship in Saudi Arabia.

Complementary to environmental policies, the government also needs to enhance entrepreneurial spirit combined with an innovation policy (Zahedi and Otterpohl 2015). Innovation policy is a relatively new consideration on the policy-makers' agenda (Edler and Fagerberg 2017). Only from the mid-1990s onward, the term has

become popular (Edler and Fagerberg 2017). There appears to be requirement to adopt a package of policies to accelerate and encourage innovation, whereas a more targeted choice among policies is necessary to enhance exploration of opportunity (Mohnen and Röller 2005). Various paradigms in economics have framed innovation as a major driver in societal progress and environmental wealth (Del Rio et al. 2010). Eco-innovation (i.e., innovation related to environmental protection) was the focus of the Del Rio et al.'s (2010) study. Two fields refer explicitly to this topic: innovation economics and environmental economics. Both deal with sustainable development within a three-pillar approach that combines economic, environmental, and social sustainability (Hines and Martin 2004). The focus on sustainability goes beyond traditional definitions and considers innovation in a nontraditional framework (Hines and Martin 2004; Smith et al. 2010). Generally, the stress on innovation policy is intended to boost creativity and reflexivity, thereby expanding economic, environmental, and social sustainability, leading to the relationship described in our second hypothesis:

Hypothesis 2: Innovation policy has a positive influence on green entrepreneurship in different regions in Saudi Arabia.

Governments are often seen to either construct barriers limiting unchecked growth or providing incentives to encourage growth (Dean and McMullen 2007; Cohen and Winn 2007; Shepard and Patzelt 2011). From this viewpoint, entrepreneurship policies should be a key governmental concern that affects entrepreneurship outcomes by providing new incentives and ensuring issues are mitigated (Baumgartner and Jones 1993), such as environmental and green issues. They are a set of incentives and government procedures that enable entrepreneurs to facilitate the process of opening a business and establishing projects (Obaji and Olugu 2014). Thus, governmental policies can more effectively influence the allocation of entrepreneurship. Additionally, the accessibility of financial services is one major entrepreneurship policy that supports the majority of newly formed firms, as it is an essential element in entrepreneurship. According to Shuo (2014), governments adopt direct subsidies, tax incentives, and government procurement to inject extensive resources into the entrepreneurial process. Natural resources are subsidized directly by governmental budgetary and tax measures (Shuo 2014). In this regard, governments significantly influence firms' adoption of environmental entrepreneurship supportive policies (Raines and Prakash 2005). A consequence of this approach is the government's capacity to enforce and promote environmentally sound production methods (Shuo 2014). Obaji and Olugu (2014) provided evidence from various studies that illustrated the salience of government entrepreneurship policies in developing sustainable entrepreneurial activity. Thus, we propose the following hypothesis:

Hypothesis 3: Entrepreneurship policy has a positive influence on green entrepreneurial activity in Saudi Arabia.

4 Methodology

4.1 Data and Variables

To test previous hypotheses, we used data from the annual reports of the Authority for Meteorology and Environmental Protection in Saudi Arabia and the reports of the General Authority for Statistics Saudi Arabia from 21 cities from 2014 to 2018. Our final sample consisted of balanced panel data with 105 observations from the following cities: Riyadh, Dammam, Makah, Madinah, Alqassim, Assir, Tabuk, Hael, Jizan, Najran, Albaha, Aljouf, northern borders, Abha, Alquriyat, Taif, Yanbu, Al Hofuf, Jeddah, Jubail, and Alkhobar. The mentioned cities were chosen because they are among the most developed in terms of entrepreneurship, and they were used as the experimental platforms at the onset of the implementation of these policies (General Organization for Statistics 2019). These 21 cities reflect the consensus regarding green issues and present a standardized demography because they are considered different cities from different regions, which reflect the phenomena under discussion. Thereby, dependent, independent, and control variables are explored across these cities and over the mentioned years.

