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The Mediating Role of Firm Strategy in the Relationship between Green Entrepreneurship, Green Innovation, and Competitive Advantage: The Case of Medium and Large-Sized Firms in Greece

Michalis Skordoulis [1,*], Grigorios Kyriakopoulos [2], Stamatios Ntanos [3], Spyros Galatsidas [4], Garyfallos Arabatzis [4], Miltiadis Chalikias [5] and Petros Kalantonis [1]

1 Department of Tourism Management, University of West Attica, GR12243 Egaleo, Greece; pkalant@uniwa.gr
2 School of Electrical and Computer Engineering, National Technical University of Athens, GR15780 Zografou, Greece; gregkyr@chemeng.ntua.gr
3 Department of Business Administration, University of West Attica, GR12243 Egaleo, Greece; sdanos@uniwa.gr
4 Department of Forestry and Management of the Environment and Natural Resources, Democritus University of Thrace, GR68200 Orestiada, Greece; sgalatsi@fmenr.duth.gr (S.G.); garamp@fmenr.duth.gr (G.A.)
5 Department of Accounting and Finance, University of West Attica, GR12243 Egaleo, Greece; mchalikias@hotmail.com
* Correspondence: mskordoulis@gmail.com

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Abstract: The present research examines both the relationship between green innovation and green entrepreneurship and the mediating role of firm strategies in the relationship between green entrepreneurship, green innovation, and competitive advantage. A total of 225 managers responsible for the environmental strategy of medium and large-sized firms operating in Greece were used as a sample for the study. To measure the research variables, a structured questionnaire was used. The collected data were analyzed using descriptive and inductive statistics, including principal components analysis, correlation analysis, a multivariate generalized linear model, and a structural equations model. The empirical results indicate a positive influence of green entrepreneurship in green product innovation and green process innovation. Furthermore, the mediating role of firm strategies in the relationship between green entrepreneurship, green innovation, and competitive advantage is confirmed.

Keywords: green entrepreneurship; green innovation; green product innovation; green process innovation; competitive advantage; mediating role

1. Introduction

In recent decades, environmental concerns of climate change have been globally intensified [1–3], as its disastrous consequences are now overwhelming and reported in almost every region in the world [4,5]. In response to the need for environmentally sustainable growth, firms face constant pressures to care about the natural environment by taking proactive measures against environmental degradation and natural resources depletion [6].

In this context, green entrepreneurship and green innovation are considered critical factors for firms' operation [2,7]. Such strategies can support the development of new products and services that offer environmental benefits. These environmental benefits may include energy savings, reduced carbon dioxide emissions, water savings, improved recycling, and limitation of environmental pollution. Moreover, green entrepreneurship and green innovation are considered to positively impact firms' productivity and to support their ability to develop a competitive advantage [6,7].

More and more firms are focusing on proactive approaches towards environmental protection by adopting green entrepreneurship and green innovation [8]. The ultimate success of these approaches, which are interrelated with firms' strategies, is the achievement of higher performance and the development of a competitive advantage [9]. Consequently, the role of firm strategy in the relationship between green entrepreneurship, green innovation, and competitive advantage has been in the spotlight of researchers worldwide [9,10].

In Greece, firms have dealt with a solid socioeconomic urgency to undertake measures in order to achieve environmental protection, simultaneously complying with adoption of European legislation [11]. According to the evidence provided in the relevant literature, green entrepreneurship and green innovation practices were not fully integrated into the operation of Greek firms until the early 2000s [12].

The present study aims to examine both the relationship between green entrepreneurship and green innovation and the relationship between green entrepreneurship, green innovation, and competitive advantage, taking into consideration the mediating role of firms' strategies. This analysis is considered highly important since, despite the fact that there is a well-developed body of literature concerning the international context, there is limited knowledge concerning the case of Greece. This becomes even more important due to the constant changes in the socioeconomic environment and the consequences caused by the economic development model of Greece in firms, as they can affect both the adoption and the performance of green entrepreneurship and green innovation [6,7].

This paper is organized as follows. The first section contains an introduction to green innovation and green entrepreneurship and sets out the importance of the case of Greece. The second section includes a literature review on the examined concepts and the development of the research hypotheses. The third section includes the research methodology. The fourth and the fifth sections include the research results and their discussion. Lastly, the conclusions and limitations of the research are included in the fifth section.

2. Literature Review

2.1. The Relationship between Green Entrepreneurship and Green Innovation

Green entrepreneurship is a relatively new concept, which was first introduced in the early 1990s and has been gaining increasing interest since then. Green entrepreneurship refers to a unique subset of entrepreneurship, aiming to create and implement solutions to environmental problems and simultaneously promote social changes so that the environment is not endangered. It is also suggested that green entrepreneurship could develop a new business stance instead of being considered as a subset of entrepreneurship. That is because green entrepreneurs are widely motivated, rather than selling environmentally caring products and services to niche markets [13].

