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An evaluation of the prospects of green entrepreneurship development using a SWOT analysis

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This article employs a methodological framework based on SWOT analysis to identify the most important factors and concerns in order for public policy organisations to encourage local entrepreneurs to invest in sustainable development. A survey was conducted to examine the strengths, weaknesses, opportunities and threats that the Greek Development Agencies (DAs) consider important for encouraging local entrepreneurs to exploit new opportunities using local natural resources. The results indicate that institutional, structural, social and economic factors can play a critical role in whether entrepreneurs invest in new business ventures associated with natural resources.

Keywords: Greece; development agencies; natural resources; public policy organisations

Introduction

Environmental problems have received growing attention in many modern societies. A number of scholars consider the business community as one of the main factors responsible for many of these environmental problems (Gifford 1997; Hart 1997). Environmental problems vary according to the sector in which companies operate. Examples include the mining industry, which is responsible for water, land and air pollution in its routine operations, and the tourism industry, which affects the balance of local biodiversity, landscape and heritage (Mudd 2007).

In order to address environmental problems caused by different industry sectors, several governmental, inter-governmental and non-governmental organisations have developed a range of policy instruments, standards and tools to encourage, facilitate and force businesses to introduce some environmental concerns in their strategic management. On the one hand, many governments enact environmental regulations and laws such as the Clean Air Act, CERCLA, the Solid Waste Disposal Act, the Water Resources Development Act, the Environmental Impact Assessment Act and the SEVESO II Directive in order to encourage businesses to adopt specific management practices to reduce the impacts on the natural environment for which they are considered responsible. These types of measures are known as *Command-and-Control* (CAC). Similarly, governments have adopted a range of measures from the economic agenda, known as *Market-based* instruments that encompass environmental taxes, subsidies and tradable emission permits. On the other hand, several non-governmental organisations (e.g. the Global Reporting Initiative, the Business Council for Sustainable Development, Deloitte & Touche) provide a series of measures and management systems to help voluntary efforts of the business community to *green* their

management practices (known as *Voluntary-based* instruments). Brown et al. (2009) state that such organisations build an institutional entrepreneurship framework, which is very important for promoting new green business ventures.

Regardless of the voluntary or mandatory nature of these environmental measures, they bring entrepreneurs to the forefront of some crucial dilemmas. For example, entrepreneurs of established businesses face the dilemma of whether to comply with environmental regulations and deal with the potential economic impacts by adopting some type of environmental management practices or just pay the fines and the taxes, provided that these costs are less than the cost of compliance. In the case of new entrepreneurs, the dilemma may be to start up a new business in a sector with a rigorous or lax environmental policy regime, to engage in an innovative sector associated with environmental resources (e.g. ecotourism) or in a conventional sector. Numerous previous theoretical and empirical studies explore such dilemmas and identify the ways in which both *Command-and-Control* and *Market-based* instruments can create opportunities and barriers for new business ventures (Porter and van der Linde 1995; Annandale and Taplin 2003). In particular, many scholars find that policy instruments affect a modern entrepreneur's decision to adopt proactive or reactive environmental management practices. They also identify a positive relationship between environmental efforts of entrepreneurs and competitive advantage and innovation gains (Azzone and Noci 1998).

Such examples of new green business ventures are ecotourism, biotechnology, eco-industrial parks and climate exchange organisations. In general, they are used under the broader term of green entrepreneurship that includes ideas for the establishment of new companies, restructured production processes, changes of products and

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services with respect to environmental preservation and sustainable development. The term 'green entrepreneurship' is examined in two academic fields: environmental economics and entrepreneurship. On the one hand, environmental economics concludes that market failures (e.g. public goods, externalities, monopoly power, inappropriate government intervention and inadequate information) are most responsible for environmental pollution (Cohen and Winn 2007). For this purpose, public policy interventions lead companies to implement reactive environmental practices. On the other hand, entrepreneurship literature indicates that market failures could play a crucial role in exploiting new opportunities for entrepreneurs (Dean and McMullen 2007). Entrepreneurship literature explains that established businesses adopt proactive environmental strategies in order to gain intangible assets (natural resources-based approach) or opportunities for new business ventures (Menguc and Ozanne 2005).

The majority of earlier studies focus on the examination of issues such as the motives of businesses to adopt environmental management practices on a voluntary basis, the benefits or barriers for new entrepreneurs to invest in the environmental sector, the accurate meaning of green entrepreneurship and the ways by which a company grasps competitive advantage from environmental strategies. To shed some light on this literature, this article aims to propose a methodological framework in order to identify the most important factors and concerns for assisting public policy organisations to design an overall plan for promoting green entrepreneurship. Specifically, the proposed methodological framework based on SWOT analysis aims to explore the strengths, weaknesses, opportunities and threats that public policy organisations face at the prospect of designing an overall plan to promote green entrepreneurship as well as to find which of these factors could affect the development of specific green entrepreneurship strategies. SWOT is a popular and suitable methodology for evaluating crucial factors in the promotion of business ventures and many SWOT applications are conducted in a range of environmental management case studies. Finally, this methodological framework is implemented in a Greek context as a case study to examine business perception of green entrepreneurship. The findings indicate that there are several institutional, social and economic factors that affect an entrepreneur's prospect of investing in green entrepreneurship. In addition, the findings indicate a relationship between some SWOT factors and specific green entrepreneurship strategies.

Green entrepreneurship literature review

Basic topics in green entrepreneurship

The effects of globalisation and the recent financial crisis have formed a new business landscape. A number of Western governments have announced programmes and plans that put green entrepreneurship at the top of their economic policy agenda and consider green entrepreneurship

as a crucial factor in the development of new jobs and a high rate of economic growth (CEC 2009). Similarly, several scholars have agreed that green entrepreneurship can be the driving force for a new economic start for modern economies (Hinterberger et al. 2002). Scholars, however, have not yet agreed on the meanings and terms of the concept of green entrepreneurship. The literature presents a range of terms with different meanings for the concept of green entrepreneurship such as green, environmental, ecological, sustainable entrepreneurship, eco-entrepreneurship and eco-preneurship.

In general, green entrepreneurship could be classified in two major categories: established companies that adopt environmental management practices or cleaner production processes and new business start-ups based on natural and ecological resources (e.g. solar energy companies and ecotourism). The first category could be additionally explained by theories of product differentiation, which indicates that the selection of companies to adopt environmental management practices aimed at creating innovations and gaining competitive advantage (Reinhardt 1998). This is evidenced in previous studies, which identify a positive relationship between environmental management practices that are implemented either within the context of corporate social responsibility or environmental management systems and competitive advantage and innovation gains (Hull and Rothenberg 2008; Nill and Kemp 2009). Furthermore, some authors believe that such practices do not substantially affect the total costs of businesses (Hartman and Stafford 1997).