4.1.1 Dependent Variable

Since we focused on green entrepreneurship, we measured the dependent variable by examining environmental commitment, which is one of the most important issues in Saudi Arabia. Data were derived from several different sources as previously explained. According to the Organisation for Economic Co-operation and Development (OECD) (2011), green entrepreneurship can be measured as environmental commitment. Sustainability has tended to predominantly focus on issues concerning environmental, or what may be termed "green" issues: recycling, energy, and resource conservation (Kraus et al. 2020). In Saudi Arabia, no database exists for sustainable entrepreneurship, so we used a proxy to measure green entrepreneurial activity. In this regard, the First Voluntary National Review 2018 determines whether the Saudi Arabian firms have been adhering to the standards required to do business under green entrepreneurship (Kingdom of Saudi Arabia 2018). This evaluation is based on the parameters set by the United Nations, which call for the development and growth of businesses that meet sustainable goals. To measure this variable, we found a list of firms that consider environmental issues, as well as the total number of firms in each city. This variable, thus, illustrates the percentage of firms that consider the environment as a high priority in comparison to the total number of firms. For this variable, information was derived from annual reports (General Authority for Meteorology and Environmental Protection).

4.1.2 Independent Variables

For independent variables, we considered environmental, innovation, and entrepreneurship policies. Specifically, we focused on policies that are traditionally labeled under sustainability and environmental commitment, as it was considered by several authors (cf. Shuo 2014; Mohnen and Röller 2005; Obaji and Olugu 2014). In this sense, first, environmental policy consists of creating a market and nonmarket policies for firms to reduce pollution through public disclosure of aspects of its environmental performance (Arora and Casson 1996; Konar and Cohen 1997). The values for environmental policy are on a 5-point scale (1 = minor nuisance, 5 = safety-related functioning). This was obtained from the set standards evaluating whether the firms were meeting the First Voluntary National Review 2018. A value of 1 implies that the policy is a minor nuisance. A value of 2 indicates the policy is operable, and 3 indicates the acceptable performance of the policy. A 4 means the policy is functioning, whereas 5 denotes the safety-related application of the policy is functioning.

Second, innovation policy is a relatively new concern on the policy-makers' agenda, as it was not referenced until recently (Minniti 2008). Mohnen and Röller (2005) noted that innovation policy adopts a package of policies to encourage firms to further explore the market. The values for this particular policy are again on a 5-point scale (1 = ineffective, 5 = safety-related functioning). A value of 1 indicates the policy is ineffective, 2 means that the policy is operable, 3 indicates gradual improvement of the policy, 4 means the policy is functioning, and 5 indicates the safety-related applications of the policy are functioning. Third, the entrepreneurship policy encompasses a set of incentives and government procedures that help entrepreneurs to facilitate the process of establishing their ventures (Obaji and Olugu 2014). Shuo (2014) highlighted that governments apply different mechanisms to directly affect entrepreneurs through subsidies, tax incentives, and government procurement to enhance the capacity to support entrepreneurial activity. The values for this policy are again on a 5-point scale (1 = very low, 5 = very high): 1 = very low or none, 2 = low or minor, 3 = moderate or significant, 4 = high, and 5 = very high. These values indicate the same as outlined earlier. This was examined in the First Voluntary National Review 2018.

4.1.3 Control Variables

We included other variables in the model to control for additional factors that may partly explain green entrepreneurship. These control variables were considered by different authors (cf. Zahedi and Otterpohl 2015; Uslu et al. 2015). These control variables are also cited by the Saudi government regarding sustainability issues (Mewa 2019; Moe 2019).

The annual growth rate represents the value of a country's resources, which becomes increasingly sensitive to competitive forces in world markets. Environmental issues are sensitive to world markets as they shape the potential for