Green innovation is included in the context of green entrepreneurship. Green innovation has become one of the most important strategic tools for achieving sustainable growth due to the increasing environmental pressures [14]. According to the European Union Environmental Innovation Observatory, green innovation is defined as: *"the introduction of a new or significantly improved product, service, process, organizational change or marketing solution that can reduce the use of natural resources and the release of harmful substances throughout its life cycle"* [15]. Green innovation is a crucial factor for the viability of both firms and countries. Since green innovation contributes to the development of new ideas, attitudes, products, and processes, the implementation of these new concepts supports the limitation of severe environmental impacts.

According to the Oslo Manual [16], two types of green innovation can be identified: green product innovation and green process innovation. Similarly, Chang [14] adopted these two types of green innovation. In the same context, Ma et al. [17] argued for the same two types of green innovation. Green product innovation refers to new or modified products, while green process innovation refers to new or modified production equipment in the manufacturing process and new methods and processes [17].

Researchers consider green innovation as the critical factor in making green entrepreneurship work [18,19]. Although green entrepreneurship is clearly and closely related to green innovation, firms that adopt green entrepreneurship practices may not be ultimately competent to achieve green innovation [20]. Green innovation requires higher efforts than conventional innovation [21]. In this sense, besides green entrepreneurship, several business skills are needed in order to achieve green innovation [22].

In their research, Ebrahimi and Mozaffar Mirbargkar [23] examined the relationship between green innovation and green entrepreneurship. They concluded that there is a statistically significant relationship between green innovation and increasing economic performance, taking into account the role of green entrepreneurship. As a result, they found that the implementation of green entrepreneurship can support firms to increase their financial performance. Therefore, green entrepreneurship is considered a profitable and innovative activity that positively impacts the local society, the regional economy, and the surrounding environment [23].

According to the existing literature, entrepreneurship enables firms to build up innovation either directly or indirectly [24]. Firms adopting green entrepreneurship can control the use of various resources and, consequently, reduce their activities' environmental footprint while inventing the exploitation of green opportunities for innovation, development, organization, and rational use of primary resources. Thus, the leading strategic role of green entrepreneurship is to encourage firms to form organizational dynamics, enabling them to produce as many innovative green products is possible [22].

The above orientation can become even more stable and effective if firms retain a business orientation, which means a higher level of innovation, risk taking, and initiatives [25]. Consequently, whenever firms have a strong motivation towards green entrepreneurship, they can demonstrate environmentally responsible management and innovation in products, services, processes, strategies, or business models. Thus, such firms will eventually and successfully develop green innovation [22].

Although the ultimate goal of green-entrepreneurship-oriented firms is associated with the economic benefits [26], it makes it easier for them to achieve green innovation, compared with those firms that simply focus on financial benefits and profitability [27]. As a result, even though green entrepreneurship is founded on the basis of improving technology and reducing costs, it can promote green innovation [28].

Based on the above analysis, the following research hypothesis was developed:

Hypothesis 1 (H1). *Green entrepreneurship positively affects the development of green innovation.*

2.2. The Mediating Role of Firm Strategy in the Relationship between Green Entrepreneurship, Green Innovation, and Competitive Advantage

As suggested by Porter's Competitive Strategy [29], competitive advantage can be developed either by diversification or by low cost. Therefore, firms that adopt differentiation or cost leadership strategies can gain a competitive advantage [30], as several studies have shown [31].

Environmental strategy refers to how a firm's products, services, and any other activities interact with the natural environment. Firms' environmental strategies are usually characterized as either reactive or proactive. The main goal of reactive environmental strategies is to meet the institutional framework's requirements for the pollution caused by firms' activities. On the other hand, proactive environmental strategies concern a more general framework that includes environmentally sound practices and innovative solutions, which usually lead to the redesign of products, services, and business processes in order to protect the environment. Therefore, it is understandable that firms following proactive environmental strategies adopt green entrepreneurship and green innovation at a higher level [32,33].

The cost leadership strategy creates a competitive advantage through resource efficiency and cost reduction [29]. Green product innovation entails high research costs, opposing to cost leadership [14]. A cost leadership strategy could negatively mediate the re-

lationship between competitive advantage development and green product innovation [10]. This argument can be supported by the fact that green product innovation requires the investment of significant resources, a fact that is characterized by high uncertainty [34]. On the other hand, the cost leadership strategy focuses on reducing product costs by intensifying and upgrading the existing technical facilities of production [35].

Moreover, a cost leadership strategy may hinder the pursuit of many benefits derived from green innovation. Indeed, aiming to ensure the benefits of green product innovation, firms are prone to utilize and promote the environmental characteristics of green products in the market [10]. However, the cost leadership strategy focuses on actions and initiatives that should reduce costs rather than advertising new product innovation or entering new markets [36]. Thus, the profits gained from green product innovation are likely to be mediated by adopting a cost leadership strategy. Therefore, green product innovation can be proven cost-inefficient whenever firms invest in it and, at the same time, follow a cost leadership strategy [10].

A cost leadership strategy can mediate the relationship between green process innovation and the competitive advantage as well [10]. This is explained because green process innovation can minimize production costs and improve resource efficiency [37]. Furthermore, cost leadership strategy allows firms to protect the innovation-generated profits as they can gain value from green process innovation by creating unique construction patterns that prevent competitors from imitating them [38]. Firms that adopt cost leadership strategies can also ensure stakeholder support by gaining certification for sustainable environmental management processes, such as ISO 14001. Such certifications further support firms to benefit from improved production processes [10].

