

Green Entrepreneurship in Turkey



Regional Activity Centre for Cleaner Production (CP/RAC)
Mediterranean Action Plan



Regional Activity Centre
for Cleaner Production



Generalitat de Catalunya
**Departament de Territori
i Sostenibilitat**

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The CP/RAC, based in Barcelona-Spain, was established in 1996. Its mission is to promote mechanisms leading to sustainable consumption and production patterns and sound chemicals management in Mediterranean countries. The CP/RAC activities are financed by the Spanish Government once they have been submitted and approved by the Contracting Parties to the Barcelona Convention and by the Bilateral Monitoring Commission made up of representatives from the Spanish and Catalan Governments.

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ABBREVIATIONS

BSTB:	Ministry of Science, Industry and Technology
CEO:	Chief Executive Officer
CER:	Certifications for Emission Reductions
CP/RAC:	Regional Activity Centre for Cleaner Production
CSB:	Ministry of Environment and Urbanization
CSP:	Concentrated Solar Power
CSR:	Corporate Social Responsibility
EB:	Ministry of Economy
EEC:	Energy Efficiency Consultancy
EIB:	European Investment Bank
EIF:	European Investment Fund
ELT:	End of Life Tyres
EMAS:	Regulation on Eco-Management and Audit Scheme
ESG:	Environmental, Social and Governance
ESCO:	Energy Service Companies
ETKB:	Ministry of Energy and Natural Resources
GEGIDER:	Young Entrepreneurs Association
GEF:	Global Environment Facility
GEM:	Global Entrepreneurship Monitor
GESIAD:	The Association of Young Industrialists and Businessmen
GTZ:	German Technical Collaboration
IISD:	International Institute for Sustainable Development
IKV:	Foundation of Economic Development
IPA:	Instrument for Pre-Accession Assistance
IPO:	Initial Public Offering
ISE:	Istanbul Stock Exchange
iVCi:	Istanbul Venture Capital Initiative
KAGIDER:	Women Entrepreneurs Association of Turkey
KB:	Ministry of Development
KOSGEB:	Small and Medium Enterprises Development and Support Administration
METU:	Middle East Technical University
NBG:	National Bank of Greece
NGO:	Non-Governmental Organization
OIZ:	Organized Industrial Zone
PE:	Private Equity
RDA:	Regional Development Agencies
REACH:	Directive on Registration, Evaluation, Authorization and Restriction of Chemicals
SCP:	Sustainable Consumption and Production
SEGEM:	Sustainable Entrepreneurship and Green Employment Strategy
SI:	Sustainability Index
SME:	Small and Medium Enterprise
TBCSD:	Turkish Business Council for Sustainable Development
TEA:	Total Early Stage Entrepreneurial Activity

TEKMER:	Technology Development Centre
TESK:	Turkish Tradesmen and Craftsmen Confederation
TDZ:	Technology Development Zones
TKB:	The Development Bank of Turkey
TOBB:	Union of Chambers and Commodity Exchanges of Turkey
TOSYOV:	Turkish Foundation for Small and Medium Businesses
TTGV:	Technology Development Foundation of Turkey
TUREB:	Federation of Turkish Tourist Guide Associations
TUGIAD:	Young Businessmen Association of Turkey
TUSIAD:	Turkish Industrialists' and Businessmen's Association
TUBITAK:	The Scientific and Technological Research Council of Turkey
UNDP:	United Nations Development Programme
UNFCCC:	United Nations Framework Convention on Climate Change
UNIDO:	United Nations Industrial Development Organization
VC:	Venture Capital
VAT:	Value Added Tax
WEEE:	European Union Directive on Waste Electrical and Electronic Equipment
YEGM:	General Directorate of Renewable Energy

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EXECUTIVE SUMMARY

The Regional Activity Centre for Cleaner Production (CP/RAC) started a study for developing a Sustainable Entrepreneurship and Green Employment Strategy (SEGEM) for the Mediterranean region. Within this framework, Technology Development Foundation of Turkey (TTGV) has implemented an investigation and analysis of the existing situation as well as the assets and challenges in promoting green entrepreneurship in order to establish sustainable lifestyles in Turkey. The main outcomes and findings of this study are summarized below:

Entrepreneurship in Turkey is at a starting level, but it has been exhibiting a rising trend in recent years. It is possible to make a rough estimation that approximately 15% of the existing Research and Development (R&D) and entrepreneurship activity in Turkey are related to environment, with a rising tendency.

The major motivations for entrepreneurship in Turkey are generally defined as gaining work independence, higher incomes, personal satisfaction, providing security, etc. Green entrepreneurship however, requires more than these. The two critical drivers for green entrepreneurship are “passion and belief in green values” and “identifying a gap in the market and an environmental solution for it.” This requires an awareness of environmental problems as well as technical, legislative and market knowledge on environmental issues.

The major assets and opportunities in favour of green entrepreneurship in Turkey are: the rising trend in entrepreneurship activities as well as in environmental R&D, regional development agencies’ supports favour green entrepreneurship; business angles are an opportunity for green businesses, an ownership has been raised towards cleaner production related topics from relevant ministries, comprehensive environmental and energy related legislation creates opportunities for green entrepreneurship and other potential legislation (eco-labelling directive, etc.), which are part of the EU harmonization process.

Meanwhile, the major barriers and challenges can be listed as: the low level of entrepreneurship in general, no specific support programs dedicated to green entrepreneurship, a limited number of support programs dedicated to environmental projects and investments, limited knowledge and capacity in sustainable consumption and production (SCP) and even eco-efficiency, a lack of consumer awareness and interest regarding environmentally friendly products and services, no specific strategy or action plan for SCP, the environmental and energy related legislation in execution are deficient and auditing, capacity in environmental technologies development and incentives are limited.

It is quite a common opinion that “green entrepreneurship covers quite a wide range of investment areas. The sectors of “energy” and “waste management” come up as the highest priority sectors, which also act as cross cutting sectors for many other sectors including the predefined priority areas namely food, housing and mobility. The following sectors are determined as the present and potential sectors for green entrepreneurship in Turkey:

- Energy (renewable energy, clean coal technologies, energy efficiency).
- Waste Management (waste recovery, recycling and valorisation).
- Agriculture and Husbandry (efficient techniques, organic agriculture and husbandry,

- waste valorisation, waste to energy and waste to product).
- Automotive (electrical cars, engine and battery technologies).
- Electrical Household Appliances (energy efficient and eco-designed appliances).

Most of the green entrepreneurship cases (or business ideas) developed in Turkey, according to the research made in this study, are in the sectors of waste management and valorisation, organic agriculture and energy. Meanwhile, in the service sector, environmental and energy consultancy is becoming an important sector, both in technical and legislative aspects. The eco-tourism sector, which has not come into significant existence so far, can be regarded as a potential opportunity for Turkey, being able to address all priority areas (housing, mobility, food) and service sectors. On the other hand, industrial symbiosis and climate change adaptation, which have the potential to cover and extend to many sectors and areas of services, products and technologies, are believed to hold extensive potential for green entrepreneurship. Based on the current situation, possible initiatives for the improvement of green entrepreneurship in Turkey are proposed below:

- Raising Awareness on environmental problems and the significance of SCP and dematerialization at all levels of the community, including consumers, the business world and entrepreneurs.
- Development of stakeholder's capacity, communication and inclination regarding the environment and green entrepreneurship through dissemination events, technology development, success stories and collaborative actions.
- Development of an SCP Strategy and Action Plan as well as market policies for encouraging entrepreneurs and investors and enhancing the demand as well as incorporating sustainable lifestyles into the regional development policies.
- Improvement of financial opportunities through specific support programmes and mechanisms to stimulate existing investment opportunities towards green entrepreneurship.

1. INTRODUCTION

Most policymakers and academics agree that entrepreneurship is critical to the development and well-being of society. Entrepreneurs create jobs. They drive and shape innovation, speeding up structural changes in the economy. By introducing new competition, they contribute indirectly to productivity. Entrepreneurship is thus a catalyst for economic growth and national competitiveness [1]; it appears to be the mechanism that converts knowledge into growth [2].

Since environmental issues are becoming increasingly important, there has been a growing interest to find innovative ways to tackle them. In this respect, the adoption of environmentally responsible business practices can, conceivably, open up an additional range of opportunities for entrepreneurs. The move to a sustainable business framework provides numerous niches that enterprising individuals and firms can successfully identify and service [3]. This has led to a rather new concept compared to entrepreneurship, namely “green entrepreneurship”.

For almost half a century, environmentalists have been advocating for big businesses to incorporate sustainability principles into their practices. Yet even ten years ago, it was rare to hear of any business with dedicated green, environmental, or sustainability initiatives (outside of those designed to protect them from regulatory fines and other liability for polluting activities). Today “green” is regarded as a big business [4]. Sustainable, social and green entrepreneurship are discussed at different occasions as a solution or a tool for social and economical changes required for adopting sustainable lifestyles and combating with the major environmental problems such as resource scarcity, climate change, ozone depletion and biodiversity.

In this respect, the Regional Activity Centre for Cleaner Production (CP/RAC) started a study for developing a Sustainable Entrepreneurship and Green Employment Strategy (SEGEM) for the Mediterranean region. Within this framework, the Technology Development Foundation of Turkey (TTGV), which is acting as one of the major players in Research and Development (R&D), entrepreneurship and environment areas, has, for many years in Turkey, assumed the responsibility of investigating and analyzing the existing situation of sustainable lifestyles in Turkey, as well as the assets and challenges in promoting green entrepreneurship in order to establish such a lifestyle.

The present report is the outcome of this study. In this report a conceptual framework which includes brief description of the concepts of entrepreneurship and green entrepreneurship, with a specific focus on the drivers of green entrepreneurship rather than those of entrepreneurship in general. Then an analysis is made on the entrepreneurship ecosystem in Turkey as a baseline and background for the evaluation of the conditions in terms of green entrepreneurship. In addition to that, specific conditions (legislation, financial incentives and national capacity) which may have an impact on green entrepreneurship in Turkey are summarized. The perception of “green entrepreneurship” by Turkish stakeholders is discussed and a sectoral outlook is given in terms of green entrepreneurship potential and opportunities with a special focus on the priority sectors: food, housing and mobility. The report also includes a compilation of cases of already established or ongoing business projects for green entrepreneurship.

In this study green entrepreneurship is taken as the “business and social projects contributing to social changes towards sustainable patterns of consumption and lifestyles in population”. In other words, the focus is set on environmental benefits, particularly those which have a direct contribution to sustainable lifestyles. In this respect, the green (environmental) aspect is taken within the context of “Sustainable Consumption and Production (SCP)”.

The information given in this report is the outcome of the review of national and international literature, the experience and know-how of TTGV, as well as the interviews made with the representatives of the selected stakeholders in Turkey.

The interviews mentioned above were held with representatives of the business world, including both the entrepreneurship and the environment sectors. The ten interviewees, who are briefly introduced in Appendix 1, have provided valuable insights, opinions and visions for the different aspects of green entrepreneurship. Green entrepreneurship is a new concept for many of them. However, it has been very interesting to reach a common understanding on the concept in quite a short time and to discuss the examples and cases, which they are able to easily elaborate on.

Considering that the entrepreneurship community is not specifically inclined towards environmental issues and opportunities while simultaneously the people engaged in the environment sector are not knowledgeable about the basic concepts of entrepreneurship, it is believed that this report shall be a good start towards making the necessary linkages in Turkey.

It is regarded as a valuable opportunity to make contributions to the SEGEM for the Mediterranean region, which was started by the CP/RAC, as well as to start a discussion on green entrepreneurship in Turkey among relevant stakeholders.

2. CONCEPTUAL FRAMEWORK

2.1. Entrepreneurship and its Motives

In order to conceptualize the term “entrepreneurship” it can be a good starting point to go back to medieval times when in French, “people who get things done” were referred to as “entrepreneurs”. In the early 18th century Richard Cantillon, an Irish-French economist and author, is credited with first imbuing the term with a new and more significant meaning. Cantillon used the term “entrepreneur” to identify those individuals in the economic system who accept risk to make a financial profit rather than depend on a regular salary for income [5].