Menguc and Ozanne (2005) state that ('green') businesses could gain valuable intangible resources that would be very difficult to imitate by other companies (natural resource-based approach). They also classify environmental entrepreneurs as: those who adopt proactive environmental strategies to identify new market opportunities and those who place environmental issues at the centre of the companies' management (e.g. corporate environmentalism and exocentric management, respectively). Following this trend, Menon and Menon (1997) suggest that large companies integrate ideas relative to environmentalism into their overall management and marketing practices (e.g. *enviro-preneurial* marketing concept) in order to gain competitive advantage and exploit new market opportunities. Based on the strategy of businesses for *greening* their management, Pastakia (1998) defines green entrepreneurship as the attempt of individuals and institutions to popularise their environmentally friendly practices either through market or non-market routes. Following this trend, environmental entrepreneurship could be defined as the strategy of an established company to adopt environmental management practices for differentiating its product, changing its production process or both (e.g. ISO 14001, EMAS, Eco-label) in order to gain innovation and competitive advantage.

The second category includes organisations and businesses engaged in pollution prevention (e.g. air pollution control and rehabilitation of mining sites) and the use

of natural resources for developing new products (e.g. from soils, waters, mountains, lakes, biodiversity and forests). There are several examples that highlight new market opportunities associated with environmental services. For instance, Dean and McMullen (2007) present the Chicago Climate Exchange entrepreneurship that provides an organised marketplace for trading carbon emission credits. Similarly, numerous opportunities for new businesses in tourism and natural environment (eco-tourism) have arisen, as well as some specific programmes from international institutions have been developed to inform entrepreneurs about green entrepreneurship issues such as the SEED (Supporting Entrepreneurs for Sustainable Development) initiative of the International Institute for Sustainable Development.

In this context, Lober (1998) defines green entrepreneurship as 'the creation of new products, services or organisations to meet market opportunities' (p. 26) and, furthermore, suggests that the strategies for pollution prevention implemented by established businesses shall be the motive for corporate self-renewal. Cohen and Winn (2007) define sustainable entrepreneurship as 'the examination of how opportunities to bring into existence future goods and services are discovered, created, and exploited, by whom, and with what economic, psychological, social and environmental consequences' (p. 35). Following this trend, green entrepreneurship could be defined as a new company start-up in the environmental services industry. The analysis of this article is based on the trend that green entrepreneurship is the opportunity of entrepreneurs to establish new business focused on natural resources or natural conditions such as ecotourism, recycling, wastewater treatment and biodiversity.

Market failures: barriers or triggers for green entrepreneurship?

Recently, it was suggested that green entrepreneurship is the result of market failures. Environmental economics indicates that market failures are the main factor responsible for contemporary environmental problems. Various environmental assets and natural resources are not perfectly allocated through the markets because the majority of those resources have no precise economic value. The current insufficient environmental regulatory regime and the low level of environmental awareness of modern societies are two very important additional reasons explaining the growing environmental problems. In fact, insufficient environmental awareness on the part of modern societies leaves companies free to pollute (negative externalities) and exploit natural resources uncontrollably over critical capital and carrying capacity of ecosystems, and also avoid compensating societies for environmental damages for which they are responsible (Dean and McMullen 2007). Literature refers to five main types of market failure that are responsible for environmental problems: public goods, externalities, monopoly power, inappropriate government interventions and imperfect information.

However, the literature on entrepreneurship indicates that those market failures may be crucial factors leading entrepreneurs to exploit new opportunities. Dean and McMullen (2007) explain how these market failures may create opportunities for new business ventures. They examine how the different types of market failures create environmental problems and new entrepreneurship opportunities, as well as how new entrepreneurship will correct environmental problems. For example, environmental problems associated with free environmental resources (public goods) may be overlapped by a well-defined governmental framework of property rights that gives the appropriate and safe economic context for entrepreneurs to find opportunities for new ventures (institutional entrepreneurship). Similarly, environmental externalities will encourage entrepreneurs to find opportunities for new business ventures in the environmental services industry. By examining monopoly power, inappropriate government intervention and insufficient information, Dean and McMullen (2007) propose a newly organised environmental, institutional and financial framework necessary for developing green entrepreneurship.

Similarly, Cohen and Winn (2007) conclude by analysing four premises: (1) a significant relationship between market failures and environmental degradations is identified; (2) the environmental degradation may generate entrepreneurship opportunities; (3) the massive changes in the natural environment may redefine the institutional and natural environment of companies eventually generating additional opportunities for new green ventures; and (4) the entrepreneurs who invest in green entrepreneurship may gain higher entrepreneurial rents.

Public policy and green entrepreneurship

This preview indicates that market failures have negatively affected the quality of the environment and may have positive consequences on entrepreneurial development. The consequences should be examined either from the viewpoint of demand or supply. The side of demand indicates that the new business ventures are the result of new economic conditions and the growing demand of consumers for environmentally friendly products. The supply side, however, highlights several other factors that could explain the decisions of entrepreneurs to invest in environmental strategies. Governments promote green entrepreneurship through changes in the economic and regulatory context, the adoption of interest rates and taxation, deregulation and simplification, financial assistance, information services and venture capital subsidies. Those government policies could affect the production side of an established company or give incentives to entrepreneurs to invest in new sectors (Angel de Brio et al. 2002).

The literature of corporate environmental management describes a range of government environmental policies in which the initiative of companies to adopt environmental management practices is explained. However, environmental policy is classified in two general categories,

compliance-based requirements (*Command-and-Control* instruments) and market-based incentives and disincentives (*Market-based* instruments). The former category includes environmental regulations and laws that commit companies to compliance with specific limits and standards. These policy instruments lead entrepreneurs to invest in environmental management practices mainly to gain competitive advantage. For this view, Porter and van der Linde (1995) support that environmental regulation will encourage companies to produce new environmentally friendly products that may add to an economy's overall competitiveness as well as to environmental preservation (win-win theory). However, this argument is not commonly accepted by all scholars from all sectors and countries. The second category includes economic instruments such as environmental taxes, subsidies and tradable permits. Relative literature indicates that these tools lead companies to invest in environmental management and environmental-friendly strategies (Rennings 2000; Mazzanti and Zoboli 2006).

Methodological framework

Research structure

The proposed methodological framework aims to identify the important factors that affect the decisions of public policy organisations in designing an overall plan to promote green entrepreneurship, as well as how these factors will affect some specific green entrepreneurship strategies. Specifically, it is structured as follows (Figure 1): (a) research questions development; (b) description of SWOT analysis methodology; (c) sample and data collection – questionnaire development; (d) analysis and results; (e) policy recommendations.

Research questions development

The main research questions presented in this study are derived from SWOT analysis.

Question 1. What are the more important strength factors that district authorities (DAs) should take into account in order to organise an overall plan for stimulating green entrepreneurship as well as for promoting specific strategies of green entrepreneurship? This question aims to examine the strengths of DAs in order to organise an overall green entrepreneurship plan and specific strategies of green entrepreneurship. For example, this question aims to find the most important benefits gained by local entrepreneurs to invest in environmental sectors. In addition, this question aims to identify which of those benefits affect specific green entrepreneurship strategies.

Question 2. What are the weaknesses that DAs should take into account in order to organise an overall plan for stimulating green entrepreneurship as well as for

promoting specific strategies of green entrepreneurship? This question examines the weaknesses of DAs to organise an overall green entrepreneurship programme as well as to stimulate specific strategies of green entrepreneurship. For example, this question refers to limited know-how of local entrepreneurs on green entrepreneurship, low demand for green products and the long distance from essential markets.