economic growth by conditioning survival. In Saudi Arabia, the unsustainable use of resources is one important issue and is mainly triggered by the lack of natural resource availability (Mewa 2019). This challenges the sustainability of green entrepreneurship at a deep level and requires plentiful resources that are dependent on an annual growth rate (Mewa 2019). The data source was the annual reports of the General Authority for Statistics in Saudi Arabia. Possible values for the annual growth rate are related to the average recorded over the 5 years for the agricultural sector in each city. We controlled for the population of the area, since green entrepreneurship aims to minimize threats that may occur from a decrease in environmental resources, such as an increase in population growth (Uslu et al. 2015). Several main approaches suggested for sustainability include a reduction in population growth (Zahedi and Otterpohl 2015). Saudi Arabia is one of the world's most populous countries, growing from four million in 1960 to in excess of 33 million in 2018 (General Organization for Statistics 2019). According to Zahedi and Otterpohl (2015), population growth needs to be reduced to increase sustainability. The data were derived from the annual reports of the General Authority for Statistics in Saudi Arabia. The value of this control variable is the population size, increasing for each area during the five-year study. The size of the city, included as a control variable, may affect the amount of available environmental resources, so government supportive policies are required to efficiently manage environmental resources among different-sized cities (Mewa 2019). The size of a city may also affect the rate of environmental resource depletion. A large city leads to a greater amount of required environmental resources (Mewa 2019).

We needed to consider controlling over education as well. Governments aim to improve access to quality education, which may be required for sustainable developmental goals at all levels and in all social contexts, to transform society by reorienting education and help individuals develop the knowledge, skills, values, and behavior needed for sustainable development (Moe 2019). This variable was measured as a percentage of people with the highest possible education levels in a city, which is a postgraduate degree. According to Abdul Rahman (2016), the increase in the number of postgraduate students is of utmost importance for the entrepreneurial attitude and activity. Hence, government and higher education organizations play an important role in developing graduates' entrepreneurial attitudes and effective entrepreneurial strategies (Al-Barawi et al. 2017).

Summing up, Table 1 shows further details about our dependent, independent, and control variables, which were standardized and transformed into natural logarithm. The reason is that the former avoids problems coming from variables with different scales, while the latter enables a direct interpretation in terms of a percentage change of the dependent variable when the independent one changes in 1% (for a more precise explanation see Urbano and Aparicio [2016]).

Table 1 Descriptions of variables

Variable	Definition	Data source
Dependent variable		
Green entrepreneurship	Percentage of firms considering the environment in the city out of the total number of firms in the city. The variable is standardized	Annual reports (general Authority for Meteorology and Environmental Protection)
Independent variables		
Environmental policy	Policies for firms to reduce pollution by requiring public disclosure of some aspects of firms' environmental performance; values are on a 5-point scale (1 = minor nuisance, 5 = safety-related functioning). The variable is standardized	Annual reports (Authority for Meteorology and Environmental Protection)
Innovation policy	Innovation policy is the interface between technological development policy, research, and industrial policy, which aims to create a framework for bringing new ideas to the market (OECD Reviews of Innovation Policy; OECD, 2020). The values for this particular policy are on a 5-point scale (1 = ineffective, 5 = safety-related functioning). The variable is standardized	Annual reports (Authority for Meteorology and Environmental Protection)
Entrepreneurship policy	A set of incentives and government procedures that facilitate the entrepreneurial process of establishment of projects. The values for this policy are on a 5-point scale (1 = very low, 5 = very high). The variable is standardized	Annual reports (Authority for Meteorology and Environmental Protection)
Control variables		
Population	The number of inhabitants per region the variable is standardized	General Authority for Statistics in Saudi Arabia
Size of the city	Area of the city (km^2). The variable is standardized	General Authority for Statistics in Saudi Arabia
Annual growth rate	The annual growth rate for the agricultural sector in each city. The variable is standardized	General Authority for Statistics in Saudi Arabia
Education	The percentage of people with tertiary education in each city. The variable is standardized.	General Authority for Statistics in Saudi Arabia

Authors' own table based on General Authority for Meteorology and Environmental Protection: https://mewa.gov.sa/en/InformationCenter/Pages/default.aspx.; and General Authority for Statistics in Saudi Arabia: https://www.stats.gov.sa/ar#

4.2 Model and Techniques

The model that we considered is a simple log-log equation that takes into consideration both variations in the independent variables of interest and some controls, as shown below:

$$\ln GE_{it} = \alpha + \beta_1 \ln EvP_{it} + \beta_2 \ln IP_{it} + \beta_3 \ln EP_{it} + \sum_k \delta_k \ln CV_{it} + \varepsilon_{it}$$

where GE_{it} represents green entrepreneurship in city *i* at time *t*, EvP_{it} is environmental policy across cities and time, IP_{it} denotes innovation policy, EP_{it} is entrepreneurship policy,δ_i is the parameter estimated for each *k* control variable CV_{it}, and $\varepsilon_{it}\varepsilon_{it}$ is the error term that captures the variables that may affect green entrepreneurship but are unknown in this study.