Joseph Schumpeter, the father of the theory of modern entrepreneurship, on the other hand was the first to elaborate on the role of entrepreneurship in the economy and society in 1934. His famous phrase ‘the process of creative destruction’ describes the activity of entrepreneurs who stimulated fundamental change in society. In Schumpeter’s view, creative destruction takes place through the discovery of new technologies, products, markets, processes and organizational forms that create clear alternatives to existing products and practices [6]. Schumpeter also considered entrepreneurship the introduction of ‘new combinations,’ for example, existing technology with new processes or applications, or enhanced products delivered to expanded market segments through a new organizational form.

According to Schumpeter and others [7, 8, 9], to be called entrepreneurial, an activity must entail a discovery of new means–ends relationships that generate a different image of the future. Efficiency improvements to existing goods and services do not constitute true entrepreneurial opportunities. Only the introduction of new goods, services, raw materials and organizing modes that allow outputs to be sold above the cost of production earn the term entrepreneurship [3]. From this point of view, entrepreneurship arises when enterprising individuals identify an unsolved problem, or an unmet need or want, which they then proceed to satisfy through these actions.

The classic archetypal entrepreneur is often regarded as an individual who starts his or her own small business, which may eventually grow into a much larger and more successful corporation [3]. But entrepreneurs can also be found within existing large corporations, where they help create new business divisions and products and bring about changes to internal operations; these people are known as corporate entrepreneurs or intrapreneurs [10].

Shortly, entrepreneurship can be regarded as developing new business ventures/activities with new products, technologies, markets, processes and organizational forms, representing a significantly different commercial activity from the traditional sector, coinciding with the entrepreneurship statement of Larson [6].

A number of surveys of entrepreneurs provide insight into the motivational aspects of the entrepreneurial experience. Kuratko et al. [11] and Robichaud et al. [12] surveyed North American entrepreneurs to determine how motivation relates to business success. Findings from their studies show that motivation falls into four categories: (i) extrinsic rewards, (ii)

independence/autonomy, (iii) intrinsic rewards, and (iv) family security [13]. Extrinsic motives are the economic reasons that entrepreneurs work, whereas intrinsic motives are related to self-fulfillment and growth.

Wagner and Ziltener [14] have defined almost the same motives in a different way and categorization, on the basis of a range of empirical studies. The four major drivers can be distinguished on (i) self-realisation and independency, (ii) enhanced status and income; (iii) economic contribution and impact, and (iv) upholding tradition and securing income.

The motivating factors may differ across countries due to differences in income levels and employment opportunities. According to Ozsoy et al. [15], entrepreneurs in Turkey are motivated to start their own businesses to provide security for themselves and their family, “to make a direct contribution to the success of a company,” and “to increase income”. Other important motivations are a desire for flexibility, work freedom, and to be his/her own boss. According to Cetindamar [16], gaining work independence is the most important motivation for Turkish entrepreneurs working in technology producing firms. Other crucial motives include the creation of employment opportunities, higher income, and personal satisfaction [13].

2.2. Green Entrepreneurship

Since environmental issues are becoming increasingly important, there is a growing interest to find innovative ways to tackle them. When the subject becomes an “innovation” or a “new way of doing business” there is always a place for entrepreneurship. In other words, the adoption of environmentally responsible business practices can, conceivably, open up an additional range of opportunities for entrepreneurs. The move to a sustainable business framework provides numerous niches that enterprising individuals and firms can successfully identify and service [3]. Owing to this, a rather new concept compared to entrepreneurship, namely “green entrepreneurship” was born.

Different writers and researchers have variously referred to the concept of “green entrepreneurship” such as environmental entrepreneurship, enviro-preneurship, ecological entrepreneurship and eco-capitalism [6, 17, 18, 19, 20]. The individuals or group of people who serve as the agents that bring about the changes to the business arena have also been referred to as ecopreneur, enviropreneurs and green entrepreneurs by researchers interested in the idea of entrepreneurship [19]. In any of the different ways that the concept has been described, a common theme that resonates is the fact that environmental entrepreneurship connotes the idea of developing a business while at the same time demonstrating a concern for ecological and social needs of present and future generations [3].

Isaak [21] stated that the ideal type of ecopreneurship does imply a deliberate (albeit sometimes accidental) strategy to transform the sector in which one operates towards sustainability. In addition he advocates that it is also possible to have incremental ecopreneurial efforts that aim towards cost reduction by means of efficiencies that reduce resource use and thereby contribute to sustainability.

There are also different opinions about the definitions of sustainable/sustainability entrepreneurship. According to Parrish [5] there are currently only a handful of works that directly address sustainability entrepreneurship as he describes. Among these, some authors explore the contribution to more conventional forms of entrepreneurship can make to sustainable development, such as providing employment opportunities, facilitating a shift to cleaner

industries, and as a source of technology and innovation for new products and services (e.g. Ahmed and McQuaid [22]). Others self-identify their object of study as sustainability entrepreneurship, but limit their focus exclusively to environmental issues, which is considered to be the domain of environmental entrepreneurship by Parrish [5] (e.g. Dean and McMullen [23]). Others still are really addressing sustainable management practices of conventional enterprises (e.g. Crals and Vereeck [24]). As Parrish [5] stated, “While all of these approaches may make contributions to sustainable development in their own ways, they are not consistent with what is considered to be ‘sustainability entrepreneurship’”. Sustainability entrepreneurship is understood as entrepreneurship that explicitly instills both environmental- and social-purpose dimensions into a single enterprise. The purpose and level of commitment for these enterprises exceeds what is usually discussed as corporate social responsibility and eco-efficiency.

Since there is quite a debate on the related concepts, analysis of the interactions between social and environmental challenges and their possible linkages with the approaches of systemic change/innovation is required, so as to determine the conceptual framework of this study dedicated to green entrepreneurship. As depicted in Figure 1, social and/or environmental challenges can be tackled by entrepreneurial activities relying on systematic change/innovation. If both challenges are addressed in a single entrepreneurial activity it is regarded as sustainable entrepreneurship. On the other hand it is named as eco-entrepreneurship when only environmental issues are subject of entrepreneurship.

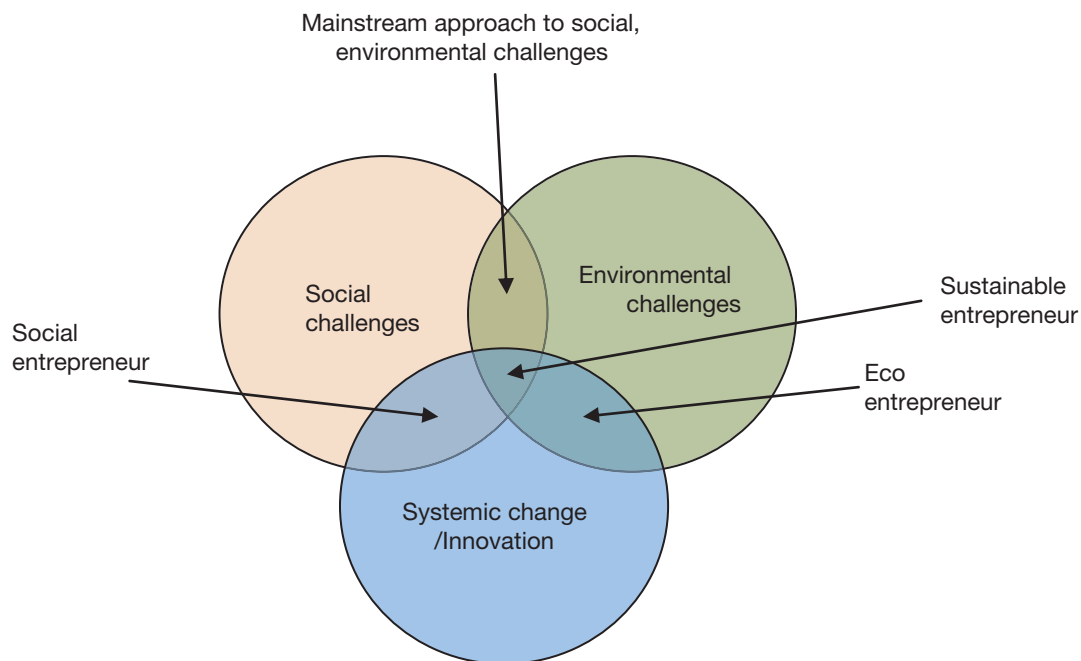


Figure 1. Interactions between social/ environmental challenges and systemic change/Innovation

In this study, green entrepreneurship is regarded as the combination of sustainable entrepreneurship and eco-entrepreneurship. In other words, the focus will be on the environmental benefits, particularly those which have a direct contribution to sustainable lifestyles. In this respect, the green (environmental) aspect will be taken within the context of “Sustainable Consumption and Production (SCP)”.

The following sectors/activities are some examples which can be accepted as green entrepreneurship within the framework of this study:

- Eco-tourism and agro-tourism.
- Organic markets and sustainable agriculture.
- Dematerialization (replacing products with services to meet specific needs).
- Collaborative consumption (car/bike share, food cooperatives, micro-credits).
- Co-production (closed cycle industrial clusters).

In this regard, environmental entrepreneurs are the entrepreneurs who are ecologically or environmentally focused in their approach to their businesses. Such entrepreneurs, named as “ecopreneurs” can still make profits but are interested in new businesses founded on the principle of sustainability [25].

According to Kirkwood and Walton [25], ecopreneurs are a subset of entrepreneurs and have five common motives that may drive their decision-making. These are: green values, the identification of a gap in the market, making a living, being their own boss, and a passion for the industry, product or service. Although these motives do not vary much from those one would expect of mainstream entrepreneurs, it is stated that green values seem to be driving the reason why these entrepreneurs start businesses rather than other common motives such as profit making and a need for independence.

In other words, for being an ecopreneur, different drivers are necessary in addition to the drivers of entrepreneurship in general. The ecopreneur should have passion and believe in green values and/ or should identify a gap in the market and find an environmental solution for that. This requires an awareness and perception about environmental problems as well as technical and legislative knowledge to identify gaps and corresponding solutions.

Hence in this study, a brief analysis is made of the entrepreneurship ecosystem in Turkey and its assessment in terms of green entrepreneurship. In addition, the specific conditions and aspects related to green entrepreneurship are discussed.

3. ENTREPRENEURSHIP ECOSYSTEM IN TURKEY

Turkey is regarded as a centre of attraction, with its geographical location, young population, and strong banking sector. This is supposed to be an opportunity and a favourable environment for Turkey in terms of entrepreneurship.

It is envisaged that about 13 million young people will have entered the business arena within the coming 5 years and the existing unemployment rate for young generation is 21%. This is a big pressure on the Turkish economy and social life. In other words, it is essential to create new jobs for young people. Meanwhile, high impact and sustainable entrepreneurship is regarded as the key to creating employment [26].

Yet, as stated by the Global Entrepreneurship Monitor (GEM) – The Turkish Annual Report “Entrepreneurship in Turkey in 2007” which provides a brief overview of the status of Turkish Entrepreneurship, Turkey is “not entrepreneurial” when compared to other countries worldwide [27]. This was confirmed in both 2006 and 2007. Of the 42 countries that participated in the 2007 study, Turkey ranked among the least entrepreneurial countries [27]. In 2010, although Turkey still was less entrepreneurial than the expected levels, it took a place among the countries experiencing an increase over the previous year [1]. As also suggested by interviewees of this study, it is quite a common opinion among the stakeholders that “entrepreneurship in Turkey is increasing”.

In 2010, the three best aspects that affected the entrepreneurial climate in Turkey were identified as commercial infrastructure, internal market dynamics and physical infrastructure; while the worst aspects were finance, internal market openness and cultural, social norms [1].

The lack of confidence in new businesses and entrepreneurs, limited expertise in management, the lack of role models and the inaccessibility to business networks and mentors are among the other barriers underlined by the business world [28].