Question 3. What are the opportunity factors that DAs should take into account in order to organise an overall plan for stimulating green entrepreneurship as well as for promoting specific strategies of green entrepreneurship? This question examines the opportunities of DAs to organise overall green entrepreneurship as well as specific green entrepreneurship. This question requires information about challenges such as new jobs, new business start-ups and gain competitive advantage over local businesses.

Question 4. What are the threat factors that DAs should take into account in order to organise an overall plan for stimulating green entrepreneurship as well as for promoting specific strategies of green entrepreneurship? This last question analyses the threats DAs face when trying to organise an overall green entrepreneurship problem and specific strategies of green entrepreneurship. Specifically, this information involves future environmental degradation, future need for additional green investments and low level of diffusion of green technology.

SWOT analysis: a short description

The proposed methodological framework is based on SWOT analysis, which is considered a useful tool for the strategic planning process of environmental management and policy of organisations (Geneletti et al. 2007). It is analysed as a 2×2 matrix, including a listing of important external and internal factors of an organisation with the prospect of identifying the correct strategy. These factors are placed under the headings of strengths, weaknesses, opportunities and threats (i.e. SWOT). This helps in finding critical factors of an implemented plan (or management strategy/practice) or a future plan. The strengths of a plan may be the advantages of an organisation in implementing it or the benefits that arise from an already implemented plan by the organisation. The weaknesses of the plan could be the obstacles that should be avoided in order for an organised plan to respond sufficiently to designed goals. The opportunities indicate the benefits arising from the plan and the threats show the barriers that will have to be overcome for the implementation of the plan. Certain studies have been conducted to examine all these important features, which focus on environmental management and sustainable development issues (Srivastava et al. 2005; Geneletti et al. 2007; Terrados et al. 2007; Kuo-liang and Shu-chen 2008; Nikolaou and Evangelinos 2010).

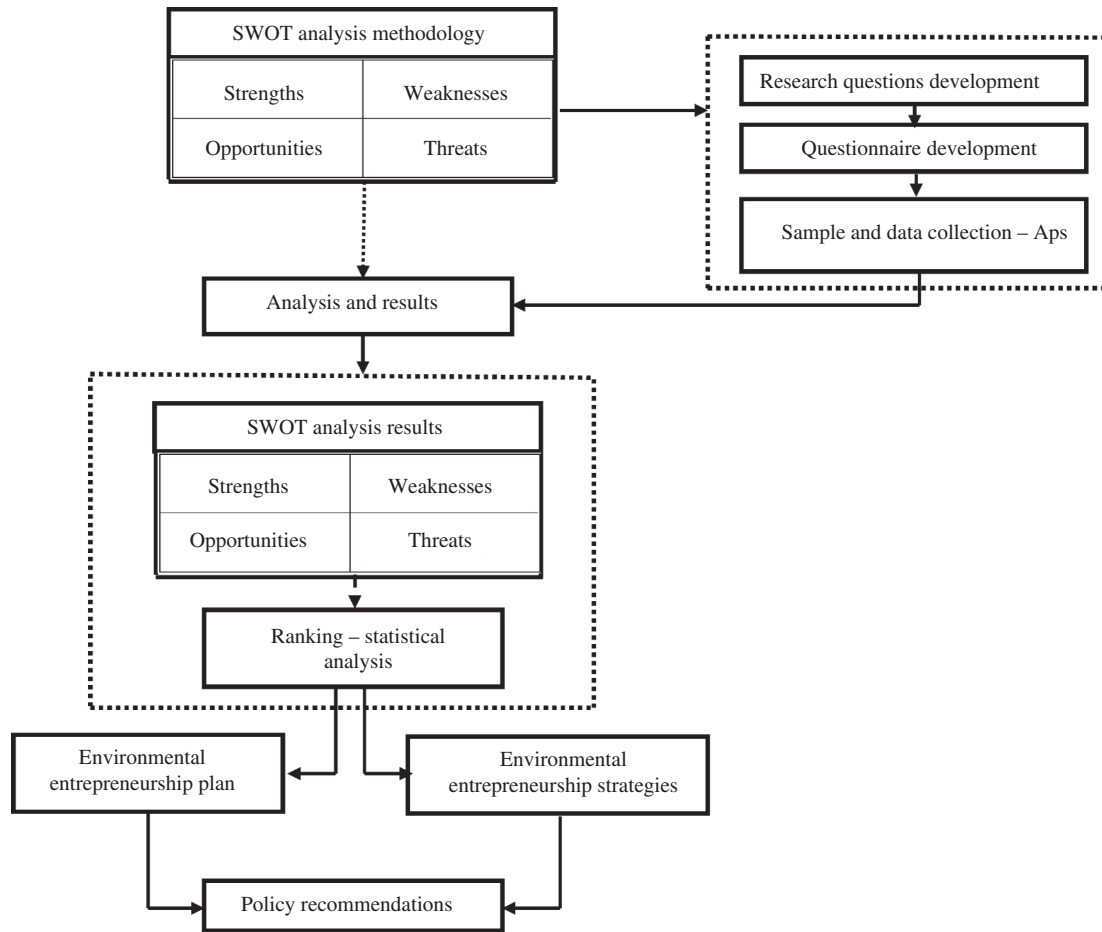


Figure 1. Research methodology structure.

Sample and data collection

The target population was 40 Greek DAs that participated as management agents in the implementation of a local programme in the context of the community initiative LEADER+. This particular criterion was selected on the grounds that the management of a local programme in the context of the community initiative LEADER+ was considered to offer valuable up-to-date knowledge and experience to DA executives regarding the value and potential of regionally available natural resources, the development of new products and services, the reinforcement of local entrepreneurship and the potential and means of sustainable development in the countryside.

The data were collected through a fully structured questionnaire. The questionnaire was organised in accordance with the framework of SWOT analysis and current literature on green entrepreneurship and environmental management. It has four parts: strengths, weaknesses, opportunities and threats. Each of these groups included: 12, 16, 10 and 6 items as described in Tables 1–4, respectively. These items were ranked on a six-point Likert scale as: not important = 0, unimportant = 1, of little importance = 2, moderately important = 3, important = 4 and very important = 5. The questionnaire also included a section with questions regarding specific green

entrepreneurship strategies such as ecotourism, recycling businesses and wastewater businesses (Table 5). This section included 10 items measured on the same scale. In total, 39 valid questionnaires were received, corresponding to a response rate of 99.7%. The questionnaires were sent by post and followed by call reminders to ensure that they were returned completed.

Analysis and results

Overall green entrepreneurship plan

The result indicates the hierarchical classification of all strengths, weaknesses, opportunities and threats. This classification was based on answers from Greek DAs on the prospect of designing an overall plan for promoting green entrepreneurship. Figure 2 indicates the ranking of all SWOT factors according to design and overall entrepreneurship plan. In the following sub-sections, the analysis of the most important SWOT factors is presented.