The fixed effects (FE) estimation technique was used to test whether environmental, innovation, and entrepreneurship policies affect green entrepreneurial activity. These techniques allowed us to observe the time effects in a cross-regional approach (Baltagi 2008; Cumming et al. 2014). Univariate and bivariate statistics were considered initially to illustrate the existing relationships between variables (Table 2). Subsequently, multivariate models were employed (Table 3). The main analysis was completed with the FE model, considering green entrepreneurship as the dependent variable. The independent variables were environmental, innovation, and entrepreneurship supportive policies, being the main predictors for the three suggested hypotheses. In Model 1, only control variables were included. Afterwards, the three models were set, each having only one predictor that represents each hypothesis. The first one regressed green entrepreneurship on environmental policy

Table 2 Descriptive statistics and correlation matrix

	Variable	Mean	SD	Min	Max	1	2
1	Green entrepreneurship	44.866	12.462	20.220	77.650	1	
2	Environmental policies	3.352	1.373	1	5	0.467*	1
3	Innovation policy	3.248	1.426	1	5	0.438*	0.105
4	Entrepreneurship policy	3.057	1.336	1	5	0.597*	0.265*
5	Population	1,945,362	2,392,560	54,622	8,597,713	0.11	0.099
6	Size of the city	123,036	118,669	12,000	540,000	0.001	−0.05
7	Annual growth rate	3.814	0.458	2.950	5.240	0.260*	0.074
8	Education	61.800	4.783	53.380	73.980	0.179*	0.164*
		3	**4**	**5**	**6**	**7**	**8**
3	Innovation policy	1					
4	Entrepreneurship policy	0.13	1				
5	Population	−0.03	−0.064	1			
6	Size of the city	−0.121	−0.141	0.412*	1		
7	Annual growth rate	0.205*	0.250*	−0.098	0.007	1	
8	Education	0.252*	0.290*	0.13	−0.179*	0.155	1

*$p < 0.1$. Authors' own table

Table 3 Estimated results for green entrepreneurship

	1	2	3	4	5	6	7	8
Environmental policies		0.044*			0.053**			0.050**
		(0.022)			(0.022)			(0.019)
Innovation policy			0.065***			0.061**		0.077***
			(0.020)			(0.022)		(0.024)
Entrepreneurship policy				0.066**			0.059*	0.068**
				(0.030)			(0.031)	(0.029)
Population	0.024				0.029	0.029	0.027	0.036
	(0.025)				(0.023)	(0.028)	(0.022)	(0.023)
Size of the city	0.000				0.000	0.000	0.000	0.000
	(0.001)				(0.001)	(0.001)	(0.001)	(0.001)
Annual growth rate	0.127				0.180	0.031	0.054	−0.027
	(0.184)				(0.170)	(0.191)	(0.201)	(0.205)
Education	0.236 (0.180)				0.235 (0.171)	0.183 (0.192)	0.164 (0.175)	0.086 (0.188)
Observations	105	105	105	105	105	105	105	105
R^2 overall	0.076	0.218	0.192	0.356	0.212	0.185	0.297	0.494

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Authors' own table

(Model 2), the second one considered the influence of innovation policy (Model 3), whereas the third one regressed green entrepreneurial activity on entrepreneurship policy (Model 4). In the second set of models, the control variables were added to the three models with one variable, each regressing the dependent variable on both the independent variable of interest and the control variables (Models 5, 6, and 7). Following this, Model 8 included all predictors through the fixed effects technique. Models 2, 3, and 4 are useful since they illustrate the associations of the three independent variables with the dependent variable within models that do not suffer from having too many predictors compared to other cases. Therefore, Models 1–4 provide a connection between the three aspects that underpin green entrepreneurial activity, which include innovation, environmental, and entrepreneurship supportive policies. We believe that an institutional change can be observed through these three policies due to the time dimension that was incorporated into our panel data models. Thus, we were able to observe how the 5-point Likert scale varies across time.