Although experts believe in the abundance of opportunities in Turkey, in 2007 they were less optimistic than they had been in 2006. The experts also remained sceptical about whether there were enough people with the vision to see such opportunities and have the capacity to take advantage of them [27]. The likelihood of good opportunities arising for new business formation will, in large part, depend on the ability and motivation of the population to transform those opportunities into new ventures.

Many leaders of the business arena agree that entrepreneurship in Turkey is at a starting level and needs to be improved a lot. As a consequence of that, a good business idea or a product is found sufficient for a successful business disregarding the critical and essential elements such as patents, strong financial models, business plans, market access strategies, etc. This in turn leads to unsuccessful initiatives [29].

In the following sections, a quantitative assessment is made on the current state of entrepreneurship in Turkey, in addition to the evaluation of the primary aspects and elements of the entrepreneurship ecosystem. This is believed to be a basis and a baseline during the analysis of “green entrepreneurship” in more detail.

3.1. Current State: A Quantitative Assessment

According to 2010 data and surveys, Turkey has generally shown an entrepreneurial performance of below average among the same economic category of countries (efficiency-driven countries), in terms of the indicators such as “perceived opportunities”, “perceived capabilities”, “entrepreneurship as a good career choice”, “media attention for entrepreneurs” and “entrepreneurial intentions”. However, the fear of failure of the Turkish entrepreneur is only 25% while the related average rate is 31.7% [1].

Although necessity-based entrepreneurship had increased by 11%, from 1.79% in 2006 to 1.98% in 2007 and the opportunity-driven entrepreneurship rate had decreased from 3.68% to 2.93% over the same period, the balance between necessity and opportunity based entrepreneurship has changed in 2010, having 4.0% opportunity-based and 3.2% necessity based entrepreneurship. As known, necessity-based entrepreneurship tends to focus on consumer oriented sectors to generate immediate income. These businesses typically do not require technical know-how or advanced education [27]. Opportunity-driven entrepreneurs, on the other-hand, have more ambitious growth objectives than necessity-driven entrepreneurs.

Consistent with previous years’ results, the majority of Turkish entrepreneurs are males, with a percentage of 72% [1]. It is striking that the youngest age group (18-24) is becoming more active, whereas the older age group (45-54) is showing a decline in involvement in Turkey [27].

Turkey had a Total Early Stage Entrepreneurial Activity (TEA) rate similar to developed countries (such as Denmark, Israel, UK, and Greece) which were 6.07% and 5.58% in 2006 and 2007 respectively. However, compared to developed countries, Turkey had not achieved the same level of per capita income. According to the data found by the Eğrican and Karadeniz [27] Turkey might be expected, at this stage of economic development, to have a much higher TEA rate (approximately, to the order of 13-15 percent) than developed countries. Over the course of 2010 however, Turkey experienced an increase in TEA rate which became 8.6, yet this was still lower than the expected levels as well as lower than the average of all efficiency-driven countries, which was 11.7 [1].

The indicator of “early-stage businesses with new technologies” is defined as the proportion of start-ups and new businesses indicating that they intend to employ or have employed the latest technologies released within the past year. This value increased from 1.32% in 2006 to 8.54% in 2007. This ranked Turkey as 25th out of the 42 participating countries [27]. Although there was a significant increase, the percentage of early-stage businesses in Turkey that intend to employ or have employed the latest technologies was lower than the GEM average of 11.09%. There was a significant drop in the rate of firms that use no new technology.

The indicator of “early-stage businesses with new markets” is defined as the proportion of start-ups or new businesses that intend to sell or have sold their products or services to what they believe to be entirely new markets. Some 40% of early-stage businesses in Turkey intended to sell or had sold their products or services to entirely new markets, compared to the average of 15.94% for all countries [27]. This ranked Turkey 3rd out of the 42 GEM countries.

In terms of the social dimensions of entrepreneurship, 75.44% of the Turkish adult population felt that, “starting a business is a good career choice,” compared to an average of 57.8% in other GEM countries. This ranked Turkey 10th out of the other 42 countries. Fur-

thermore, 82.46% of the adult population believed that, “new business success is associated with high social status,” compared to an average of 69.29% among the other participant countries, ranking Turkey 6th out of 42. These findings are consistent with the 2006 results on the perceptual metrics of entrepreneurship [27].

Turkey’s entrepreneurial environment was rated lower than average in all fields except for market openness (rapidity of changes in the markets) when compared to the other GEM countries in 2007 [27]. On the positive side, a number of dimensions registered improvement in the experts’ assessment including: the availability of capital, market openness (rapidity of change in the markets), commercial and professional infrastructure, ease of entry, and physical infrastructure.

In the World Bank’s Report of “Doing Business 2011: Making a Difference for Entrepreneurs”, Turkey was given the ranking of 65 among 183 countries in terms of ease of starting a business and several parameters affecting 10 areas of everyday business activity: starting a business, dealing with construction permits, employing workers, registering property, getting credit, protecting investors, paying taxes, trading across borders, enforcing contracts, and closing a business.

3.2. Major Players and Fields of Activities

In Turkey, there are several institutions of central and local governments, public or semi-public business organizations, enterprise associations and Non-Governmental Organizations (NGOs) which act as initiatives supporting enterprises [30].

3.2.1. Support Organizations and Intermediaries

Ministry of Science, Industry and Technology (BSTB) is one of the major players, among governmental institutions in Turkey. It determines the objectives for the Turkish Industrial Policy and encourages the activities of industries of various scales. Different directorates of the Ministry give services to small industrialists to have their own modern workshops and allocate credits for the infrastructure of Organized Zones [30]. BSTB provides Technical Entrepreneurship Capital Support including grants up to 100,000 TL. This Grant Program aims to steer the issue of entrepreneurship towards technology and innovation based enterprises. The program encourages young entrepreneurs (undergraduate, graduate, post-graduate and doctorate students) lacking sufficient financial resources to transform their knowledge and research into marketable and high value-added products [31]. This mechanism also aims to lead the production of high value added and competitive products generate by the entrepreneurs and to engage young qualitative entrepreneurs in the business life [32]. In addition to that, BSTB coordinates the Industrial Thesis Projects (San-Tez) program which provides funding to graduate students who develop new, technology-based products and processes in their graduate (MS/PhD) theses. The program seeks to transform graduate research into innovative products and processes that engages in and addresses the needs and requirements of the industry [31]. Within the framework of this support program, BSTB funds up to three quarters of the project and the firm partner to the project funds the remainder.

With an aim to increase technology development capability, innovation culture, and competitiveness of Turkish companies, the Industrial R&D Grant Program, executed by **The Scientific and Technological Research Council of Turkey (TÜBİTAK)**, provides competi-

tive, project-based grants to trigger R&D expenditures in the private sector. TÜBİTAK also places an emphasis on new funding programs to increase the number of innovating Small and Medium Enterprises (SMEs) and to encourage the creation of new, technology-based firms [31]. Such programs are designed to enable innovative business ideas, including those of candidate entrepreneurs, to be transformed into high value-added enterprises. In this respect, the SME RDI Grant Program is formulated and is in operation as an SME oriented funding program.

Entrepreneurship development occupies an important place in the strategic plan of **Small and Medium Enterprises Development Organization of Turkey (KOSGEB)**, the main public agency in Turkey responsible for the development of SMEs. In pursuit of this strategy, the Administration established its Entrepreneurship Development Directorate in 1998, and ten years later amended its Establishment Law to adopt entrepreneurship as one of its main axes of operation, the other axis being the development of SMEs [33]. KOSGEB gives services in; training, supporting entrepreneurship and providing information about business opportunities, investment analysis, market research, export development, quality development, technology development, patent applications, laboratories and workshops for common-use machines and equipment, and accessibility to financial resources. KOSGEB also has projects in the field of regional planning, for development of entrepreneurship and cooperation, quality improvement, modernization of machinery, and development of infrastructure [30]. The instruments of support to entrepreneurs, coordinated by the Directorate of Entrepreneurship are categorized as follows: (i) entrepreneurship training, (ii) business incubators, (iii) start-up capital, and (iv) business plan awards.

Ministry of Economy (EB), one of the main players involved in formulating and implementing enterprise policy, is a governmental institution under the Office of the Prime Minister. Its main duty is to regulate Turkey's foreign trade policy. EB's wide spectrum of duties and responsibilities include providing enterprises with support to improve export potential. EB is also involved in the funding of R&D support and innovation activities via the Technology Development Foundation of Turkey (TTGV).

Around Turkey, 26 **Regional Development Agencies (RDAs)** are providing financial support to the private sector on a regional basis. These agencies are defined as improving collaborations between the public sector, the private sector and the voluntary sector, providing effective use of resources and accelerating regional growth by being in line with proposals of national development plans and programs, activating local potential, ensuring sustainability and reducing inter-regional and intra-regional disparities. The agencies have various tasks. One of which is to support SMEs and new entrepreneurs by cooperating with relevant agencies on the topics of management, production, promotion, marketing, technology, financing, organization and training, promoting regional business and investment opportunities on a national and international level in cooperation with relevant institutions [34].

As an example of public private partnership, the **Technology Development Foundation of Turkey (TTGV)** has been promoting technology entrepreneurship in Turkey since 1999. It provides (i) pre-incubation, (ii) risk sharing facility and (iii) start-up support for investing in promising entrepreneurs and in creative and unique ideas based on advanced technologies, in order to facilitate the creation of new business ideas as well as to create and develop technology based companies with growth potential. The TTGV set up a fully owned private investment vehicle in Istanbul, Teknoloji Yatırım A.Ş. to operate all entrepreneurship related programs. All related pilot actions are being funded from TTGV's own rotating fund.

According to the study carried out by Eğriçan and Karadeniz [27], the experts argue that

there are some shortcomings about the abovementioned support organizations and associated programs. It is stated that transparency, efficiency and coordination between supporting agencies (TÜBİTAK, TTGV, EB, BSTB, and KOSGEB) can be strengthened. In addition, administrative bureaucracy faced in all financing programs can be decreased. In other words, existing government programs that provide valuable support in the promotion and development of entrepreneurship are still open to improvement.

Furthermore, potential intermediaries between research institutions and industry are rather scarce. Even though there has been a recent increase in the number of incubators, technology parks, and technology transfer offices, especially after the 'Law on Technology Development Zones' in 2001, the number of intermediaries remains unsatisfactory given the size of the country. Moreover, the industrial and social heterogeneity of Turkish regions suggests a more decentralized approach of the national innovation system. In this context, the recently established regional development agencies become a crucial part of the national innovation system, but it is still too early in its stages to evaluate its impact [35].

3.2.2. Enterprise Associations and Non-Governmental Organizations (NGOs)

Besides public institutions, enterprise associations formed by local entrepreneurs have a crucial role in creating formal networks among the entrepreneurs. **Chambers of Industry and Commerce** are organizations which have mostly been based on the extension of patronage relations with government authorities [30]. They inform their members about local/national or international business related issues and build partnerships with various public/private organizations for special projects.

The Turkish Industrialists and Businessmen Association (TUSIAD) acts as one of the dominant organizations representing businessmen. With the establishment of this kind of regional-based organization for industrialists and business organizations, the Turkish economic life has witnessed the pluralisation of economic actors with different discourses and strategies, bringing together a large number of enterprises of different sizes located in different geographical regions of Turkey [30]. Their main characteristic is that they support local development by establishing networks among entrepreneurs. It is observed that entrepreneurs increasingly form local initiatives and active groups through business organizations.

In addition to business associations, there are several NGOs supporting enterprises. **Turkish Foundation for Small and Medium Businesses (TOSYOV)** for example, which was founded for the purpose of providing support and service to its members from SMEs in Turkey, has created an organization network of 1500 registered members, 17 support associations and two branches (İstanbul, İzmir) to provide support [30]. It offers training not only for its members, but also for other SMEs through conferences, panels and seminars.

The Union of Chambers and Commodity Exchanges of Turkey (TOBB) is another actor which facilitates entrepreneurial activities in Turkey with its councils dedicated to young and woman entrepreneurship. These are: TOBB Young Entrepreneurs Council and TOBB Women Entrepreneurs Council. Both of these councils are in operation with the primary objective of providing continuous support to entrepreneurs by various activities including capacity building and training programs.