Strengths. A classification of the strengths and the stated level of importance of green entrepreneurship by the representatives of DAs are presented in Table 1. In Column (7), the presence of universities specialised in environmental topics (S₆), the level of knowledge and skills of local

Table 1. Description of strengths and stated level of importance (%).

Strengths	Not important (1)	Unimportant (2)	Of little importance (3)	Moderately important (4)	Important (5)	Very important (6)	Ranking of low importance (7) = [(1) + (2) + (3)]	Ranking of high importance (8) = [(5) + (6)]
S₁ : Existence of appropriate natural resources and conditions	0	2.6	2.6	5.1	33.3	56.4	10	1
S₂ : Existence of environmentally protected areas	0	7.7	0	17.9	41.0	33.3	9	2
S₃ : Current level of entrepreneurship culture	2.6	2.6	17.9	17.9	35.9	23.1	7	4
S₄ : Level of current infrastructure	2.6	10.3	12.8	33.3	28.2	12.8	5	7
S₅ : Level of knowledge and skills of local employment for 'green' professions	2.6	12.8	20.5	25.6	33.3	5.1	3	9
S₆ : Presence of universities specialised in environmental topics	2.6	17.9	33.3	20.5	25.6	0	1	11
S₇ : Level of cooperation with ENGOS	12.8	5.1	23.1	20.5	30.8	7.7	2	8
S₈ : Existence of local certified schemes for 'green' products	0	5.1	10.3	25.6	43.6	15.4	8	4
S₉ : Level of knowledge of local entrepreneurs on green entrepreneurship opportunities	2.6	10.3	12.8	38.5	28.2	7.7	6	10
S₁₀ : Potential economic benefits from green entrepreneurship	5.1	10.3	10.3	20.5	43.6	10.3	5	5
S₁₁ : Small number of organic farmers	0	7.7	20.5	23.1	33.3	15.4	4	6
S₁₂ : Existence of PDO and PGI product challenges	0	10.3	17.9	12.8	41.0	17.9	4	3

Table 2. Description of weaknesses and stated level of importance (%).

	Not important (1)	Unimportant (2)	Of little importance (3)	Moderately important (4)	Important (5)	Very important (6)	Ranking of low importance (7) = [(1) + (2) + (3)]	Ranking of high importance (8) = [(5) + (6)]
Weaknesses								
W₁ : Limited know-how of local entrepreneurs on green entrepreneurship	0	0	7.7	15.4	43.6	33.3	2	10
W₂ : Low demand for green products	2.6	5.1	5.1	33.3	46.2	7.7	10	8
W₃ : Long distance from essential markets	0	12.8	20.5	28.2	17.9	20.5	12	3
W₄ : Absence of appropriate institutional factors for supporting green entrepreneurship	0	2.6	10.3	25.6	38.5	23.1	9	7
W₅ : Limited knowledge of green technologies	0	0	0	23.1	53.8	23.1	2	12
W₆ : High costs of green investment	2.6	2.6	12.8	28.2	30.8	23.1	10	5
W₇ : Low level of current green infrastructure	0	0	5.1	12.8	59.0	23.1	1	11
W₈ : Absence of green funds	0	7.7	10.3	15.4	46.2	20.5	7	5
W₉ : Absence of market	0	0	5.1	30.8	33.3	30.8	8	11
W₁₀ : Absence of essential economic environment	2.6	5.1	7.7	30.8	35.9	17.9	6	6
W₁₁ : Absence of experts	0	0	5.1	25.6	46.2	23.1	4	11
W₁₂ : Absence of institutions to inform on green entrepreneurship issues	5.1	2.6	7.7	33.3	33.3	17.9	11	6
W₁₃ : Absence of appropriate regulatory regime	10.3	7.7	15.4	33.3	23.1	10.3	13	2
W₁₄ : Absence of society cooperation	0	0	2.6	23.1	46.2	28.2	3	4
W₁₅ : Absence of new opportunities for green entrepreneurship	5.1	2.6	2.6	20.5	53.8	15.4	5	9
W₁₆ : Limited natural resources	12.8	17.9	20.5	23.1	23.1	2.6	14	1

Table 3. Description of opportunities and stated level of importance (%).

	Not important (1)	Unimportant (2)	Of little importance (3)	Moderately important (4)	Important (5)	Very important (6)	Ranking of low importance (7) = [(1) + (2) + (3)]	Ranking of high importance (8) = [(5) + (6)]
Opportunities								
O₁ : New jobs	2.6	0	0	17.9	33.3	46.2	4	4
O₂ : New businesses start-ups	0	0	0	12.8	48.7	38.5	1	5
O₃ : Increase in local income	0	0	0	15.4	51.3	33.3	3	5
O₄ : Gain competitive advantage of local businesses	0	0	2.6	20.5	46.2	30.8	5	5
O₅ : Increase attractiveness of area	2.6	0	0	25.6	51.3	20.5	7	4
O₆ : Better environmental quality	0	0	2.6	10.3	41.0	46.2	2	5
O₇ : Social cohesion	2.6	5.1	10.3	38.5	30.8	12.8	9	1
O₈ : Better handling of European funds for the environment	2.6	2.6	0	30.8	41.0	23.1	8	2
O₉ : Create niche market for local products	5.1	0	2.6	15.4	51.3	25.6	6	3
O₁₀ : Increasing the inputs of national and international funds	5.1	0	2.6	15.4	59.0	17.9	6	3

Table 4. Description of threats and stated level of importance (%).

Threats	Not important (1)	Unimportant (2)	Of little importance (3)	Moderately important (4)	Important (5)	Very important (6)	Ranking of low importance (7) = [(1) + (2) + (3)]	Ranking of high importance (8) = [(5) + (6)]
T₁ : Future environmental degradation	17.9	5.1	10.3	15.4	30.8	20.5	1	3
T₂ : Increasing competition of other areas	2.6	10.3	10.3	30.8	38.5	7.7	4	4
T₃ : Future needs for additional green investments	7.7	2.6	15.4	28.2	41.0	5.1	2	5
T₄ : Future decrease of consumer demand for green products	25.6	25.6	20.5	23.1	5.1	0	6	1
T₅ : Perception that green products are luxury goods and thus have limited demand with an economic crisis	7.7	7.7	20.5	28.2	23.1	12.8	5	2
T₆ : Low level of diffusion of green Technology	2.6	10.3	12.8	28.2	33.3	12.8	3	4

Table 5. Description of green entrepreneurship strategies and stated level of importance (%).