5 Results and Discussion

The descriptive statistics for the nonstandardized variables under the study are reported in Table 2. Green entrepreneurship varied from 20.220 to 77.650%. Despite the large number of firms, we identified only an average of 44.863% firms with

environmental purposes across cities in Saudi Arabia. Environmental policy ranged from 1 to 5 with an average of 3.352 (standard deviation (SD) = 1.373). Innovation policy ranged from 1 to 5 (mean (M) = 3.248, SD = 1.426). Entrepreneurship policy varied from 1 to 5 (M = 3.057, SD = 1.336). Table 2 shows that the three supportive policies are statistically correlated to green entrepreneurship, so the correlations met our initial expectations. The correlation between the variables was examined to explore the strength of the relationship between the variables (Table 2). Pearson's correlation was used to assess the relationship between green entrepreneurship and environmental, innovation, and entrepreneurship policies. Based on this test, we found that several variables had significant positive relationships. Also, we found a small correlation between environmental policy and entrepreneurship policy ($r = 0.265$), and we found a small correlation between innovation policy and entrepreneurship policy ($r = 0.130$). However, we also found a moderate correlation between green entrepreneurship and environmental policies ($r = 0.467$).

The results of correlations can be used to observe the multicollinearity problem among variables. As illustrated in Table 2, all correlation coefficients across the variables were less than 0.9. Hair et al. (2010) suggested that values above 0.90 reveal a multicollinearity problem. Therefore, this showed that the collected data had no multicollinearity problems.

Table 3 presents the results of all the FE models. The random effects (RE) models were practically identical, and the Hausman test results revealed that it was more appropriate to use the FE model since the *p*-value was less than 0.05. This means that we could reject the null hypothesis, which was H_0 = RE. We noted similarities with the FE estimation across the models. Therefore, interpretations are provided only for the FE models.

Concerning the testing of the hypotheses, we observed a significant positive influence of environmental policy on green entrepreneurship in different regions in Saudi Arabia, as stated in Hypothesis 1. We found a positive influence on government policies, such as environmental policy, on green entrepreneurship. According to Obaji and Olugu (2014), governments can create a reliable set of policies that can be implemented to provide green entrepreneurship. Environmental policy has a positive influence on a bivariate relation, which becomes positive when controlling only for other variables (the annual growth rate). This variable remains positive when using only the three variables of interest as predictors, and it is again positive in the model with all predictors.

A further variable that was also employed to comprehend green entrepreneurship was innovation policy. Hypothesis 2 proposed that innovation policy has a significant positive influence on green entrepreneurship in Saudi Arabia. We found that innovation policy was positively related to green entrepreneurship. A 1-percentage increase in the standard deviation of environmental policy led to an average of 0.049-percentage increase on the standard deviation of the dependent variable. For the second hypothesis, the same positive influence was noticeable, but overall, the influence of innovation policy was not contrary to expectations, since it was positive. According to Mohnen and Röller (2005), the influence of innovation policy on green entrepreneurship was positive.

Hypothesis 3 was also fully supported. We found a significant positive influence of entrepreneurship policy on green entrepreneurial activity in Saudi Arabia. Hence, the third hypothesis was also accepted with entrepreneurship policy being positively related with the dependent variable green entrepreneurship. Government policies affect entrepreneurship outcomes by providing new policies, and they move issues from less effective policies to more effective approaches (Baumgartner and Jones 1993), such as environmental and green issues. Thus, government entrepreneurship policies can influence the allocation of entrepreneurship resources (Baumol 1990; Bowen and De Clercq 2008). Obaji and Olugu (2014) illustrated a positive influence of entrepreneurship policy on green entrepreneurship as well.