Green product innovation necessitates the design of green products that incorporate features that add value to sustainable environmental management [17]. Consequently, green product innovation is supported by diversification strategy. The diversification strategy supports the development of a competitive advantage. It facilitates the development of products and services of exclusive characteristics and distinct features compared with those offered in the market [29]. While considering the diversification strategy as a mediating factor, a positive relationship between green innovation and competitive advantage development should be possible [10]. The causality of this statement is attributed to the fact that green products are designed to meet the requirements of sustainable environmental management and that firms following a diversification strategy spur the benefits of the green product to the market. Therefore, green product innovation makes a firm's products and services unique compared to competitors [39]; contributes to new markets expansion [40]; maintains customer loyalty [41]; and supports consumers' willingness to pay higher prices [42].

Green process innovation, contrarily to green product innovation and the diversification strategy [29], involves investments that support cost reduction and efficiency improvement [17]. In this respect, the relationship between green process innovation and competitive advantage may be negatively mediated by the differentiation strategy [10]. This type of relationship is likely determined by the need to limit the use of resources needed by green process innovation [17], which is contrary to the requirements of the diversification strategy [10].

Based on the above analysis, the following research hypothesis was developed:

Hypothesis 2 (H2). *Firm strategy mediates the relationship between green innovation and competitive advantage.*

Melay et al. [43] suggested that the interaction between green entrepreneurship, green innovation, and firm strategy is at the heart of every green firm. Organizational phenomena can be better understood when those who examine them consider firms as complex organizations, which consist of different components, including the entrepreneur, the strategy, the organizational structure, and the environment [44]. In their research, they found that the abovementioned components strongly interact with each other. The entrepreneur clearly

plays a key role in a green firm and significantly influences other areas, such as strategy, structure, and resources. At the same time, the entrepreneur's activities are limited by the external environment, which includes legal, financial, and bureaucratic obstacles.

In their research, Rehman et al. [45] examined the relationship between green entrepreneurship and firms' competitive advantage, taking into account the mediating role of firms' strategies. More specifically, they concluded that a proactive environmental strategy significantly strengthens the relationship between green entrepreneurship and competitive advantage.

Proactive environmental strategies are closely connected with differentiation strategy as they focus on redefining firms' processes and developing both products and processes innovations in order to protect the environment [46,47]. Such strategies enable firms to improve their processes and technologies and form organizational structures that will enable them to respond to any changes driven by competition [48]. In this way, the development and establishment of a competitive advantage may become feasible.

The choices of a firm's top management are often influenced by the attitudes and values of their executives [49]; meanwhile, these attitudes are crucial to the firm's strategy development [50]. Therefore, many researchers state that the implementation of proactive environmental strategies, and consequently the adoption of green entrepreneurship, is led by differentiation strategies implemented by executives with high environmental sensitivity [49,51].

Based on the above analysis, the following research hypothesis was developed:

Hypothesis 3 (H3). *Firm strategy mediates the relationship between green entrepreneurship and competitive advantage.*

3. Research Methodology

3.1. Materials and Methods

The primary data collection was carried out using a structured questionnaire delivered between 15 March 2020 and 15 July 2020. The questionnaire was answered by the managers responsible for the environmental strategies of 225 medium and large firms operating in Greece. Prior to completing the final version of the questionnaire, a pilot study was carried out. The final questionnaire consisted of 38 questions.

In order to estimate the appropriate sample size, the whole population of the research area was determined. The whole population was defined as all the firms of medium and large size operating in Greece. Firms where classifies as medium or large based on the European Commission's criteria [52]. Moreover, the Hellastat iMentor database [53] was used for the selection of the firms. This database contains 1460 firms that meet the criteria of being either medium or large. A total of 323 firms operating in industries with a low impact on the environment were excluded, as proposed in the relevant literature [7].

The adopted methodology for sample size determination was proposed by Dillman et al. [54]. According to this method, the research sample should be about 225 firms, taking into account that the level of significance of this research was set at 5%.

To select the firms, a simple random sampling was followed. More specifically, a list including all 1137 firms that met the criteria of medium and large size was developed. A code number was given to each firm. As in other similar cases [55,56], firms were randomly selected using Microsoft Excel's random number generator function, called RANDBETWEEN. The randomly selected firms were notified to participate in the survey, while for those who denied to participate, another one was selected following the above method.

A total of 892 firms were finally addressed in order to select the needed sample. Thus, a 25% response rate was obtained. This response rate is considered high and was achieved after a follow-up process to the firms agreed to participate. Besides, it should be noted that this 25% response rate can be explained by the fact that in similar studies, participants expressed vivid interest in participating, either in the Greek [57,58] or the international context [32,59,60]. The response rate in these studies varied between 15% and 35%.

Regarding the firms of the sample, most of them operate in the sectors of food and beverages (20.0%) and industrial goods and constructions (20.0%). In contrast, the minority operate in the transport and warehousing sector (2.2%), as shown in Table 1.

Table 1. Firms' sectors.