Green entrepreneurship strategies	Not important (1)	Unimportant (2)	Of little importance (3)	Moderately important (4)	Important (5)	Very important (6)	Ranking of low importance (7) = [(1) + (2) + (3)]	Ranking of high importance (8) = [(5) + (6)]
GES₁ : Biotechnology	0	12.8	12.8	30.8	30.8	12.8	3	7
GES₂ : Wastewater treatment	2.6	20.5	25.6	20.5	20.5	10.3	2	9
GES₃ : Renewable energy	0	5.1	7.7	15.4	46.2	25.6	6	4
GES₄ : Organic farming	0	2.6	0	10.3	53.8	33.3	7	1
GES₅ : Organic cattle farming	0	2.6	5.1	7.7	51.3	33.3	7	2
GES₆ : Ecotourism	2.6	0	7.7	12.8	33.3	43.6	9	3
GES₇ : Consultants for rehabilitation of mining sites	12.8	20.5	20.5	17.9	10.3	17.9	1	10
GES₈ : Biodiversity	5.1	0	7.7	23.1	35.9	28.2	8	5
GES₉ : Recycling	0	10.3	20.5	20.5	33.3	15.4	4	6
GES₁₀ : Green R&D businesses	5.1	7.7	17.9	35.9	25.6	7.7	5	8

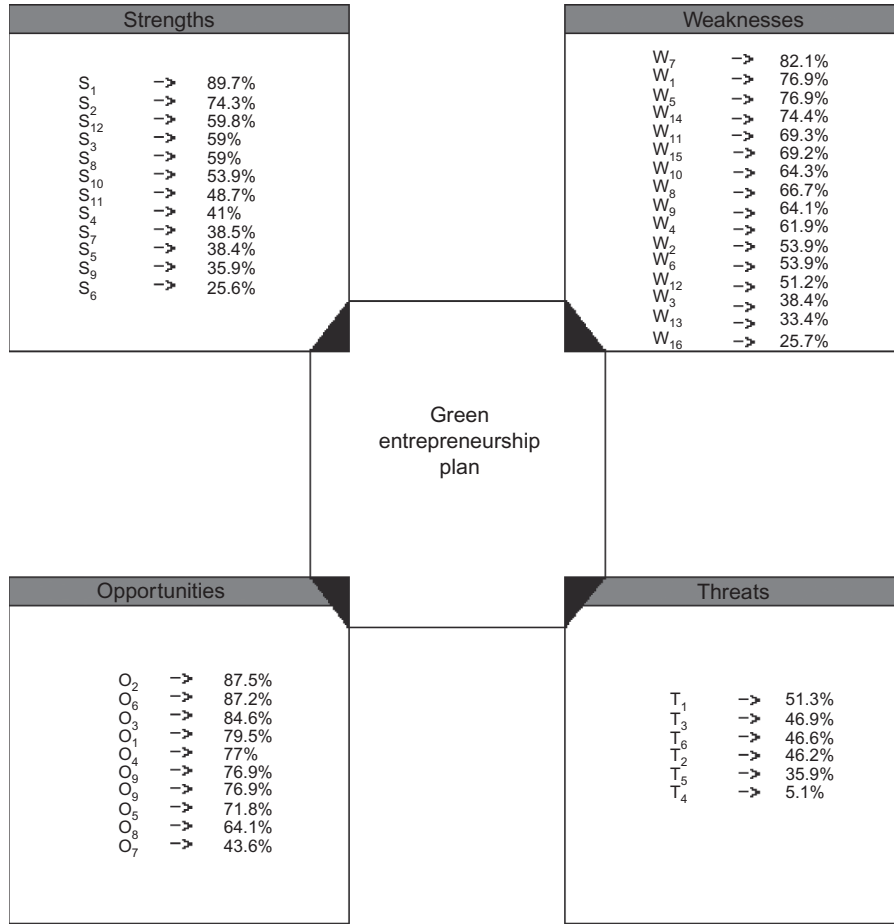


Figure 2. Ranking of SWOT analysis factors.

employment on 'green' professions (S₅) and The level of cooperation with environmental NGOs (S₇) are the first three strengths of low importance. These may be related to the previous experience of DAs, who have no form of cooperation with ENGOS related to concerns on entrepreneurship. The low importance of the role of universities may be explained due to many organisational and operational barriers. Column (8) indicates that the first three strengths with high importance are: *the existence of appropriate natural resources and conditions* (S₁), *the existence of environmentally protected areas* (S₂) and *the existence of PDO and PGI products challenges* (S₁₂). The importance of these factors indicate that DAs' desire is to promote several types of green entrepreneurship (e.g. ecotourism, organic farming) a good level of quality of natural resources, essential natural conditions, the existence of environmentally protected areas and prior experience of similar products at a local level.

Weaknesses. A classification of the weaknesses and the stated level of importance of green entrepreneurship by the representatives of DAs are presented in Table 2. Column (7) indicates that *the low level of current green infrastructure* (W₇), *the limited know-how of local entrepreneurs on green entrepreneurship* (W₁) and *the absence of society*

cooperation (W₁₄) are three factors of least importance. DAs consider that the current level of knowledge of environmental concerns by local entrepreneurs and society cooperation did not play an important role in their decisions regarding green entrepreneurship. Column (8) shows that *the limited natural resources* (W₁₆), *the absence of appropriate regulatory regime* (W₁₃) and *the long distance from essential markets* (W₃) are some important weaknesses that may be taken into account for developing an overall plan to promote green entrepreneurship. The importance of these factors indicate that DAs should take into account the present environmental regulatory regime, the current level of natural resources and the distance from appropriate markets in order to make a green entrepreneurship plan.

Opportunities. A classification of the opportunities and the stated level of importance of green entrepreneurship by the representatives of DAs are presented in Table 3. Column (7) indicates that *the new businesses start-ups* (O₂), *the better environmental quality* (O₆) and *increase in local income* (O₃), are the three factors of least importance. This may be explained as a result of the goals of public organisations in Greece. In particular, the main goal of public organisations is to increase the flow of national and international funds

and not to increase GDP or new businesses start-ups. Such economic and social goals regarding employment and GDP are mainly the duty of local authorities (municipalities). Column (8) shows *social cohesion* (O_7), *better handling of European funds for the environment* (O_8) and *increasing the inputs of national and international funds* (O_{10}). The results indicate the DAs' desire is to achieve goals such as social cooperation and raising new funds.

Threats. A classification of the threats and the stated level of importance of green entrepreneurship by the representatives of DAs are presented in Table 4. Column (7) indicates that *future environmental degradation* (T_1), *future needs for additional investments* (T_3) and *low level of diffusion of green technology* (T_6) are the three factors of least importance for DAs' decisions regarding green entrepreneurship. DAs give less importance to threats of future environmental degradation, the reduction of future green demand and low level of diffusion of green technology in order to promote green entrepreneurship. Column (8) shows that *future decrease of consumers' demand for green products* (T_4), *the perception that green products are luxury goods and thus have limited demand within the economic crisis* (T_5) and *future environmental degradation* (T_1) are the three factors of highest importance for decisions of DAs for designing an overall plan to promote green entrepreneurship. These results show that DAs worries are related to factors such as the future quality of the environment, the future demand for environmentally friendly products by consumers and the perception of environmental goods by consumers (e.g. luxury goods).

Specific green entrepreneurship strategies

This section examines which of the SWOT analysis factors are important for DAs to promote specific green entrepreneurship strategies. First, Table 5 provides the level of importance of some specific green entrepreneurship strategies as perceived by DAs. Column 8 indicates that DAs consider the following green entrepreneurship strategies of high importance: organic farming (GES_4), organic cattle farming (GES_5) and ecotourism (GES_6). This ranking is expected for Greece since agriculture, cattle farming and tourism are among the basic pillars of the Greek economy. Therefore, it is expected that DAs propose a plan for developing green entrepreneurship strategies based on these pillars. In addition, renewable energy strategy was considered as a very important factor by 71.8% of DAs because the majority of Greek prefectures have already financed renewable energy businesses and support that climate conditions are ideal for such type of entrepreneurship (e.g. several days of sunshine, several geothermic fields and high winds).