Endeavor is an international non-profit organization operating in developing countries with the purpose of establishing high impact entrepreneurship, which is considered to be the leading force of sustainable economic development. Established in 1997, Endeavor has

offices in Argentina, Brazil, Chile, Colombia, Egypt, Jordan, Mexico, South Africa, Uruguay and Turkey. They have been active in Turkey since 2006. Endeavor aims to identify and help the promising high-impact entrepreneurs unleash their potential by providing strategic access to a network of seasoned business leaders who act as mentors, advisors and consultants through several service programs. They have no sector specific priorities or differentiations. They have 120 members and have supported 26 entrepreneurs from 21 firms so far. They have recently made available a credit allocation from a bank with an existing limit of 25 million TL.

The Women Entrepreneurs Association of Turkey (KAGIDER) was chartered in September 2002 as a non-profit and non-governmental organization, by 37 prominent Turkish female entrepreneurs. It has grown steadily over the past three years as other successful businesswomen have joined its ranks. Today KAGIDER have 172 members from various sectors, including textile, communication, human resources, tourism, chemicals, mining and health [36].

The Turkish Tradesmen and Craftsmen Confederation (TESK); the Association of Young Industrialists and Businessmen (GESIAD), The Young Businessmen Association of Turkey TUGIAD, The Foundation of Economic Development (IKV) and the Young Entrepreneurs Association (GEGİDER) are other NGOs which contribute to the entrepreneurship ecosystem in Turkey.

Considering this institutional environment, a general evaluation of the actors involved at different levels in local economic policies and initiatives can be summarised as in Table 1.

Table 1. Policies and Initiatives Undertaken by Selected Sectors in Turkey [30]

Policy / initiative	Actors										
	1	2	3	4	5	6	7	8	9	10	11
Aiding starts-ups	■	▲	○	■	■	○	○	○	■	■	○
Helping existing enterprises	■	▲	○	■	■	○	■	○	■	○	○
Information supply	■	▲	■	○	■	■	■	■	▲	■	■
R&D facilities	■	▲	○	○	○	○	▲	○	▲	○	▲
Training	■	▲	■	○	▲	○	○	■	■	○	■
Subsidies/financial support	■	■	○	▲	○	○	■	○	○	○	○
Provision of land buildings	■	■	■	○	○	○	○	○	■	○	○
Industrial zones	▲	■	■	○	○	■	○	○	▲	○	○
Improving public infrastructure	■	■	▲	○	○	○	○	○	○	○	○
1. Ministry of Science, Industry and Technology	4. Banks		7. TUBITAK, TTGV					10. TUSIAD & SIADs			
2. KOSGEB	5. TESK		8. TOSYOV					11. Universities			
3. Municipalities	6. TOBB		9. Chamber of Ind. & Commerce								

▲ Lead / highly involved ■ Supportive or involved ○ Not involved

From Table 1, it is observed that although there are different initiatives taking place on vari-

ous levels, the central government and its institutions still maintain the leading roles in supporting the enterprises. The institutional framework has witnessed significant developments since the mid-1980s, but it is still limited [30]. A few limitations in the development of local economic policy are the lack of financing available to local authorities and the reliance on the central state to provide the majority of its financial resources.

3.3. Legal Framework

Some legal arrangements, including various tax deductions/exemptions, exist for enterprises carrying out R&D activities and/or operating in Technology Development Zones (TDZs), Organized Industrial Zones and Industrial Zones.

The Law Concerning the Support of Research and Development Activities (R&D Law) for example, covers income tax stoppage and insurance premium supports for enterprises and entrepreneurs carrying out innovation and R&D projects. In addition, innovation and R&D projects of SME's supported by public institutes and foundations which are established by Law or international funds or executed by TUBITAK are defined in the R&D Law. So, these enterprises, which are using technology capital support, and those which work on pre-competition cooperation projects can benefit from income tax incentives.

There are also tax incentives resulting from the accession process of Turkey to the European Union. According to the Instrument for Pre-Accession Assistance (IPA) Framework Agreement between the Government of the Republic of Turkey and the Commission of the European Communities, tax incentives and supports are provided for enterprises for research and development. These include exemptions in the Value Added Tax (VAT), import tax, income tax, communication tax, etc.

The incomes of taxpayer's whose software and R&D activities are in technology development zones are exempted from income and corporate tax as well. The incomes of technology development management companies, which are in the scope of implementation law, are also exempted from income or corporate tax. While the incomes of the entrepreneurs, who are active in technology development zones, are exempted from income and institution taxes, entrepreneurs also benefit from VAT exemption for some of their delivery and services.

One of the major acts in this subject is dedicated to Industrial Zones which lays down the rules for the establishment, management and operation of industrial zones with a view towards promoting investments, attracting the savings of Turkish labourers working abroad into investments in Turkey, and increasing the flow of foreign capital into Turkey. Incentives directed towards the income of corporation taxpayers located in organized industrial zones are found within the Incentive of Investment and Employment Law. Taxpayers functioning in these regions, were given income tax withholding incentives, employer contribution incentives, free investment land allocation and energy support.

According to the Global Entrepreneurship Monitor (GEM) – The Turkish Annual Report “Entrepreneurship in Turkey in 2007”, Turkish government policies do not adequately promote entrepreneurship in the country [27]. In general, Turkish experts do not believe that government policies are aimed at, or give priority to, entrepreneurship. Experts assert that policies are short-sighted and produce equally short-term initiatives that lack continuity and are therefore less effective. Accordingly, there is a need for a long-term strategy that provides a sense of stability. Among the government policies in need of urgent reform, heavy tax and administrative burdens remain among the priority obstacles for entrepreneurs.

It is indicated by Çakmakcı [37] that the Turkish government should pursue effective policies to encourage individuals and/or enterprises to commercialize their R&D activities. R&D financing should be linked to commercialization performance. According to Çakmakcı [37], the government should support the exit alternatives of investors (e.g. tax deductions, introduced for big companies' buyouts of small firms).

3.4. Access to Finance

As in most countries, Turkish entrepreneurs usually invest their own money primarily, and then look for additional funding through close family and friends. The next targeted sources of funding include bank loans and business angels or venture capital companies, of which only a handful have emerged recently in Turkey [27]. The banking sector is the largest and most important player in the Turkish financial sector.

The most important problem for SMEs, is securing credit from the banking sector which is based on stringent and demanding collateral requirements [27]. Owing to that, Credit Guarantee Fund (KGF) was established in 1991 in accordance with the Financial Contract signed with German Technical Collaboration (GTZ). The main objective of the KGF is to support SME's by providing a guarantee for their financing, consequently increasing the credit usage in general. In this system the KGF acts as an intermediary organization and makes it possible for SME'S with inadequate collaterals to apply for bank credit. It also increases the number of customers for the banks and minimizes their risks. This does not simply mean an increase in the number of firms who become eligible to obtain bank credits, but it also means an increase in the number of medium or long term credits available for SME's and an increase in the limits of credits provided for them. The main priorities of the KGF are to support young and woman entrepreneurs, to promote innovative investments, to promote high-tech SME's, to support exports, to increase the rate of employment and to contribute to regional development. The KGF works in collaboration with several banks and finance institutions in Turkey.

The availability and amount of venture capital in Turkey is increasing. In fact, new legislation to help spur the development of the venture capital industry is expected to serve as a long-awaited and important catalyst. However, low levels of direct foreign investment in Turkey due to the instability of the macro environment through 2005, along with the immaturity of the pension fund and insurance markets make fundraising difficult. Furthermore, the small size and limited liquidity of the capital market in Turkey makes Initial Public Offering (IPO) rare. In addition, widespread poor management practices such as irrelevant family members involved in company ownership double book-keeping to avoid taxation and the limited capabilities of entrepreneurs to prepare well-reasoned business plans impede venture capital development [27]. Consequently, the limited venture capitalists in the Turkish market still prefer to invest in more mature industrial companies or focus their investments in the post start-up stages of business. The only exception to this trend involves investments in technology companies which are often led by more well-rounded entrepreneurs in the first place.

With the support of TTGV, Istanbul Venture Capital Initiative (iVCi) was founded in 2007. It is Turkey's first ever dedicated fund of funds and co-investment programme. The investors in the iVCi are the KOSGEB, the TTGV, the Development Bank of Turkey (TKB), Garanti Bank, the National Bank of Greece Group (NBG) and the European Investment Fund (EIF). The EIF is the adviser to the iVCi. The iVCi leverages on the experience of the EIF, the European Union's specialised financial body for SMEs and the risk capital arm of the European Investment Bank Group (EIB Group).

As indicated by Çakmakcı and Sami [37, 38], there is an initiative planned by the entrepreneurship community (under the non-governmental organizations), to establish new a fund of funds which is going to act as a means for improving the venture capital financing opportunities in Turkey.

There has been an increased rate in the availability of debt and equity, venture capitalist funding and financing through initial public offerings. There has been a negative change concerning government subsidies and the availability/accessibility of business angels [27]. Turkish experts state that limited access to finance is the most fundamental barrier facing Turkish entrepreneurs. Insufficient sources of finance and low entrepreneurial activity go hand-in-hand, because companies are unable to get started.

However, a majority of the prerequisite entrepreneurial framework conditions are major obstacles to entrepreneurship in Turkey. The most important challenge is Turkey's unfavourable financial environment. Access to debt funding is more difficult in Turkey than all other GEM countries. The level of difficulty is expected to increase even more due to the upcoming adoption of Basel-II standards and lending reforms. The seed capital market is very small and access to venture capital is not widely available. The Turkish Government should be urged to explore ways to increase financial options, especially for very young, small and/or high technology companies [27].

It is emphasized by Çakmakcı [37] that the government should implement models to compensate the risk taken and income expected by the investors, in order to increase the willingness of the investors and facilitate entrepreneurs' access to such opportunities. Government should also promote best practices and ethical values for these models.

3.5. Access to Infrastructure

Infrastructure is an essential element for R&D activities. Establishing, maintaining and updating high quality research infrastructure in an efficient way is a challenging task given the number of universities and their distribution across Turkey. The Ministry of Development (KB) funds research infrastructures of higher education and public research institutes on a project basis. The proposed projects are examined by whether they are in line with priorities, respond to the needs of the public and private sectors, can run basic, applied and multi-disciplinary R&D activities and build up an environment for supporting qualified researchers and their collaborations [31]. In addition to joint laboratories, thematic expertise centres are funded in prioritized technology fields, including nanotechnology, ICT, food security, innovative food processing, hybrid vehicles, biotechnology, and clean technologies.

The Law on TDZs fosters the establishment of technology parks in higher education institutes and/or research centres to expedite knowledge circulation [31]. Currently, there are 21 active technology parks across Turkey, which stimulate the mobility of human resources between the host research institution and the Techno-park as academicians and/or R&D personnel are encouraged to work with and/or become (co)founders of new firms located in the Techno-park.

In addition, Technology Development Centres (TEKMERs) are incubators that are established in cooperation with universities to support the start-up of new, technology-based firms. There are 18 TEKMERs across Turkey whose tenants are provided with services for (i) promotion and marketing services, (ii) information services, (iii) consultancy services, (iv) laboratory and workshop services, and (v) equipment and material support [31].

Universities are more proactively marketing their support and collaboration capabilities to the private sector and it is responding positively. The emergence of TDZs, TEKMERs, open technology incubation centres and the establishment of government-funded university-industry research centres have significantly improved the amount, scope and quality of R&D activities in Turkey. This trend is expected to continue with only 15 of the planned 28 technology zones operations at the time of this survey. Experts still consider the level of collaboration between established firms and research institutions to be below its potential [27]. As Çakmakçı [37] mentioned, the government should promote the sharing and common use of research infrastructure as well as educate the researchers on market conditions and commercialization processes.