Sector	Percentage
Industrial and chemical products and medicines	4.4%
Transport and warehousing	2.2%
Consumer products	8.9%
Business services	15.6%
Consumer services	9.0%
Tourism, catering, entertainment, and information	4.4%
Food and drinks	20.0%
Energy and water	4.4%
Health products and services	11.1%
Industrial goods and constructions	20.0%

Subsequently, 83% of the firms examined were classified as medium, while 17% were classified as large. These percentages are considered representative, since 0.9% of all firms in Greece are medium, while 0.2% are large [61]. In other words, following a percentage reduction exclusively to medium and large firms, 81.8% of firms operating in Greece are medium, while 18.2% of them are large. Therefore, percentage allocation among the firms of the sample can be considered as precisely reflecting the actual situation in Greece.

The collected data were analyzed using descriptive and inductive statistical methods, while a 5% significance level was set. Descriptive statistics were used to examine green entrepreneurship and environmental process and product innovation. A principal components analysis was carried out in order to compute the components of the research and to confirm the good fit of the data to the research. The correlation between the components of green entrepreneurship and green innovation was examined using Pearson's correlation coefficient. A multivariate generalized linear model was used in order to further examine the above relationship. Lastly, a model of structural equations was used in order to examine the direct and indirect relationships between firms' strategy, green entrepreneurship, green innovation, and competitive advantage. SPSS v.26 and AMOS were used to analyze the data.

3.2. Methods of Coping with Errors

Concerning possible errors in the research, we have taken all the possible measures in order to control them. Initially, the existence of sampling error is of low possibility since the size of the research population is relatively small and we have analyzed a significant percentage of it [7]. The selection error possibility is limited since the database we have used is reliable and the firms were selected based on the specific criteria that ensure the convergence between the target population and the sample [7]. Furthermore, based on the work of Armstrong and Overton [62], we tested the existence of statistically significant differences between the first and the last 30 questionnaires using the Mann–Whitney U test. Based on the test's results, we concluded that there is no non-response error since there are no statistically significant differences between the first and the last responses [7,62]. As far as the common method bias is concerned, we have followed commonly used remedies to decrease it, including the clear development of the questionnaire, the provision of instructions, and assuring the respondents of the anonymity of their answers [63]. Moreover, the low possibility of common method bias existence is ensured since none of the research components accounted for more than 50% of the total variance [64]. Last, we consider a low possibility of desirability bias since we have implemented some common remedies, including the explanation of the absence of "correct" and "incorrect" responses and the use of forced-choice items [65].

3.3. Definition of Varibles

Competitive advantage is the dependent variable of this study. Considering that the ultimate goal of all firms is to gain a sustainable competitive advantage [66], the approach of Wagner and Schaltegger [67] took into account the fact that it is difficult to determine the impact of green entrepreneurship and green innovation on a firm's overall performance [68]. Therefore, in their methodology [67], they focused on those features of firm performance that can be more easily influenced by green entrepreneurship and green innovation. For this reason, we have followed their approach to define competitive advantage in our study.

Green entrepreneurship is the first of the independent variables. In this respect, the approach of Banerjee et al. [69] was used to measure green entrepreneurship. The main reason for this selection is that their questionnaire was delivered to a wide range of firms operating in various sectors, in contrast to the methods followed by others. In the present study, firms operating in various sectors were analyzed as well. In addition, the questionnaire of Banerjee et al. [69] was developed to enable the linkage of firms' environmental strategy with their competitive advantage, which is compatible with the aims of the present study.

The second and the third independent variables refer to green product innovation and green process innovation. Green innovation can be measured in numerous quantitative ways. However, taking into consideration both the fact that the Community Innovation Survey database of the EU do not include data for Greece [70], and the fact that only a few of the firms participating in this survey agreed to provide quantitative data, green product innovation and green process innovation were measured based on the respondents' perceptions, as in many other cases [46,58,67,71–73]. Moreover, green innovation was measured as a multivariate concept in these surveys. Additionally, the approaches of Aragón-Correa et al. in [59,72] are the basis of the majority of all the studies measuring green innovation [7]. Furthermore, these approaches considered both the strategy followed by the firms and the relationship built with the competitive advantage, as in the present study. Thus, the approaches mentioned above of Aragón-Correa [74] and Aragón-Correa et al. [72] were used to measure green product innovation and green process innovation in the present study.

The type of firm strategy (differentiation or cost leadership) is the study's mediating variable. That is because firm strategy can mediate the relationship between green entrepreneurship and green innovation with competitive advantage [9,33,58,75,76].

4. Results

4.1. Principal Components Analysis

Initially, a principal component analysis was carried out. Principal component analysis allowed the investigation of those concepts that could be measured by shrinking a large number of variables into a few interpretable components. The results showed relatively high correlations between the variables, since the value of the Kaiser–Meyer–Olkin test was equal to 0.757. Moreover, the *p*-value of Bartlett's test of sphericity was almost equal to 0. Therefore, it was concluded that the collected data were suitable for a principal components analysis.

The number of the components was selected based on the eigenvalues of the correlation table. More specifically, 4 components with eigenvalues higher than 1 were finally selected. The reliability of these 4 components was analyzed by using Cronbach's alpha coefficient. The data of Table 2 confirm the reliability of the components as in all cases Cronbach's alpha value is higher than 0.7 [77].