In order to explore the most critical factors that affect the decisions of representatives of DAs, a number of binary models were run. Although 10 models were run, four green strategies were adequately explained by factors considered

in a SWOT analysis. Table 6 presents modelled decisions for green entrepreneurship strategies in relation to SWOT analysis components. Independent variables were used: S_i ($i = 1,2,\dots,10$), W_j ($j = 1,2,\dots,16$), O_k ($k = 1,2,\dots,10$) and T_l ($l = 1,2,\dots,6$). The dependent variables were GES_n ($n = 1,\dots,10$), which were recorded to dichotomous variables: important or very important = 1 and unimportant or not important = 0. This transformation was done in order to locate the parameters that influenced other dependent variables by a positive (or negative) effect, and this was not possible in their original form. Furthermore, we seek only a positive or negative effect and are not interested in calculating the relative probabilities, which is allowed by the binary model. A conclusive model was possible for GES_2 , GES_3 , GES_8 and GES_9 . The rest of categories did not come up with a set of exploratory variables. These are reported in Table 6 and explained in the following subsections; the results are also depicted in Figure 3.

Entrepreneurship and wastewater treatment. The model indicates DAs who want to promote entrepreneurship in the wastewater treatment sector (GES_2) consider the current regulatory regime (W_{12} : $\hat{\beta} = 1.724$, $p = 0.063$) and the cooperation with local societies (W_{13} : $\hat{\beta} = 1.782$, $p = 0.034$) as important.

Entrepreneurship and renewable energy. The model indicates that DAs who desire to promote entrepreneurship in renewable sectors (GES_3) consider that the economic benefits are not an important incentive for entrepreneurs (S_{10} : $\hat{\beta} = -3.297$, $p = 0.032$), while the low level of current infrastructure (W_7 : $\hat{\beta} = 2.793$, $p = 0.038$) is very important.

Entrepreneurship and biodiversity. This model indicates that DAs who want to promote entrepreneurship in the biodiversity sector (GES_8) consider the existence of universities specialised in environmental topics (S_6 : $\hat{\beta} = -3.297$, $p = 0.032$), the current level of current infrastructure (W_7 : $\hat{\beta} = -3.297$, $p = 0.032$) and the quality of the environment (O_6 : $\hat{\beta} = -3.297$, $p = 0.032$) are not important.

Entrepreneurship and recycling. The model indicates that DAs who want to promote entrepreneurship in the recycling sector (GES_9) consider the low demand for green products (W_2 : $\hat{\beta} = -1.809$, $p = 0.040$) and the long distance from essential markets (W_3 : $\hat{\beta} = -2.833$, $p = 0.017$) are not important, while they consider social equity (O_7 : $\hat{\beta} = 3.076$, $p = 0.010$) as very important.

Table 6. Models for green entrepreneurship strategies.

Variables and statistics	Model GES ₂		Model GES ₃		Model GES ₈		Model GES ₉	
	$\hat{\beta}$	<i>p</i>	$\hat{\beta}$	<i>p</i>	$\hat{\beta}$	<i>p</i>	$\hat{\beta}$	<i>p</i>
C	-2.615	0.002	-2.422	0.096	-2.722	0.076	0.0684	0.328
S ₆					-2.267	0.015		
S ₁₀			-3.297	0.032				
W ₂							-1.809	0.040
W ₃							-2.833	0.017
W ₇			2.793	0.038	1.868	0.084		
W ₁₂	1.724	0.063						
W ₁₃	1.782	0.034						
O ₄			3.198	0.029				
O ₆					2.857	0.027		
O ₇			2.648	0.040				
Pseudo R ²	0.384		0.595		0.465		0.530	
-2LL	35.764		25.550		34.767		34.309	
Hosmer & Lemeshow test	0.029	0.986	4.016	0.674	0.854	0.836	1.514	0.959
	(df = 2)		(df = 6)		(df = 3)		(df = 6)	
Overall predictive accuracy	79.5%		87.2%		79.5%		79.5%	

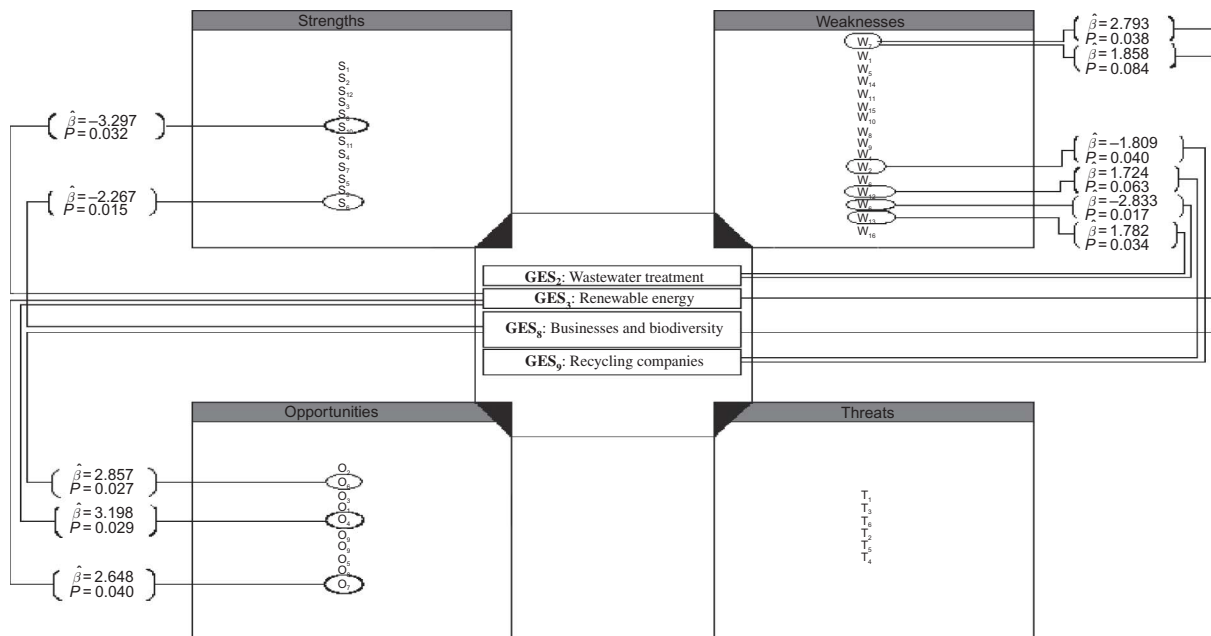


Figure 3. The link between SWOT analysis factors and environmental entrepreneurship strategies.