3.6. Education and Training

It is widely accepted that one of the most crucial aspects of enterprise creation is human resource development, which is mainly achieved through education and training [30]. The educational system is indicated as a barrier in front of entrepreneurship in Turkey. The scarcity of mechanisms which promote an entrepreneurial way of thinking in the existing educational system is a problem [39]. According to the study carried out by Eğriçan and Karadeniz [27], beyond direct government programs, the education system does not adequately promote entrepreneurship in Turkey. The current school system does not provide for the development of skills and attitudes related to creativity, critical thinking, self-sufficiency, self-expression and personal initiative. According to the experts, there are more opportunities for entrepreneurship in Turkey than there are people equipped to take advantage of them. Therefore, opportunity recognition and opportunity shaping should be put high on the agenda, and a bolder educational program for developing both entrepreneurial skills and attitudes should be developed.

Among young Turks, vocational high school students are more inclined to explore entrepreneurship as a career path than the more skilled students, but they lack business skills and the necessary self-esteem due to a “vocational school stigma”. It is accepted that the average person’s ability to identify business opportunities is low. Introducing entrepreneurial thinking and entrepreneurship education early and at all levels can go very far in nurturing a culture that rewards prudent risk-taking. Turkey could incentivize university-private sector collaborations to expose students to the power of entrepreneurship [40].

Turkey has struggled to make higher education available to those graduating from the secondary education system; furthermore more resources need to be channelled towards improving the availability of business education in Turkey. Like most countries, there is a shortage of students graduating with accounting degrees. Incentives must be created to increase the number of such graduating students. Expanding distance education, particularly in business disciplines, might partially address the training needs of small business owners [13]. Greater technical assistance and business education, especially in the areas of accounting, market research, human resources management, and technological support, would help energize the Turkish economy.

In Turkey, prevalent business support organizations provide training and counselling services to unemployed people and to people threatened by unemployment. In addition to these, by the initiative of local governments and NGOs, short courses and business start-up programs should be arranged for unemployed young people for the acquirement of skills [30].

3.7. Cultural and Social Norms Related to Entrepreneurship

Although Turkey is familiar with entrepreneurship in terms of the concepts of trade, tradesman and family business, new generation entrepreneurship is beyond this traditional approach [41]. In other words, it appears that the social and cultural norms in Turkey are not very supportive of entrepreneurship [27]. Turkish culture does not endorse self-sufficiency, autonomy or personal initiative and does not encourage creativity or innovativeness. Families, schools and society all promote obedience with limited appreciation for creativity. Consequently, entrepreneurial attitudes are under-developed among young people.

The experts also expressed particular concern about Turkey's attitudes towards failure and risk. The unstable economic conditions and the increasing number of closing firms deter entrepreneurship. Individuals prefer the security of paid employment to the risky business of starting their own firms. According to Eğrican and Karadeniz [27] once an entrepreneur has gone bankrupt, it is nearly impossible for them to obtain new financial loans from banks or limited investor resources (including friends and family).

Although entrepreneurs "by necessity" are generally respected for their work ethic, entrepreneurs "by choice" who have other promising career options are often discouraged by their families. High-impact entrepreneurs are admired but considered "lucky". In addition, the absence of a "win-win" social and business culture undermines entrepreneurship and innovation. Thus, Turkey is in as much need for cultural capital as financial capital [40].

However, the experts also provided encouraging comments regarding some promising shifts in the social and cultural norms of Turkey. Some experts sense that the mentality towards entrepreneurship is changing across all stakeholder groups in society (government, university, civil society, etc.) Until very recently, entrepreneurs had a very bad reputation being perceived as thieves or charlatans [27]. Today, entrepreneurship is rapidly becoming positively associated with leadership, social progress, job creation, and financial rewards.

In spite of the low entrepreneurship profile of Turkey, it is indicated that the importance and esteem of entrepreneurship has started to accelerate in recent years with new concepts such as "added value creation", "sustainability" and "making a difference" [42]. In other words innovation and high potential of job creation are in the agenda.

Very recently, the media has started to play an important role in disseminating the concept of entrepreneurship in Turkey. Presently there are two different television (TV) programs broadcasted by different channels, facilitating entrepreneurs' expressing themselves and reaching out for investments or awards. "Dragons' Den Türkiye", which started in 2010, gives entrepreneurs the chance to pitch to a panel of Turkey's successful business people who have pledged to invest their own money in the best ideas. As of February 2011, 13 entrepreneurs were awarded with investments from the investors. On the other hand, the Entrepreneurship Competition "birFIKRİNmiVAR?" (doyouHAVEanIDEA?), which was launched in 2007, has recently become a TV show in which entrepreneurs have the chance to present to the jury and to the Turkish audience during a 13-week-long competition. One of the interviewees stated that such initiatives will contribute to the entrepreneurship ecosystem in Turkey and the real impacts will be observed in about 2 years.

4. ANALYSIS OF THE GREEN ENTREPRENEURSHIP ECOSYSTEM IN TURKEY

4.1. Assessment of the Entrepreneurship Ecosystem in Turkey in Terms of Its Green Aspects

For the assessment of Turkish entrepreneurship in terms of its reflection in green entrepreneurship, a rough analysis has been done to have an idea about the proportion of green entrepreneurship in the overall entrepreneurship activity. For this purpose, three different samples were used:

One of them is a sample of 92 business ideas presented by the entrepreneurs at the TV program Dragons' Den Türkiye, which started in 2010 as mentioned in Section 3.7. Of the 92 business ideas, 14 ideas were green business ideas, which made for a ratio of 15.2% overall. During the program, 13 business ideas in total were successful (considered to be investable by the investors), and 4 of these 13 business ideas, were green businesses. In other words, of the business ideas adopted by the investors, 30% satisfied green entrepreneurship criteria. This was twice the ratio of the green business ideas in the whole sample, which shows that green business ideas have a higher possibility of being invested in than other business ideas. The successful green business ideas were related to the areas of "waste to product", "energy efficient products" and "sustainable agriculture".

Another sample used was the collective business ideas received by the Entrepreneurship Competition "birFIKRİNmiVAR?" (doyouHAVEanIDEA?) since 2007. As provided by the organizers of this competition, in total 10,000 ideas have been collected so far and 4% of these business ideas have been directly in the environment sector. It is also indicated that, this 4% does not include the environmentally friendly products or services categorized in other sectors such as textile, food, agriculture, automotive, etc., which are considerably high in number. Hence, it should be noted that the ratio of the green business ideas is much higher than 4%.

And finally, the R&D projects portfolio of Technology Development Foundation of Turkey (TTGV) has been analyzed in terms of the distribution of the environmental projects within the whole portfolio. Although all R&D projects do not directly refer to "business ideas", it gives a very good perspective for the potential and trends of the research and business world. TTGV has supported approximately 900 R&D projects belonging to the private sector since 1991 and 11.5% of these projects have been environmental projects; this ratio has been much higher in recent years. The distribution of these environmental projects by type of applications is given in Section 6.1.

From these figures, it can be estimated that in recent years, approximately 15% of the existing R&D and entrepreneurship activity in Turkey has been related to the environment, and this trend continues to grow.

As discussed in Section 3, entrepreneurship in Turkey is not at expected levels; however it has shown a tendency of increasing, particularly in 2010. Accordingly, a low level of entre-

preneurship is a drawback in terms of green entrepreneurship as well. On the other hand the increasing trends in both entrepreneurship in general and entrepreneurial environmental activity in recent years should be considered as an advantage in favour of green entrepreneurship.

In 2010, opportunity based entrepreneurship in Turkey had exceeded necessity based entrepreneurship, as opposed to previous years. Since opportunity based entrepreneurship is focused on more ambitious growth objectives rather than the expectation of immediate income, it provides a more favourable climate for green entrepreneurship which generally requires technical know-how and a visionary approach.

On the other hand, as indicated in Section 3.1., Turkey has been given the ranking of 65 among 183 countries in terms of ease of starting a business. This may be regarded as a barrier for green entrepreneurship which is relatively a new area for Turkey.

All the support, infrastructure and finance facilities available for improving entrepreneurship in Turkey, as discussed in Section 2 in detail, can be used for green entrepreneurship related activities. While more specific conditions related to legislation, financial incentives and national capacity will be discussed in the following sections a striking example related to “infrastructure” will be given here.

One of the technoparks located in Mersin, located in the southern part of Turkey, organized a workshop in 2010, inviting all technopark managers in Turkey as well as other stakeholders such as universities and entrepreneurs located at technoparks. The topic was “the roles and opportunities of technoparks for a green and energy efficient world”. This was a perfect opportunity for the participants to listen to and discuss green entrepreneurship related developments in the world and possible actions to be taken by the technoparks. It was discussed by the speakers and the participants that each technopark could make demonstrations related to green and eco-efficient applications as well as host entrepreneurs working on the technology side providing consultancy and IT services that support green entrepreneurship. This looks like an interesting window showing the interest of technoparks in green entrepreneurship issue and it can be regarded as an opportunity and focused on for creating practical results.

Referring back to the drivers of entrepreneurship and green entrepreneurship discussed in Section 1, “passion and belief in green values” and/or “identification of a gap in the market and finding an environmental solution for that” are indicated as the additional drivers for green entrepreneurship. So, environmental awareness as well as technical and legislative capacity and know-how for the environment are quite critical for promoting green entrepreneurship. It is believed that specific conditions related to the environment may cause disadvantages or advantages specific to green entrepreneurship rather than to entrepreneurship in general. In this respect, these specific conditions are discussed in the following sections.

4.2. Specific Conditions Affecting Green Entrepreneurship

Apart from the general elements of the entrepreneurship ecosystem in Turkey, there are specific elements which support environmental activities, particularly the Sustainable Consumption and Production (SCP) aspect, creating additional and specific opportunities for “green entrepreneurship”. These may include the environmental and energy related legislation in favour of SCP, the financial incentives specific to environmental activities and the existing national capacity.

4.2.1. Environmental and Energy Related Legislation

In Turkey, there is a comprehensive set of legislation supporting SCP including environmental and energy related arrangements, although there are serious problems related to the execution of this legislation. As emphasized by the International Institute for Sustainable Development (IISD), regulations are one of the most important drivers for the development of environmental technologies and the ecopreneur needs to identify and assess which environmental laws, regulations and standards will present business opportunities [43]. Although this field is quite complex, staying in touch and anticipating trends can help the entrepreneur capitalize on opportunities. Regulations are becoming more stringent and enforcement is expected to increase, meanwhile it is expected that a transition to market based mechanisms (such as energy taxes) may be necessary and that the principle of the “polluter pays” will be more prevalent. Hence this field is becoming more likely to provide opportunities for green entrepreneurship. International agreements on climate change, ozone depletion and biodiversity are also underlined as a unique set of drivers for developing new products, technologies and processes. It is mentioned that financial rewards await those who take initiative in the relevant sectors and markets.

Taking into consideration the rising costs of waste disposal and consequently the pull towards the necessity of reducing the volume and toxicity of wastes, the approach of “pollution prevention” and “recycling - recovery” dominates the markets, rather than abatement technologies which are becoming obsolete. Integrating the “consumption” aspect, which is the major indicator of the markets, into this picture the SCP concept is revealed to be the main framework, as mentioned in Section 1.

In this respect, a summary of the relevant legislation in Turkey, having been reviewed within the framework of the SCP concept, is given below. It also takes into account the plans and developments in the process of adaptation to EU environmental legislation.

4.2.1.1. Environmental Law and Regulations

Turkish Environmental Law emphasizes the principles of “sustainable environment and sustainable development” as well as the promotion of renewable energy utilization and clean technologies, waste prevention, minimization and recovery.

Regulations related to **water pollution** control are “Regulation on Water Pollution Control” and “Regulation on the Control of Pollution Caused by Hazardous Substances in and around Water Bodies” which include terms on the use of cleaner production technologies.

There is a comprehensive list of **waste management** regulations in Turkish legislation, most of which have been revised or introduced within the framework of the EU harmonization process. These arrangements include the “Regulation on General Principles of Waste Management” as well as separate regulations on the control of solid wastes, hazardous wastes, waste oil, waste vegetable oil, waste batteries and accumulators, packaging waste, end-of-life tyres, end-of-life vehicles and waste electrical and electronic equipment. The basic principles and activities indicated in these regulations related to SCP are listed below:

- Development and use of clean and minimum waste producing technologies.
- Waste minimization, recycling and reuse.
- Waste recovery as raw material and energy.
- Separate collection of different wastes at the source.
- Taking certain end-of-life products to relevant collection points for recovery.