Table 2. Cronbach's alpha values for the components.

Component	Cronbach's Alpha Value	Number of Variables in the Component
Green entrepreneurship	0.870	7
Green product innovation	0.836	6
Green process innovation	0.824	8
Competitive advantage	0.801	14

4.2. Green Entrepreneurship and Green Innovation Analysis

The descriptive statistics of the components concerning green entrepreneurship, green product innovation, and green process innovation are provided in Table 3.

Table 3. Green entrepreneurship and green innovation components descriptive analysis.

Component	Variables	D*	A	N	Mean	S.D.
Green entrepreneurship	Environmental issues integration into strategic planning	15.50	73.30	11.10	5.29	1.60
	Quality includes reducing the environmental impact of products and processes	20.00	71.10	8.90	5.16	1.65
	Every effort is made to associate environmental objectives with other objectives	19.90	68.90	11.10	5.02	1.63
	Commitment to develop products and processes that minimize the environmental impact	13.30	77.80	8.90	5.31	1.54
	Environmental protection is the driving force of business strategy	31.10	53.30	15.60	4.67	1.84
	Environmental issues are always considered when developing new products	22.20	68.90	8.90	5.00	1.70
	Products and processes are developed concerning the minimization of the negative environmental effects	11.10	75.50	13.30	5.33	1.45
Green product innovation	Sponsorships regarding events related to the environment	33.33	51.11	15.56	4.42	1.85
	Use of environmental arguments in marketing	13.33	71.11	15.56	5.20	1.55
	Ecological requirements for suppliers selection	13.33	77.78	8.89	5.27	1.51
	Application of the life cycle analysis model (LCA)	26.67	53.33	20.00	4.42	2.02
	Reducing the use of toxic substances	6.62	82.22	11.11	5.62	1.44
	Use of ecological raw materials	11.11	75.56	13.33	5.31	1.49
	Improvement of energy efficiency	8.89	82.19	8.92	5.51	1.46
	Use of energy from renewable energy sources	28.89	51.11	20.00	4.58	1.71
Green process innovation	Integration of environmental protection in administrative decisions	13.33	75.56	11.11	5.27	1.85
	Periodic environmental inspections	20.00	64.44	15.56	4.96	1.79
	Design and implementation of a waste recycling program	17.78	68.89	13.33	5.11	2.00
	Environmental education of employees	15.60	64.40	20.00	4.80	1.53
	ISO certificates adoption in environmental issues	11.11	82.22	6.67	5.42	1.44
	Environmental directives adoption in industrial processes	11.11	73.33	15.56	5.36	1.60

Abbreviations: A—"agree" and "totally agree"; D*—"disagree" and "totally disagree"; U—"neutral" statements.

Based on the above table, concerning green entrepreneurship, the commitment to develop products and processes that minimize the environmental impact received the highest positive score (77.80%). In contrast, the statement that received the lowest percentage of positive responses is that environmental protection is the driving force that guides the business strategy (53.30%). The standard deviation was low in all the cases, implying that the responses were not widely dispersed.

Green innovation was divided into two components based on the results of principal components analysis. Concerning green product innovation, it can be stressed that most

answers in all cases were positive. Reducing the use of toxic substances received the highest positive score (82.22%), whereas the lowest percentage of positive answers referred to the use of energy from renewable energy sources (51.11%). Low standard deviations indicated that the responses were not widely dispersed.

Moreover, in all the cases of green process innovation, positive responses received the highest scores. In particular, the highest percentage of positive answers referred to the use of ISO certificates in matters of quality and environment (82.22%). In contrast, the lowest positive score referred to the environmental education of employees (64.40%). The standard deviations were low, inferring that the answers did not differ significantly.

Regarding the environmental ISO certification, although Greek firms have recently and gradually adopted them, they are still lagging behind the European average [61].

4.3. The Relationship between Green Entrepreneurship and Green Innovation

In order to investigate the existence of a relationship between the components of green entrepreneurship and green innovation, Pearson's correlation coefficient was applied, taking into account the fact that these variables are continuous and normally distributed.

The *p*-values of Table 4 are lower than 5%; thus, the existence of a statistically significant correlation between green entrepreneurship with both green product innovation and with green process innovation is confirmed. This relationship in both cases is moderately positive.

Table 4. Pearson correlation coefficient regarding the relationship between green entrepreneurship, green product innovation, and green process innovation.

Component	Green Entrepreneurship	
	Pearson's Correlation Coefficient	***p*-Value**
Green product innovation	0.497	0.000
Green process innovation	0.689	0.000

However, the above result did not fully explain the relationship between the variables, taking into account the need for the existence of dependent and independent variables. Based on the literature review, green product innovation and green process innovation can be considered dependent variables, while green entrepreneurship can be considered independent. The examination of the required relationship necessitated the application of a multivariate generalized linear model [78,79]. This model can be considered as an extension of the well-known multivariate analysis of variance (MANOVA). The primary application of the multivariate generalized linear model, as supported by SPSS, was that its statistical design, unlike MANOVA, does not require the independent variables to be categorical [80]. This statement explains the applications of a model that consists of two continuous dependent variables (green product innovation and green process innovation) and a continuous independent variable (green entrepreneurship). In this case, the primary condition is the normal distribution of dependent variables [78,79] that is proved by the Kolmogorov–Smirnov test (*p*-values > 5%). The second essential condition refers to the homogeneous variation of the sample groups, which is examined using Levene's test. However, since the only independent variable is continuous—thus, no different groups were created in the sample—Levene's test does not apply.