According to Urbano et al. (2019b), the institutional approach provides a broad insight into understanding how institutions are related to entrepreneurial activity, as well as which institutions are most important in explaining the entrepreneurship rates that enhance economic growth. From this viewpoint, the main results in this chapter support the assertation that the formal institution (i.e., government policy) positively influences green entrepreneurship. Particularly for our laboratory, there have been various policies to support entrepreneurial endeavors within Saudi Arabia involving innovation and the environment. It is vital that the world, particularly Saudi Arabia, embraces sustainability to reflect on the recent increased interest and concerns about the environment. Increased availability of local resources, easier logistic planning, simplification of administrative procedures, and clearly expressed support for green entrepreneurship are policies that will advance forward the regional economy. The increased interest in green issues and sustainability since 2014 reflects the views of the public and general world leader on such issues. Global issues regarding deforestation, exploitation of local cheaper resources, clearer modes of communication, and, where possible, the ease of red tape all contribute to a clearer and more accessible supply chain. These factors will not only aid green entrepreneurship but also raise its profile globally.

6 Conclusions

This exploratory study illustrated the positive influence of governmental supportive policies (i.e., environmental, innovation, and entrepreneurship policies) on green entrepreneurial activity in Saudi Arabia. Institutional economics was used to theoretically frame our literature review and analysis. This was complemented with an empirical approach based on balanced panel data for the 2014–2018 period. Our results revealed that the three analyzed factors are important for green entrepreneurship across cities in Saudi Arabia.

These findings have several implications for different audiences. First, national and local governments are encouraged to adopt influential and suitable policies to develop entrepreneurial activities that solve environmental problems. Thus far, governmental supportive policies have strongly influenced environmental commitment and solving environmental issues in Saudi Arabia. This accomplishment may

encourage government staff and managers from private companies to create new policies and strategies that improve policy instruments and public–private collaborations that attract entrepreneurs. Second, governments need to help create an environment where entrepreneurs engage with environmental commitments. For example, governments can increase the emotional engagement of green entrepreneurs by building strong bonds with managers or colleagues from other companies, as well as with other new ventures.

Green entrepreneurship can be cognitively engaged by understanding the clear mission and purpose of new business and by receiving information and appropriate feedback regarding social needs. If green entrepreneurs have strong bonds with governments, they feel valued by local and national entities, so their opinions and actions are highly considered in sustainable developmental processes. This allows entrepreneurs to internally develop an emotional engagement that aids a new venture to succeed concerning its goals. Additionally, government support for green entrepreneurship is beneficial for a more sustainable environment. This may be the first step toward a more environmentally conscious society and for the conservation of resources for future generations. The government of Saudi Arabia, in particular, should continue to promote such policies. They may be interested in publicizing the results to increase legitimacy and support from managers and the entire population. Practitioners in nongovernmental organizations and businesses could claim the need for similar regulations and measures, including fiscal benefits and founding green actions.

Despite these findings and implications, this research has also some limitations. Initially, as we explored the relationship between governmental supportive policies and green entrepreneurship, which is represented by environmental commitment in Saudi Arabia, considering other government policies that may affect green entrepreneurship would be beneficial. These policies may be related to the taxation system or financial structure, along with other aspects. Second, we used secondary data over 5 years (2014–2018), so subsequent studies should focus on a longer time frame to enable long-term analyses. Third, future research may be interested in extending the analysis to cross-country comparisons (for example, by examining other regions in the Arab Gulf). Fourth, we do not have a database for sustainable entrepreneurship in Saudi Arabia, so future research could experiment with various proxies for green entrepreneurship. Limited data sources are a challenge faced by researchers, particularly when attempting to conduct cross-country comparisons. Due to the limited number of indicators and the differences in measurements across countries (Schillo et al. 2016), further efforts are necessary to gather homogenous data relating to antecedents and consequences of green entrepreneurship. As for the existing measurements, future research should improve the quality and scope of the indicators for both dependent and independent variables. This may increase reliability and enable the analysis of causal relationships in cross-sectional data (Urbano et al. 2019b).

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