- Identification of wastes.
- Production of long life products.
- Reduction of hazardous chemicals use in products.
- Waste collection systems for waste recovery.
- Obligations for producers and retailers (for packaging).
- Training on waste valorisation and recovery.

In relation to **(hazardous) chemicals**, there are several regulations supporting SCP, namely; the Regulation of the Categorization, Packaging and Labelling of Hazardous Chemicals, the Regulation on the Reduction of Ozone Depleting Substances, the Regulation on the Restriction of the Production, Supply and Use of Certain Chemicals, Preparations and Goods, the Regulation on the Inventory and Control of Chemicals.

As can be seen, there are many references to SCP approach in Turkish environmental legislation. The recently issued communiqué “Integrated Pollution Prevention and Control in Textile Industry” is the first legislation directly addressing the application of cleaner production measures. However, it should also be emphasized that the “production” aspect of SCP is quite dominant and the aspects of “consumption”, “consumer” and “product” are encountered particularly in the waste management related regulations which have entered into force in recent years.

It should also be noted that, despite the extensive EU adapted legislations, there are very important problems in their “execution”. These are due to several reasons such as deficiencies in the physical infrastructures, social awareness as well as monitoring and auditing systems.

In addition to the existing legislation summarized above, there are several regulations included in the Turkish National Programme Related to the Undertaking of the European Union Legal Acquis published in 2008, which are directly related with SCP. The most important of such potential regulations which are in the process of adaptation are:

- Regulation on Eco-labelling.
- Regulation on Eco-Management and Audit Scheme (EMAS).
- Directive on Registration, Evaluation, Authorization and Restriction of Chemicals (REACH).

Under the same Program, the following measures have been planned as well:

- Establishment of a database in order to provide access to information about waste quantity, intermediate storage, recovery, disposal, and the present disposal and recovery facilities.
- Formation of separate collection systems for waste reduction by using the most convenient technologies and improvement of recovery systems.
- Formation of separate collection systems for special wastes (waste oils, PCB/PCT, battery and accumulators, end-of-life vehicles, mineral wastes, waste electrical and electronic appliances).

4.2.1.2. Energy Related Legislation

Legislation concerning energy efficiency and renewable energy which overlap with the concept of SCP concept are:

- Energy Efficiency Law.
- Regulation on the Enhancement of Efficiency in Energy Resources and Energy Use.
- Regulation on the Energy Performance in Buildings.

- Regulation on the Procedures and Principles for the Enhancement of Energy Efficiency in Transportation.
- Law on the Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy.
- Regulation on the Eco-Design of Energy Related Products.
- Communiqués/ Regulations Related to the Energy Labelling of Household Appliances (refrigerators, washing machines, air conditioners, dish washing machines, dryers, ovens, bulbs, etc.)

When the regulations listed above are examined with the perspective of SCP, it can be concluded that the aspects of “consumption”, “consumer” and “product” have been covered as much as the production aspect. In particular, energy labelling of household appliances is an important and useful instrument in terms of providing consumers with information on the energy performance of the products. “Raising the awareness of consumers” is a separate section in the Energy Efficiency Law. The Energy Efficiency Law also issues the principles for energy efficiency services, training and awareness activities, Energy Efficiency Consultancy (EEC) Companies and their authorization. This is an important element in creating an EEC market which is an opportunity in terms of green entrepreneurship.

Meanwhile, the **Regulation on Eco-Design of Energy Related Products**, which has recently entered into force, is expected to create a large shift towards more environmentally friendly products in the market. This regulation aims at reducing the environmental impact of products, including the energy consumption throughout their entire life cycle. It defines conditions and criteria for setting requirements regarding environmentally relevant product characteristics and allows them to be improved quickly and efficiently. The life cycle phases to be considered are; “selection and use of raw material”, “production”, “packaging, transportation and distribution”, “installation and maintenance”, “use” and “ultimate disposal”; and in these phases, the environmental aspects, given below are evaluated;

- resource consumption,
- air, water and soil emissions,
- estimated pollution due to noise, vibration, radiation, electromagnetic fields etc. physical factors,
- estimated waste amount,
- re-use, recycling and recovery possibilities of material and/or energy.

According to the **Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy**, together with the Law amendment recently put into force, certain incentives are applicable for renewable energy projects and investment, which are explained in Section 4.2.2.

The Regulation on Energy Performance in Buildings, which came into force in 2009, also supports the SCP approach because it emphasizes energy efficiency, anticipates the use of environmentally friendly and energy-saving materials, and provides incentives for the applications such as cogeneration and renewable energy.

Turkey is at quite the beginning of the road in terms of the realization of energy efficiency measures, potential and use of renewable energy technologies. There are some problems in the execution of the relevant legislation.

Within the context of the EU adaptation process and the National Program Related to Undertaking of European Union Legal Acquis, following measures have been planned in relation to energy.

- Publication of the Regulation Related to the Dissemination of Bio-fuels.
- Implementation of the preparation of legislation, audits, documentation, database (building inventory) formation and R&D activities within the context of the Regulation of Energy Performance in Buildings.
- Implementation of awareness raising and training programs in areas such as “ecological building program”, “solar energy use program”, and “Zero CO₂ emission building”, for the construction sector.
- Development of programs for raising public awareness by municipalities and the ministry in order to maintain the effective implementation of the Regulation of Energy Performance in Buildings.

4.2.1.3. Industrial Strategy and Action Plan (2011 – 2014)

The Turkish Industrial Strategy and Action Plan (2011 – 2014) which has recently entered into force, is regarded as an important development in terms of the new concepts in favour of environmental policies and SCP.

It is indicated that the Strategy has been designed based on the recent developments both in Turkey and the EU. “Inefficient management of natural resources and the problem of energy” has been listed among the weaknesses of Turkish industry. While environment and climate change are indicated as threats, the positive steps taken in these issues are regarded to be an opportunity.

In the context of environmental policies, “sustainable growth”, “social responsibility standards” and “production in accordance with environmental rules” have been referred to, making specific and direct emphasis on energy efficiency, environmentally friendly production processes, low carbon (and fossil fuel) economy, “transition to zero carbon public” and “dissemination of eco-efficiency in the whole country”.

The action plan includes establishment of an eco-efficiency centre as well as specific actions for different industrial sectors. Some of the examples are given below.

- Machinery: Meeting eco-design requirements.
- Domestic appliances and electrical and electronic equipment: Adaptation to Eco-labelling, Eco-design, WEEE and the Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS).
- Textiles: Environmentally friendly production, EKOTEKS labelling.

4.2.2. Financial Incentives and Resources

Financial incentives and resources are discussed below in two main categories: (1) The evaluation of general purpose incentives and resources given in Section 3, in terms of environmental activities and green entrepreneurship, (2) The Evaluation of incentives and resources specific to the environment in terms of green entrepreneurship.

4.2.2.1. General Purpose Incentives and Resources

In addition to the legislative framework presented in the previous section, there are different financial incentives and resources provided by several different institutions.

It is possible to use most of the general purpose incentives and supports for environmental initiatives and investments [44]. Hence, it is possible to shape the environmental (more specifically SCP related) activities in accordance with the conditions and requirements of the financial incentives and resources mentioned in Section 3 to create synergies and opportunities in favour of SCP activities.

For SCP related activities, it is possible to benefit from the tax exemptions, land allocations, energy support, superstructure credits, supports for infrastructures, etc. which are specified under the incentives for Organized Industrial Zones (OIZs), Small Industrial Sites, Technology Development Zones (TDZs) and Industrial Zones. For example, it is possible to start green businesses in TDZ's or incentives for industrial zones may be helpful for industrial symbiosis (ecology) types of initiatives and for the infrastructures of green businesses.

Similarly, since it is indicated in the New Incentive System in Turkey by the Undersecretariat of Treasury that new investments, extensions, modernization and product diversification investments are eligible for the incentives, it is possible to use such incentives for SCP related investments and new green businesses.

The R&D, commercialization, innovation and entrepreneurship supports of The Scientific and Technological Research Council of Turkey (TUBITAK), Small Business Administration of Turkey (KOSGEB), TTGV and the incentives provided by the Law Concerning the Support of Research and Development Activities (R&D Law) listed in Section 3, are accessible for SCP related projects and green business initiatives. The same opportunity applies for the different types of supports provided by KOSGEB (bank credit interest support, project support, consultancy and training, regional development, international cooperation, etc.).

Regional Development Agencies (RDA) provide good opportunities for the development of certain economic sectors in accordance with the priorities of the region on an annual basis. It is possible for entrepreneurs to benefit from such supports to start green businesses in the priority sectors announced by the RDAs. For example, the priorities of the Çukurova Development Agency for 2010 program include "added value creation in the sectors of agriculture, food, textile and clothing". Organic agriculture and food or environmentally friendly textile products could be green business opportunities applying for the RDA supports. Another example is the West Mediterranean Development Agency, who identified "extension of tourism season to 12 months and creation of alternative tourism opportunities" as one of the priorities for the regional support program. Hence, eco-tourism initiatives are good examples of green businesses which could be evaluated under this program. The "regional" development approach of this system is believed to be in coherence with the "localization" aspect of green entrepreneurship.

4.2.2.2. Specific Incentives and Resources for Environmental Activities

There are a limited number of incentives and supports which specifically target environmental, particularly SCP, related activities and hence support the green entrepreneurship ecosystem. Examples of such instruments are summarized below:

The Scientific and Technological Research Council of Turkey (TUBITAK):

In addition to its general R&D and entrepreneurship programs, TUBITAK provides support for environmental projects by means of two research groups. "Processes for the prevention of environmental pollution before it is created" and "clean technologies" are two of the priority areas of Environment, Atmosphere, Earth and Marine Research Group (CAYDAG) and

“studies for identification, control, prevention and elimination of environmental pollution”. These research groups (ÇAYDAG and Basic Sciences Research Group) provide supports for environmental projects (and SCP) by means of various support programs of TUBITAK. These programs are, The Support Program for Scientific and Technological Research Projects (1001), the Short-Term R&D Funding Program (1002), the Support Program for Research Projects of Public Institutions (1007), the Patent Application Promotion and Support Program (1008), the Global Researcher Program (EVRENA) (1010), The Participation Program for International Scientific Research Projects (1011), The Support Program for the Initiative to Build Scientific and Technological Cooperation Networks and Platforms (1301) and the National Young Researchers Career Development Program (Career Program) (3501).

Technology Development Foundation of Turkey (TTGV):

In addition to its general R&D and entrepreneurship supports, TTGV has been implementing an “Environmental Support Program” since 2006. This program, which provides soft loans for the private sector, covers the investment and application projects of environmental technologies, energy efficiency and renewable energy. Environmental technologies support and target the minimization of resource and water consumption, the minimization of waste and wastewater generation at their respective sources, the minimization of emissions, shifting to usage of less hazardous chemicals, environmentally friendly technologies in energy production and consumption, new product/energy production from wastes, the production of environmental friendly products, industrial ecology (symbiosis) and carbon capturing and storage systems. The TTGV provides good opportunities for SCP and green business initiatives.

Ministry of Energy and Natural Resource (ETKB):

In accordance with the Energy Efficiency Law mentioned above,

- Implementation projects which are submitted by industrial establishments to the General Directorate of Renewable Energy (YEGM), approved by the Advisory Board of Energy Efficiency upon the affirmative opinion of YEGM, that have a payback period of at most five years, and cost at most five hundred thousand Turkish liras shall be subsidized up to twenty percent of total project cost.

Twenty percent of the energy costs shall be paid, without exceeding one hundred thousand Turkish Liras, for the year of agreement. The industrial establishments are owned by natural or legal persons who make voluntary agreements with YEGM to commit to reduce energy intensity by at least ten percent on average within three years. Moreover, according to the Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy, the following incentives are applied:

- For electricity produced by power stations commissioned between 5/18/2005 and 12/31/2015, the following prices are guaranteed for 10 years.