Green entrepreneurship has a statistically significant impact on both green product innovation and green process innovation, based on Wilks' Lambda *p*-value (Table 5). The same statistically significant result is inferred based on all the other indicators as well. The partial square root Eta is actually a pseudo R-squared coefficient, measuring the degree to which the variability of the independent variable explained the variability of the dependent ones. Therefore, based on the value relating to the Wilk's Lambda test used in this case, it has resulted that green entrepreneurship explains 23.6% of the total variation of the two components of green innovation.

Table 5. Multivariate generalized linear model results considering the analysis of the role of green entrepreneurship in the development of green innovation.

		Test Value	F	*p*-Value	Eta
Constant	Pillai's Trace	0.808	288.694	1.000	0.722
	Wilks' Lambda	0.989	288.694	1.000	0.722
	Hotelling's Trace	68.735	288.694	1.000	0.722
	Roy's Largest Root	68.735	288.694	1.000	0.722
Green entrepreneurship	Pillai's Trace	0.722	12.861	0.000	0.236
	Wilks' Lambda	0.278	7.255	0.000	0.230
	Hotelling's Trace	0.601	14.735	0.000	0.350

Based on the above analysis, green entrepreneurship's positive influence on green product innovation and green process innovation is confirmed. Thus, the research hypothesis H_1 is accepted.

4.4. The Mediating Role of Firm Strategy

The mediating role of firm strategy is examined using a model that can focus on the simultaneous influence of green entrepreneurship and green innovation in developing competitive advantage. The analysis of structural equations models can be used to examine the above mentioned mediating role, as suggested by similar studies [23].

The following Table 6 reveals the direct relationships between the components of the proposed model.

Table 6. Direct relationships of the multivariate generalized linear model.

Variables' Relationships			Estimators	S.E.	*p*-Value
Firm strategy	←	Green entrepreneurship	0.766	0.057	0.000
Green product innovation	←	Green entrepreneurship	0.608	0.048	0.000
Green process innovation	←	Green entrepreneurship	0.679	0.054	0.000
Firm strategy	←	Green product innovation	0.604	0.047	0.002
Firm strategy	←	Green process innovation	−0.221	0.040	0.000
Competitive advantage	←	Green entrepreneurship	0.501	0.009	0.000
Firm strategy	←	Competitive advantage	0.301	0.021	0.012
Competitive advantage	←	Green product innovation	0.410	0.077	0.000
Competitive advantage	←	Green process innovation	0.482	0.087	0.000

More specifically, there are direct positive relationships between green entrepreneurship and green product innovation (estimator = 0.608), between green entrepreneurship and green process innovation (estimator = 0.679), and between green entrepreneurship and competitive advantage (estimator = 0.501). Moreover, there are direct positive relationships between green product innovation and competitive advantage (estimator = 0.410), and between green process innovation and competitive advantage (estimator = 0.482). Last, there are direct positive relationships between firm strategy and green entrepreneurship (estimator = 0.766), between firm strategy and green product innovation (estimator = 0.604), and between firm strategy and competitive advantage (estimator = 0.301). On the contrary, there is a direct negative relationship between firm strategy and green process innovation (estimator = −0.221).

The direct and indirect relationships between the examined components are shown in the following Figure 1.

Based on the above model of structural equations, the indirect relationships emerged, as shown in Table 7.