Policy recommendations

The methodological framework has significant implications for public policy entities. It enables them to identify strengths, weaknesses, opportunities and threats for designing and stimulating both an overall plan for green entrepreneurship and some specific types of green entrepreneurship strategies. In many instances, this policy tool should help local public policy entities to allocate more effectively the relevant financial resources and prepare essential infrastructure for developing green entrepreneurship. The findings show that public policy entities should take into account a number of strengths, weaknesses, opportunities and threats in order to design an overall plan for stimulating green entrepreneurship (e.g.

present state of natural resources, future financial resources and present status of entrepreneurship).

Because of a lack of a national and regional policy contexts, public policy entities should lay the foundations for a number of entrepreneurs to invest in green entrepreneurship as well as to allocate national and European financial resources effectively. Moreover, this policy tool should also be considered by public policy entities outside Greece. Indeed, green entrepreneurship is considered a critical factor in world economic growth, especially in the presence of the recent global financial crisis. New business ventures associated with natural and ecological resources may be the driving force for creating new job opportunities and economic growth in many countries.

To this end, new policy instruments are needed to assist public policy entities to stimulate those strategies effectively. Specifically, public entities may:

- (1) develop an essential regulative regime for green entrepreneurship development. As mentioned in previous sections, the appropriate regulatory regime is very important for some specific types of green entrepreneurship such as wastewater treatment;
- (2) design specific programmes to inform local societies regarding the hazardous risks associated with such green entrepreneurship strategies;
- (3) prepare appropriate guidelines to inform local entrepreneurs about strengths, weaknesses, opportunities and threats associated with investing in environmental sectors;
- (4) prepare appropriate guidelines to inform consumers of environmental products that are produced or will be produced by new green businesses;
- (5) allocate efficiently the national and European funds regarding green entrepreneurship; and
- (6) implement a green entrepreneurship strategy that should include: national or local targets regarding sustainable development; essential institutional, regulatory and economic aspects (terms of concessions, grid connection rules, standards, taxes, and others rules and regulations).

Discussion and conclusions

The results show that the most important strength and opportunity factors for promoting an overall plan of green entrepreneurship (questions 1 and 2) by DAs are the following: *existence of appropriate natural resources and physical conditions, existence of environmental protected areas, existence of PDO and PGI products challenges, Social cohesion, better handling of European funds for the environment and increasing the inputs of international and national funds*. These findings are consistent with previous research on green entrepreneurship that also considers such factors as necessary for green entrepreneurship (Anderson 1998; Parrish 2010). Similarly, the findings indicate that DAs consider the following factors as significant weaknesses and threats (questions 3 and 4): *limited natural resources, absence of appropriate regulatory regime, Long distance to essential markets, future decrease of consumers' demand for green products, perception that green products are luxury goods and thus have limited demand within economic crisis and future environmental degradation*. The majority of such factors are also consistent with the general literature (Kyro 2001; Beverdige and Guy 2005). Some of the findings, nevertheless, are associated with social and structural factors of Greece. For example, the absence of future demand for green products may be explained as a result of the present low level of demand for environmentally friendly products.

For specific green entrepreneurship strategies, the first findings show that the most important strengths and opportunities factors for promoting green entrepreneurship (questions 1 and 2) by DAs are *existence of appropriate natural resources and conditions, existence of environmentally protected areas, existence of PDO and PGI products challenges, social cohesion, better handling of European funds for the environment and increasing the inputs of international and national funds*. These findings confirm the general literature of green entrepreneurship that provides these factors as necessary for green entrepreneurship (Anderson 1998; Parrish 2010). Similarly, findings indicate that DAs consider that the significant weaknesses and threats are the following (questions 3 and 4): *limited natural resources, absence of appropriate regulatory regime, long distance to essential markets, future decrease of consumers' demand for green products, perception that green products are luxury goods and thus have limited demand during the economic crisis and future environmental degradation*. The majority of these factors are consistent with the general literature (Beverdige and Guy 2005). Some of the findings, nevertheless, are associated with social and structural factors of Greece. For example, the absence of future demand for green products may be explained as a result of the current low level of demand for environmentally friendly products.

Second, the findings indicate that particularly for motivating entrepreneurship in the wastewater treatment sector, an essential regulatory regime and cooperation with local societies is necessary (questions 1 and 2). Indeed, this type of entrepreneurship needs both transparent and accurate regulations in order to encourage entrepreneurs to invest in new business start-ups as well as good cooperation with local societies due to the many types of odour. This argument is also identified in the work of Brockner et al. (2004) (on general entrepreneurship), who suggest that, 'regulatory focus theory provides a well-developed framework to better understand the various motives, beliefs, and behaviors that ultimately dictate whether a given entrepreneurial venture will be successful' (p. 218). However, Meek et al. (2010) consider that the political climate, regulatory environment and organisational density that explain the propensity for entrepreneurs to invest in green entrepreneurship are very important factors. Although some scholars consider that appropriate regulations could be the incentive for new business ventures (Porter and van der Linde 1995), costly regulations would possibly hamper the creation of new firms, especially in new sectors.

The third finding shows that encouragement of entrepreneurship in the renewable energy sector is not appropriately associated with financial incentives. This is consistent with the findings of Parrish (2010), who indicated that the real incentives for green entrepreneurship start-ups are not actually the financial benefits but wide sustainability values, which cannot be easily identified in the conventional views of a business case. This may also be explained by the current economic and structural status of the renewable energy sector in Greece.

The Greek government, for instance, signs contracts with entrepreneurs in the solar energy sector for buying solar energy on a permanent basis. Another important factor arising from the research is the low importance of the level of current infrastructure for such types of entrepreneurship. This can be explained as a great part of the required infrastructure is financed by national funds for renewable energy investments. This conclusion would also be associated with other types of green entrepreneurship. For example, although Lerner and Hamber (2000) support that an important factor for developing the tourism industry is the current infrastructure (e.g. electricity, water, casinos); some types of eco-tourism do not require any other type of infrastructures, such as traditional tourism besides natural conditions and resources.

The fourth finding show that the promotion of entrepreneurship in biodiversity does not depend on the contribution of universities specialised in environmental topics, the current level of infrastructure and the quality of environmental resources. Some studies have already indicated that numerous universities give emphasis to their commercialisation mission, which considers their operations compatible with that of the business community (Markman et al. 2005; Powers and McDougall 2005). Although they additionally acknowledge that the new financial environment has diminished the negative perceptions of faculty personnel of universities for cooperation with businesses, numerous structural and social problems in Greece (e.g. state character of universities, permanent employment of faculty personnel, permanent funds by government) have negatively affected the perception of faculty personnel for such cooperation. This perception of Greek universities could explain the negative perception of DAs regarding the ability of universities to assist in development of green entrepreneurship.

Two basic categories are identified for the promotion of entrepreneurship in the biodiversity sector: (a) new businesses that use biodiversity to develop new products (e.g. non-timber forest products, bird-watching, watershed protection), and (b) established businesses that aim to conserve biodiversity in their day-to-day operations (e.g. forestry and mining companies) (BBH 2002). The low importance of the current level of infrastructure may be explained as a result of developing types of green entrepreneurship like the first category that does not seem to need specific previous infrastructure. However, the low importance of the quality of the environment could be explained from the second type of green entrepreneurship that aims to contribute to biodiversity preservation.