Table 2. Guaranteed Price

Source	Price (USD cent/ kWh)
Hydro	73
Wind	7.3
Geothermal	10.5
Biomass	13.3
Solar	13.3

- Additional price advantages will be provided in cases where equipment manufactured in Turkey is utilized at the plants. As an example, if only local manufactured equipment is used in a concentrated solar power plant the guaranteed price will go up to 20 USD cent/ kWh.

Small and Medium Enterprises Development and Support Administration of Turkey (KOSGEB):

In relation to the Energy Efficiency Law, the KOSGEB provides financial support to SMEs for energy efficiency audits as well as for consultancy and training services.

Ministry of Economy (EB):

The EB provides enterprises with support to improve their export potential, while also implementing the “Environmental Costs Support Program”. In this respect, certification costs for

- ISO 9000 quality assurance systems.
- ISO 14000 environmental management systems.
- CE Mark.
- Other international quality and environmental standards,

are met by EB. Certification and laboratory analysis costs are supported by 50% and with a maximum of \$50,000 USD per certification and analysis. Since the CE Mark, is directly related with eco-design requirements, EB’s relevant support provides a contribution to SCP applications.

Banking Sector:

Within energy investment projects for which the “environment” is a rising issue, renewable energy plants, including those that produce hydroelectricity, geothermal energy, solar and wind power, are among the investment areas where the highest amount of financial resources are allocated. Also supported by international banks and programs, such as the Clean Technology Fund, the European Investment Bank, the World Bank, etc., there are a number of banks executing credit lines for renewable energy and energy efficiency investments. Recently cleaner production investments have been included into the context of the credit programs of a few banks.

Voluntary Carbon Trade:

The Voluntary Carbon Market which is applicable for sectors and countries excluded by Kyoto Protocol, is a market used by enterprises who intend to decrease their greenhouse gases voluntarily. The procedures are independent of the policies and targets set by their respective countries. In general, greenhouse gas emission reductions achieved by renewable energy investments gain recognition in this market. Such greenhouse emission reductions are to be approved by internationally certified institutions which create Certifications for Emission Reductions (CER’s). CERs represent “sellable” carbon emission rights. There

are some companies which act as an intermediary between those who provide the supply and demand for CER's. On the other hand, there are also international standards, such as the "Gold Standard", the "ISO 14064", and the "Voluntary Carbon Standard", which are used for the validation and certification of the emission reductions declared. The voluntary carbon market, which is the only available mechanism in the private sector in Turkey for the present time, is growing rapidly in Turkey. There are foreign companies which provide services for certification and marketing procedures (Pioneer Carbon, FutureCamp, One Carbon, EcoSecurities, etc.).

4.2.3. Evaluation of the National Capacity and Projects

The concepts of SCP, eco-innovation, and even cleaner production, which constitute the infrastructural elements of green entrepreneurship, are not generally well known by the relevant stakeholders in Turkey. As far as these concepts and relevant activities are concerned, there is quite a limited capacity in the relevant stakeholders. The following findings were revealed in a previously implemented project in 2010, for the "Determination of the Framework Conditions and R&D needs for the Dissemination of Cleaner (Sustainable) Production in Turkey", which also applies to SCP and eco-innovation which include cleaner production [44]:

- A limited number of universities starting with Middle East Technical University, Boğaziçi University and Istanbul Technical University have had educational, research, and consulting, etc. activities on the subject for over ten years. However, the existing capacity based on quantitative performance criteria (publications in Citation Index journals, Research and Development, implementation and consulting projects, technology development and patent applications, etc.) is far from being sufficient for the needs of the country.
- A limited number projects have been implemented in public institutions on the subject. Most of these projects were not carried out directly to enhance the cleaner (sustainable) production capacity in the country. They were implemented to comply with some commitments regarding international agreements, adoption to EU, etc. and mainly by international consultants. Thus, they did not create a significant capacity.
- Almost all the existing work on cleaner (sustainable) production was carried out by using international funding. Making a certain amount of public funding available for these activities is very important in terms of a public commitment to the cleaner (sustainable) production concept.
- When the responses to the questionnaires conducted in this project are considered, it is observed that the difference between end-of-pipe approaches and cleaner (sustainable) production is not clearly known by many stakeholders. This is a very solid indication that priority should be given to capacity building activities in Turkey.
- Only a few Non-Governmental Organisations (NGOs) (generally international) work specifically on these subjects.
- The existing capacity in Turkey on cleaner (sustainable) production is possessed by only a few institutions.
- Even though raising awareness in the industrial sector is of the utmost importance, it is believed that the organized industrial zones and the chamber of industries in Turkey have a limited understanding on the subject. Most of their related activities aim towards EU adaptation, health and safety issues, environmental management systems, etc. and lack an integrated vision.
- Cleaner (sustainable) production applications have reached a certain market share in many countries including EU. This is far from being the case in Turkey.

Since then important developments have taken place in terms the awareness and capacity particularly at government level. In this regard, Ministry of Environment and Urbanisation (CSB) has significant roles and responsibilities in sustainable development, promotion of cleaner production (eco-efficiency) and application of best available techniques within the framework of integrated pollution prevention and control approach all of which provide an important capacity and support within the framework of green entrepreneurship. In Autumn 2011 the Ministry established a new unit dedicated to these topics. Similarly, General Directorate of Efficiency was established under Ministry of Science, Industry and Technology as a new unit to focus on cleaner production (eco-efficiency) topics, mainly the “production” aspect of SCP approach.

Meanwhile in 2011 a national workshop was organized by TTGV within the scope of an EU 7th Framework Program supported project which aims to encourage activities towards SCP among all relevant stakeholders in Turkey. In total, 68 representatives from different sectors, including the government, private sector, universities, NGOs, chambers and associations, etc. participated in the workshop to discuss the SCP concept, relevant policies, life cycle thinking and relevant applications. It was revealed that all the sectors and relevant institutions have a high interest in the topic and a willingness to implement initiatives; however there is a gap and lack of capacity in terms of the aspects of both policy and technical knowledge, including life cycle assessment and similar concepts. Participants agreed on the necessity of making further studies, executing collaborative activities and building a national network/platform to improve SCP oriented activities. This has been regarded as a good opportunity to orient the interest shown by participants into practical outputs.

Meanwhile, there are several projects being implemented or started by different stakeholders, which are believed to provide contribution to SCP, eco-innovation and green entrepreneurship. Some examples of such projects are given below:

The UNIDO Eco-Efficiency (Cleaner Production) Program was carried out by United Nations Industrial Development Organization (UNIDO) and TTGV, with the consultancy of Middle East Technical University (METU) during 2008-2011, in the context of the United Nations Joint Program, Enhancing the Capacity of Turkey to Adapt to Climate Change. It aims to improve the existing awareness and capacity, the implementation and dissemination of pilot projects, and to establish a national eco-efficiency (cleaner production) centre. The Eco-Efficiency Centre may provide many services directly or through universities, accredited consulting firms, etc. to enhance the cleaner (sustainable) production capacity in Turkey.

Three energy efficiency improvement projects (Appliances, Building and Industry) which are supported by the Global Environment Facility (GEF) have been started with the contribution of different project partners such as the General Directorate of Renewable Energy (YEGM), the Ministry of Environment and Urbanization (CSB), KOSGEB, the National Standards Institute, TTGV, and the electrical/electronic appliance producer ARÇELİK, with the support of the United Nations Development Program (UNDP) and UNIDO.

The Feasibility Phase of the Project of Industrial Symbiosis in Iskenderun Bay, mainly sponsored by Baku Tbilisi Ceyhan Fuel Oil Pipeline Company (BTC Co), was implemented by the UNDP and the Industrial Chamber of Adana in 2009-2010. The Implementation Phase of the Project, again sponsored by BTC Co, was started at the beginning of 2011, and has been implemented by TTGV. It is believed that the implementation process and the outcomes of the project will create valuable opportunities for SCP and green entrepreneurship.

5. PERCEPTION OF GREEN ENTREPRENEURSHIP BY TURKISH STAKEHOLDERS

A set of interviews were held with experts and representatives of significant stakeholders from the Turkish entrepreneurial and business community. Brief biographies of interviewees are provided in Appendix 1. The results revealed from these interviews, in combination with existing experiences and knowledge, are compiled and summarized in the following sections:

5.1. Green Entrepreneurship: A Very New Concept

Green Entrepreneurship is a considerably new concept for Turkey. It is an important finding that the entrepreneurial community is not particularly inclined towards environmental issues and opportunities while those engaged in the environment sector are not knowledgeable about the concept and basics of entrepreneurship.

On the other hand, after a discussion with the representatives of the entrepreneurship community, they could elaborate several examples of green entrepreneurship and even some of them indicated that “green entrepreneurship covers quite a wide range of investment areas, including energy, although it may be regarded as a niche area by many people” [38].

Looking at the existing green entrepreneurship examples and the perception of the interviewees, green entrepreneurship in Turkey is considered to be more “product based”, rather than being related to new business models or replacement of products with services (dematerialization).

Within the framework of Green Entrepreneurship, “environmental technologies” are regarded as the technology of the future, particularly for the energy sector. The analogy made by Ultav [45] with computer technology is interesting: “Fossil fuel based technologies correspond to mainframe computers, while environmental technologies resemble micro computers”.

5.2. Corporate Social Responsibility and Creating a Shared Value

In recent years big companies have started to discuss shifting sustainability (environmental and social) issues from “Corporate Social Responsibility (CSR)” towards an approach of “creating a shared value” with which corporate success and social welfare are interdependent and the linkage between competitive advantage and CSR is particularly emphasized [45]. This is considered to be a better approach which can be adopted by the private sector more easily and can be directly reflected into their practical applications, since environmental and social issues are a part of corporate profitability.

It is in a way regarded as an efficient way of combining globalization with localization, improving resource efficiency as well as creating local business opportunities. Nestlé’s recent investments in Africa are given as an example. Through the opening of new factories in the region and establishing processing and packaging facilities near the production sites, it is

assumed that it provides closer links with consumers and incurs considerable savings, particularly from decreased transportation.

Although public incentives are quite critical for the development of green entrepreneurship, the approach of shared value creation is assumed to be a more sustainable mechanism. The priority sectors identified as food, housing and transportation are believed to be quite suitable for the shared value creation concept [45].

Even if the environment is not a focus of investors, satisfying environmental criteria and risk management is an important aspect in terms of value creation and profitability. In this respect, “Environmental, Social, Governance” (ESG) is a concern for some companies and investors, particularly for those who have international shareholders. The Sustainability Index (SI) Project, implemented by the Istanbul Stock Exchange (ISE) and Turkish Business Council for Sustainable Development (TBCSD) with the goal of launching a Turkish sustainability benchmark for ISE-listed companies, was emphasized by different stakeholders as an important development in the sector.

It was indicated by Güvenç [46], a TBCSD representative, that the criteria of the SI index are being discussed for the present time with relevant stakeholders and that it will be possible to revise them on an annual basis according to developments and necessities.

5.3. Chaos Management

Due to the fact that an increasing number of global markets are presently undergoing major paradigm shifts and new ways of thinking are rapidly evolving, the classical type of management patterns for organization is being replaced by chaos management approaches. Chaos management involves reformulation of fundamental concepts and hence requires parallel and integrated management of “many” aspects and dimensions. It was indicated by a stakeholder representative, that social and environmental aspects –in other words sustainability aspects, were not regarded as the components of organizational management in recent times. However, now companies and entrepreneurs have to internalize social and environmental aspects into their organizational management and this brings about the necessity of adopting the principles of chaos management [45].

In other words, incorporating environmental and social aspects into the organizational management of a company requires a significant change in the ways of organizational managing and thinking. And “chaos management” which is regarded as a catalyst for change in organizations, may provide tools for managing this change and bringing in the relevant capabilities, such as the development of diversity, equality and inclusion strategies, the management of differences and conflicts as well as the development internal resources for change.

The guiding principles set forward by Tetenbaum [47], such as “destabilization”, “forgetting predictability”, “relying on the collective intelligence of people” and “revelling in messes” will help organizations and entrepreneurs to perceive the gaps and opportunities to create new solutions as well as new businesses. This is believed to bring about possibilities for social and environmental entrepreneurship as well and has to be regarded both as a requirement and an opportunity for new possibilities of jobs. This is how green entrepreneurship is strongly linked to chaos management trends.