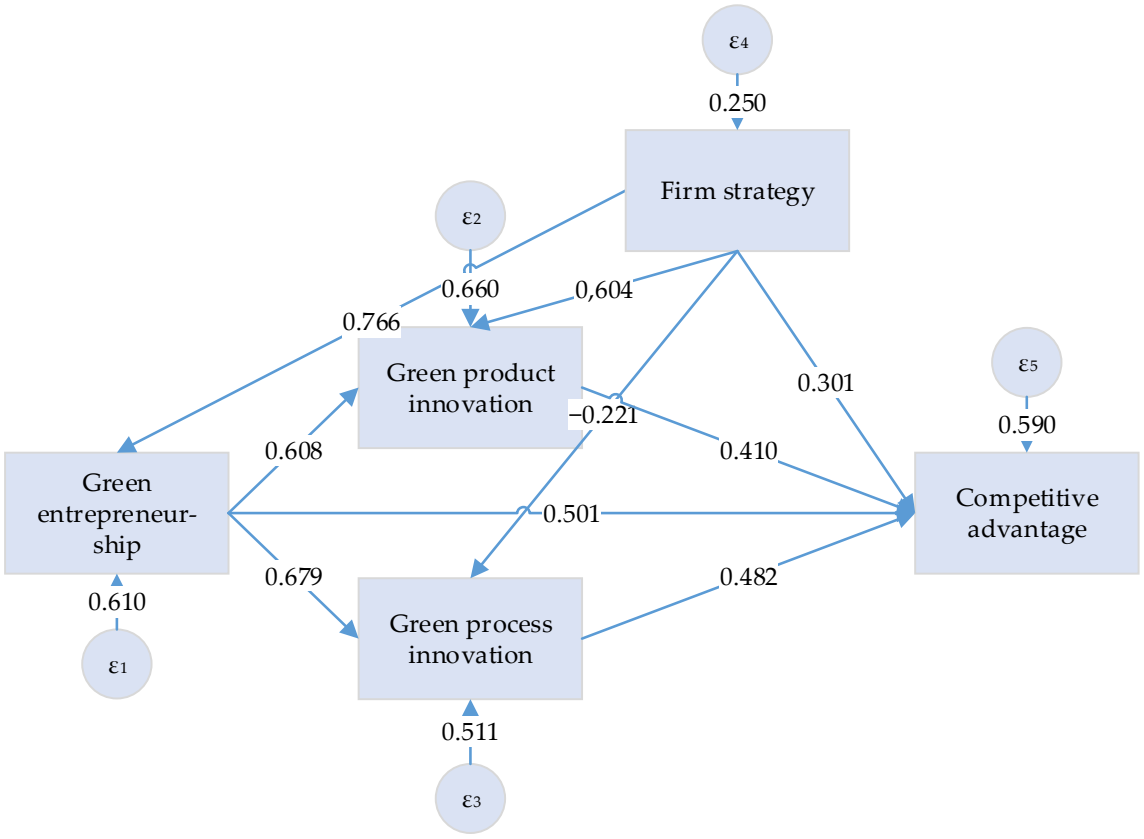

Figure 1. The final model of structural equations for the direct and indirect relationships between firms' strategies, green entrepreneurship, green innovation, and competitive advantage.

Table 7. Standardized coefficients of indirect effects.

	Firm Strategy	Green Entrepreneurship	Green Product Innovation	Green Process Innovation
Green entrepreneurship	0.000	0.000	0.000	0.000
Green product innovation	0.261	0.000	0.000	0.000
Green process innovation	0.234	0.000	0.000	0.000
Competitive advantage	0.142	0.546	0.000	0.000

Based on the standardized coefficients of indirect effects, an indirect positive effect of the firm strategy on green product innovation, green process innovation, and competitive advantage can be signified. Moreover, there was an indirect positive effect of green entrepreneurship on competitive advantage. Consequently, the mediating role of both firm strategy and green entrepreneurship in competitive advantage is detected by their indirect effects.

The data in Table 8 confirm the good fit of the model. Initially, the value of the RMSEA index should be as close as possible to 0, since it is an indicator of "poor adjustment" of the model, while its acceptable values are lower than 0.06. Its value in the present case is, therefore, acceptable. The GFI adjustment index range is between 0 and 1. Its value should be considered as close to 1 as possible, since it is affected by the sample size. In any case, its value here is considered satisfactory. Contrarily, a better estimate is offered by the CFI adjustment index, the value of which is equal to 0.866. Therefore, this value is considered satisfactory as well. Finally, the value of TLI index, which is another indicator of goodness of fit, is considered acceptable since it is higher than the threshold limit of 0.9 [81].

Concerning the validity of the above model it should be noted that it cannot be confirmed. As in other similar cases, the reason for omitting the model's validity has to do with the fact that the model must be tested if it could fit into different random samples

from the same sampling population [81]. Thus, the verification of the model's validity is proposed as future research to be carried out.

Table 8. Goodness of fit indicators for the structural equations model.

	Indicators' Values
Chi-square	79.030
Root mean square error of approximation (RMSEA)	0.051
Goodness of fit index (GFI)	0.805
Comparative fit index (CFI)	0.866
Tucker–Lewis coefficient (TLI)	0.901
Akaike Information Criterion (AIC)	11.530

According to the above analysis, the model of structural equations reveals that firm strategy can mediate the relationship developed between green entrepreneurship, green product innovation, and competitive advantage. Thus, we conclude that research hypotheses H_2 and H_3 are accepted.

5. Discussion

In the above analysis, the mediating role of firms' strategy in the relationship between green innovation, green entrepreneurship, and competitive advantage is confirmed, as in many other similar cases [45,46,57,67].

Specifically, concerning the first research hypothesis about the positive impact of green entrepreneurship on green innovation, the results of Melay et al. [43] showed that several factors interact with each other and influence green innovation. These factors include the entrepreneurs, the strategy, the environment in which the company operates, the company's structure, and its resources. The entrepreneur plays a vital role in a green firm. So, it can be concluded that the application of green entrepreneurship, although related to green innovation promotion, is not the only factor influencing green innovation. Such innovation is based on entrepreneurs' views and environmental beliefs, but one must consider the factors of the external environment.

While most of green entrepreneurship's definitions focus in relating it with the implementation of innovations to support environmentally sustainable development, green innovation's definitions focus in relating it with a set of measures taken to develop processes, products, or services that support the reduction in an environmental impact [82]. Based on the definitions of green entrepreneurship and green innovation, the relationship between these components can emerge, since they are considered as two different but interrelated concepts [83]. Indeed, entrepreneurship supports innovation to grow while it utilizes it to support firms' growth [84].