Finally, incentives for entrepreneurship in the recycling sector are not associated with the prospect of the declining demand for environmental products by consumers in the future. The literature indicates that the demand for recycled products by consumers shall increase in the future (Meek et al. 2010). This is also true for Greece, as earlier studies indicate that Greek consumers are willing to pay for environmentally friendly products (Katisikis 2009). However, this finding contrasts with DAs' need to design an overall plan for promoting green entrepreneurship. Additionally,

the distance from essential markets is not an important factor for promoting entrepreneurship in the recycling sector. This is also in contrast to the general view of DAs when examining the importance of this factor for the prospect of designing an overall plan for promoting green entrepreneurship. Finally, social cohesion is considered a very important factor because the viability of recycling companies requires a high degree of local social capital and education of society (Tsai 2008).

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References

- Anderson AR. 1998. Cultivating the Garden of Eden: environmental entrepreneurship. *J Org Change Manage.* 11(2): 135–144.
- Angel de Brio J, Fernandez E, Junquera B. 2002. The role of the public administrations in the promotion of the environmental activity in Spanish industrial companies. *Ecol Econ.* 40: 279–294.
- Annandale D, Taplin R. 2003. Is environmental impact assessment regulation a 'burden' to private firms? *Environ Impact Assess Rev.* 23:383–379.
- Azzone G, Noci G. 1998. Seeing ecology and 'green' innovations as a source of change. *J Org Change Manage.* 11(2):94–111.
- BBH. 2002. *Business & Biodiversity: The Handbook for Corporate Action.* Prepared by the Earthwatch Institute, World Conservation Union, World Business Council for Sustainable Development. Available from: <http://www.wbcsd.org> (accessed 30 December 2010).
- Beveridge R, Guy S. 2005. The rise of the eco-preneur and the messy word of environmental innovation. *Local Environ.* 10(6):665–676.
- Brockner J, Higgins ET, Low MB. 2004. Regulatory focus theory and entrepreneurial process. *J Bus Venturing.* 19:203–220.
- Brown HS, de Jong M, Lessidrenska T. 2009. The rise of the global reporting initiative: a case of institutional entrepreneurship. *Environ Polit.* 18(2):182–200.
- [CEC] Commission of the European Communities. 2009. *Mainstreaming sustainable development into EU policies: 2009 review of the European Union strategy for sustainable development.* Brussels (Belgium): CEC. COM (2009) 400.
- Cohen B, Winn MI. 2007. Market imperfections, opportunity and sustainable entrepreneurship. *J Bus Venturing.* 22:29–49.
- Dean TJ, McMullen JS. 2007. Toward a theory of sustainable entrepreneurship: reducing environmental degradation through entrepreneurial action. *J Bus Venturing.* 22:50–76.
- Geneletti D, Bagli S, Napolitano P, Pistocchi A. 2007. Spatial decision support for strategic environmental assessment of land use plans: a case study in southern Italy. *Environ Impact Assess Rev.* 27:408–423.
- Gifford D. 1997. The value of going green. *Harv Bus Rev.* 75(5):11–12.
- Hart SL. 1997. Beyond greening: strategies for a sustainable world. *Harv Bus Rev.* 75(1):66–76.
- Hartman C, Stafford E. 1997. Green alliances: building new business with environmental groups. *Long Range Plann.* 30(2):184–196.
- Hinterberger F, Omann I, Stocker A. 2002. Employment and environment in a sustainable Europe. *Emprica.* 29:113–130.
- Hull CE, Rothenberg S. 2008. Firm performance: the interactions of corporate social performance with innovation and industry differentiation. *Strateg Manage J.* 29:781–789.

- Katsikis IN. 2009. Market demand and new industry formation: eco-products and entrepreneurship in the 'Natural Cosmetics Sector' in Greece. DIME Workshop, Utrecht University.
- Kuo-liang L, Shu-chen L. 2008. A fuzzy quantified SWOT procedure for environmental evaluation of an international distribution centre. *Inf Sci.* 178:531–549.
- Kyro P. 2001. To grow or not to grow? Entrepreneurship and sustainable development. *Int J Sustain Dev World Ecol.* 8(1):15–28.
- Lerner M, Hamber S. 2000. Performance factors of small tourism ventures: the interface of tourism, entrepreneurship and environment. *J Bus Venturing.* 16:77–100.
- Lober JD. 1998. Pollution prevention as corporate entrepreneurship. *J Org Change Manage.* 22(1):26–37.
- Markman GD, Phan PH, Balkin DB, Gianiodis PT. 2005. Entrepreneurship and university-based technology transfer. *J Bus Venturing.* 20:241–263.
- Mazzanti M, Zoboli R. 2006. Economic instruments and induced innovation: the European policies on end-of-life vehicles. *Ecol Econ.* 58:318–337.
- Meek WR, Pacheco DF, York GJ. 2010. The impact of social norms on entrepreneurial action: evidence from the environmental entrepreneurship context. *J Bus Venturing.* 25(5):493–509.
- Menguc B, Ozanne LK. 2005. Challenges of the 'green imperative': a natural resource-based approach to the environmental orientation – business performance relationship. *J Bus Venturing.* 58:430–438.
- Menon A, Menon A. 1997. Envirpreneurial marketing strategy: the emergence of corporate environmentalism as marketing strategy. *J Mark.* 61:51–67.
- Mudd GM. 2007. Global trends in gold mining: towards quantifying environmental and resource sustainability? *Resour Policy.* 32:42–56.
- Nikolaou EI, Evangelinos KI. 2010. A SWOT analysis of environmental management in Greek mining and mineral industry. *Resour Policy.* 35(3):226–234.
- Nill J, Kemp R. 2009. Evolutionary approaches for sustainable innovation policies. *Resour Policy.* 38:668–680.
- Parrish BD. 2010. Sustainability-driven entrepreneurship: principles of organization design. *J Bus Venturing.* 25(5): 510–523.
- Pastakia A. 1998. Grassroots ecopreneurs: change agents for a sustainable society. *J Org Change Manage.* 11(2): 157–173.
- Porter ME, van der Linde C. 1995. Toward a new conception of the environment–competitiveness relationship. *J Econ Perspect.* 9(4):97–118.
- Powers JB, McDougall PP. 2005. University start-up formation technology licensing with firms that go public: a resource-based view of academic entrepreneurship. *J Bus Venturing.* 20:291–311.
- Reinhardt LF. 1998. Environmental Product differentiation: implication for corporate strategy. *Calif Manage Rev.* 40(4):43–73.
- Rennings K. 2000. Redefining innovation – eco-innovation research and the contribution from ecological economics. *Ecol Econ.* 32:319–332.
- Srivastava PK, Kulshreshtha K, Mohanty CS, Pushpangadan P, Singh A. 2005. Stakeholder-based SWOT analysis for successful municipal solid waste management in Lucknow, India. *Waste Manage.* 25:531–537.
- Terrados J, Almonacid G, Hontoria L. 2007. Regional energy planning through SWOT analysis and strategic planning tools: impact on renewable development. *Renew Sustain Energy Rev.* 11:1275–1287.
- Tsai T-H. 2008. The impact of social capital on regional waste recycling. *Sustain Dev.* 16:44–55.