Concerning the second research hypothesis on firms' strategy mediating role between green innovation and competitive advantage, our results are compatible with the study of Rehman et al. [45] and Kraus et al. [85]. Even though green innovations may be new for a firm, they are not necessarily new to the market [86]. Firms following proactive environmental strategies and responding to increased customer demands for green products and services they can be favored from bridging green entrepreneurship with green innovation in the way for competitive advantage establishment [87]. Indeed, the adoption of proactive environmental strategies can improve both firms' profits and their environmental performance by adopting green innovation, collaboration, digitalization, social-media influencing, and collaborative economy types, which are gaining a competitive advantage over former types of economies, especially these of traditionally transactional and linear types of entrepreneurship [69,88].

The third research hypothesis was about the firms' strategy mediating role between green entrepreneurship and competitive advantage. The mediating role of firm strategy on the relationship between green entrepreneurship and green innovation, can create an environmentally responsible reputation [89]. Furthermore, this relationship can maintain

an active stance for opportunities offered to develop green products and services, offering the so-called "blue ocean" advantage, defined as the advantage of entering a completely new and unexplored market in which there are no other competitors.

Firms adopting green entrepreneurship can pluralistically improve their performance by effectively designing green products and services to effectively address energy and resource costs [90]. In this respect, the developed technologies can lead to more efficient management of energy and resources, ensuring lower consumption of fossil fuels and water sources and, finally, supporting higher use of recyclable materials in the production process under the principles of circular economy, compared with the traditional linear economy [41,91,92].

6. Conclusions, Limitations, and Future Research Directions

6.1. Conclusions

This research aimed to investigate the relationship between green entrepreneurship and green innovation, and furthermore to explore the mediating role of firm strategy to the relationship between green entrepreneurship, green innovation, and competitive advantage. The research focused on the concepts of green entrepreneurship, green innovation (divided into green product and green process innovation), and competitive advantage.

From the statistical analysis carried out, it was revealed that green entrepreneurship positively affects the development of both green product innovation and green process innovation.

Moreover, green entrepreneurship and green innovation contribute to sustainable environmental management. Several studies also show that these components contribute positively to developing a competitive advantage for the firms adopting them [7,57,67].

However, it can be stressed that the abovementioned relationship becomes much more complicated in the case the strategy that each firm adopts to achieve a competitive advantage is involved [9,10]. The mediating role of strategy impacts the relationship between green entrepreneurship, green innovation, and a firm's competitive advantage, making it questionable whether—and to what extent—a firm's strategy mediates these relationships. The answer to this question was given by the statistical analysis carried out. More specifically, it was found that, when a firm follows a diversification strategy, the adoption of green product innovation is favored. Contrarily, when a firm follows a cost leadership strategy, green process innovation is supported. The relevant literature also reported similar research conclusions [10].

Societies with a high level of environmental consciousness can reward environmentally responsible firms as they perceive them as agents of a better world. Therefore, a firm's compliance with the environmental and cultural values of a society can be considered an essential condition for the development of effective environmental management initiatives.

It is also noteworthy that sustainable environmental management and green innovation are considered significant factors in developing a competitive advantage, since green innovation can confront barriers for other competitors to enter in a specific market [87]. In this respect, green innovation is framing a proactive environment for firms to make even more market changes, under bilateral contracts and trading agreements running at regional, entrepreneurial, interorganizational, national, or international levels of analysis [7].

However, not all firms have the necessary conditions to implement green entrepreneurship and innovation. In this regard, firms need to follow a process of cooperation, which refers to a growing awareness of business activities, new business models, and the promotion of technologies developing in new markets [93]. The above process is defined as open innovation [7,94].

6.2. Limitations and Future Research Directions

Several avenues for future research arise from the limitations of the present research. Initially, the present research is based on the perceptions of the examined firms' managers. Therefore, future research is proposed to be based on quantitative data.

Furthermore, taking into consideration the fact that the results are limited only in the case of Greece, future research is proposed to be conducted concerning different countries, either with similar or different socioeconomic characteristics than those of Greece, in order to make possible a more comprehensive analysis of the issues examined, and, simultaneously, to make feasible the comparison of the research results between the examined countries. Moreover, similar studies in the existing literature have come to interesting conclusions about how firms operate and how this is influenced by the institutional framework for environmental protection that applies in each country [95]. In this way, the verification of the present study's model validity, which was omitted, will also become feasible.

The implementation of green entrepreneurship and green innovation is likely to differ between firms of different sizes [23,96]. However, another limitation of this research is that only medium- and large-sized firms were examined. Thus, it is suggested that other firm sizes are examined in future research.

Last but not least, climate change and its effects are perceived more year by year, while, simultaneously, the time for achieving the environmental goals set by international agreements is running out [97,98]. It is expected that firms' requirements for environmental protection will increase in the following years. Therefore, it is proposed that the present research is repeated at regular time periods; this would help to compare the results and understand the evolution of green entrepreneurship and innovation implementation. After all, it is expected that the evolution of technology will contribute to developing new methods that will be integrated into the context of green entrepreneurship and green innovation.

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