According to Ultav [45], Turkish entrepreneurs are good at creating an opinion ?opportunities? and initiating a new job, however they are quite far away from the chaos manage-

ment concepts and creating partnerships and cooperations in this chaos atmosphere where many parameters and stakeholders have to be managed simultaneously. It is critical to create synergies by collaborating with other stakeholders; otherwise it will not be possible to be successful as an entrepreneur.

5.4. Investment Instruments and Green Entrepreneurship:

Interviews were conducted with the representatives of two independent **Private Equity (PE)** firms in Turkey the Actera Group and İş Girişim [48, 49].

Although they receive many applications from the energy sector (with a majority of them being wind energy investments), none of the two PE firms are interested in this sector due to reasons such as long term investment periods (construction, etc.), long pay back periods, less risk and no probable niche area left with an advantage of competitiveness, and not being commercially interesting since there are already many investors in the energy sector. Although both firms find waste management and waste recovery/recycling investments quite interesting, they hold back from this sector as well, due to the difficulties of waste logistics and relations with municipalities.

PE firms generally prefer an investment range of 50 – 100 million USD. Their goal is to exit from their investments after the targeted value creation is achieved and they typically target holding periods between 3.5 – 7 years. Due to the same reasons, they generally do not invest in start-up companies which are newly created and are in the phase of development and research for markets. Hence, small and new investments of green entrepreneurship with a moderate value creation and profit are not interesting for PE investors.

Özgen [48], a representative of İş Girişim, indicated that the PE sector needs time (around 10 years) to reach the saturation level, only after which green entrepreneurship investments may become interesting for the PE sector.

Since **Venture Capital (VC)** is still a growing sector in Turkey and the limited venture capitalists in the Turkish market still prefer to invest in more mature industrial companies or focus their investments in the post start-up stages of business, it is not easy to assess its possible usage for green entrepreneurship, at least in the near future.

The concept of **business angels** is also quite new for Turkish entrepreneurship community, with about 4 years of history. One of the interviewees who is an investor and business angel network manager, emphasized that the concept of “business angels” with its nature has relatively a social aspect, compared to the approach of PE and VC. Hence, green businesses may be interesting for business angels along with their social aspects. The level of investment is below \$500,000 USD and target groups include start-ups as well, making business angels an opportunity for green entrepreneurship [38]. Moreover, in general, the whole investment burden is shared by about ten business angels, with the logic of risk sharing, making it easier for each investor to get into the process. This may be an advantage for green entrepreneurship, which is a relatively new investment area.

On the other hand, the business plan, profit potential and economical sustainability of an investment are still important factors of consideration for business angels. Economical sustainability seems to be a concern for green entrepreneurship. An example is the “biodiesel” sector where many “fearless” Turkish entrepreneurs entered, but became unsuccessful at the end of the day, due to unstable market policies and conditions [38].

Meanwhile, Altop [50], a representative of Endeavor, a non-profit organization that aims to help promising entrepreneurs without any sector specific priority or differentiation, mentioned that “environment and sustainability” could be a focus in the coming years and collaborative activities with other stakeholders specific to green entrepreneurship may be carried out.

5.5. Assets and Opportunities of Turkey for Green Entrepreneurship

Turkey has considerable technical capacity, especially when taking into account the fact that a majority of the departments in Turkish universities involve engineering which results in a high capacity of people being educated as engineers. These facts hold great potential for innovation [45].

There is both an economic and a social buoyancy in Turkey, in addition to a so called “spring time” in terms of intellectual capacity. This can lead to quite a favourable environment for entrepreneurship. When taking into consideration the environmental and social sensitivities of the Turkish people it can be expected that green entrepreneurship has the potential to become a rising area in Turkey [45]. If it is promoted, there will be many opportunities.

Turkey’s high potential in almost all renewable energy sources is an important opportunity for green entrepreneurship, as well [45].

As indicated above, the development of the sustainability index by the ISE and the TBCSD is a considerable opportunity, emphasized by different stakeholders in terms of sustainable and green entrepreneurship.

The ISE Sustainability Index is expected to be a platform for institutional investors to demonstrate their commitment to companies managing ESG issues with high performance. It will help raise the awareness of companies (particularly those listed on the ISE) and on sustainability issues and it will encourage them to act on these issues. Those companies that are included in the index will be more attractive for investors and the volume of corporate investment will increase [51].

In addition, the TBCSD and the Turkish Industry and Business Association (TUSIAD) will collaboratively start working on “Vision 2050” for the business world, in particular the Chief Executive Officers (CEO’s) will collaborate. One of the topics of this vision extension process will be SCP. TBCSD members include a variety of companies from small to very big companies, in a way creating a supply chain environment [46]. Hence, the efforts made for the adoption of SCP in the business world, may have a multiplier effect and may also support the green entrepreneurship environment.

It was stated by Güvenç [46], a TBCSD representative, that the business world is very interested in and knowledgeable about climate change issues, however it is unaware of how to take initiative. This may be a channel to focus the business world’s attention to SCP, creating an area and opportunity for green entrepreneurs.

It was also indicated by the same interviewee that, some sectors such as the cement industry in Turkey, which have a relatively high sustainability outlook, may act as a leader for other sectors also based on supply chain relations.

5.6. Barriers in Turkey for Green Entrepreneurship

There are no governmental incentives designed specifically for green entrepreneurship. It would be a wise approach to ignore the possibility of such incentives and to not expect such incentives in the near future [45]. The Turkish government does not make long-term policies in general. For example, renewable energy incentives (guaranteed prices) are much lower than those applied in Europe.

There are not many institutions that focus on green entrepreneurship and on emphasizing related topics, such as eco-innovation. There is a gap in most universities (departments of environmental engineering) in terms of implementing cooperative projects with industry [45]. The private sector has not started to mention these concepts frequently.

The present attitude of consumers towards environmentally friendly products and services plays a critical role in shaping the relevant market conditions and thereby the attitude of the business world. The business world thinks that consumers have to be led towards sustainable products and services; yet, changing consumer trends is quite a difficult and is a long term process. So in general, the private sector looks quite conservatively at sustainability issues, considering them as a drawback in terms of competitiveness [46]. This may be the result of an “end of pipe” understanding of what sustainability is rather than eco-efficient approaches.

Turkish people are not really inclined towards communication, sharing and open innovation. In other words, relevant stakeholders are not used to “cooperating” as a cultural characteristic [45]. This is a significant drawback in terms of creating synergies and being successful in entrepreneurship including green entrepreneurship.

Although renewable/ clean energy is regarded as one of the primary sectors for green entrepreneurship in Turkey (Section 6), public incentives are found to be insufficient. For example the basic price guaranteed for the electricity produced by solar power is 13.3 USD cent/kWh, which has been found to be rather low by the sector [52].

Green Public Procurement, which is one of the primary policies for promoting SCP and green entrepreneurship, is not a policy adopted or considered in Turkey. Moreover, Public Procurement Law itself bars governmental institutions from enlisting more environmentally friendly products/services if they do not have the lowest price in the tender.

Most of the investments within the scope of green entrepreneurship require VC and business angel types of investment tools, which are not sufficiently or efficiently used in Turkey, meanwhile PE firms are not generally interested in this sector, due to various reasons. In addition, banks prefer to give credit to investments in well known and regular areas.

Another barrier in front of the investments in green entrepreneurship is the lack of know-how about relevant environmental technologies and as a consequence, the lack of confidence on the investor side. However, investors who have an access to an international network of experts that can provide reliable information on relevant environmental technologies would feel much more comfortable in the case that they need to analyze and evaluate such investment opportunities.

6. SECTORAL OUTLOOK IN TERMS OF GREEN ENTREPRENEURSHIP

As mentioned in Section 6.1, green entrepreneurship covers quite a wide range of investment areas, including energy, although it may be regarded as a niche area by many people. The existing perception of green entrepreneurship in Turkey is more “product based” rather than dematerialization.

6.1. Present and Potential Sectors in Turkey for Green Entrepreneurship:

As mentioned in Section 4.1., although statistical data on R&D projects do not directly refer to entrepreneurship, they provide a good perspective and idea about the potential and trends of the research and business world, which directly affect entrepreneurship. Therefore, the distribution of the 104 environmental R&D projects of the private sector supported by TTGV is given here, in Figure 2, to give an idea about the effort made for different aspects of the environmental sector.

As can be seen from the figure, as far as the portfolio of TTGV is concerned, most of the R&D effort in the environmental sector has been directed towards projects related to pollution prevention, energy efficiency, environmentally friendly products and waste to product.

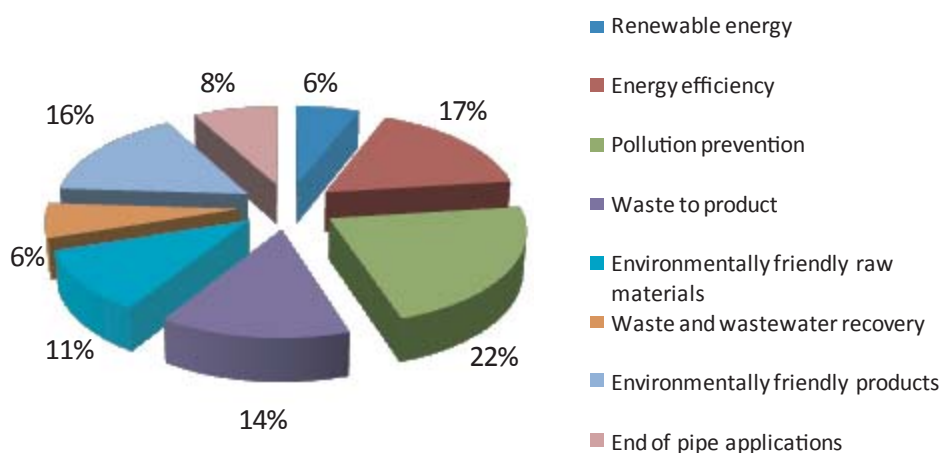


Figure 2. Distribution of the Environmental R&D Projects Supported by TTGV

A more specific and detailed evaluation has been made for green entrepreneurship based on the findings from the interviews with stakeholders in addition to the existing experience and knowledge.

As discussed before, the perception of green entrepreneurship in Turkey is quite limited. The two main sectors mentioned by most of the stakeholder representatives for green entrepreneurship are “renewable/clean energy” and “waste management and recovery”. These

can be regarded as “cross cutting” areas for many sectors including the three main priority sectors in the world, which are food, housing and transportation. The results of this evaluation, which are discussed below, are based on the present and potential sectors for green business in Turkey, most of which are interrelated to each other.

6.1.1. Energy

Within the context of renewable/ clean energy, solar energy, particularly Concentrated Solar Power (CSP) technologies, and clean coal technologies are emphasized as important potential sectors for Turkey, where there are a limited number of companies already working. It is believed by some sector representatives that the existing innovation potential of Turkish engineers can be triggered to create and improve entrepreneurship in these sectors where large investments are expected in the near future [45].

Some of the successful Turkish entrepreneurs particularly indicate “energy” as one of the investment areas, primarily emphasized in their company vision. Manas [52], who has spent years in the Information Technologies (IT) sector, underlines the fact that energy technologies are replacing IT technologies and that his company is now diverting their long term experience in IT sector into their new businesses in energy sector.

The same interviewee mentioned that wind and photovoltaic technologies may not be real entrepreneurship opportunities for Turkey, since Turkey is not the technology developer in these sectors [52]. It may be crucial to get the know-how from other countries for some of the technologies to realize a successful initiative.

It is expected that bioenergy (particularly biogas) investments will explode in the near future in Turkey, as another interviewee indicated [48].

Although the public incentives for renewable energy given in Section 4.2.2 are generally found insufficient, they are still important for promoting national equipment manufacturers and technology developers as well as for making a visible market and long term plans for investors.

6.1.2. Waste Management and Recovery

As discussed above, most of the EU directives related to waste management are already harmonized into Turkish legislation. Hence, wastes which are subject to such legal regulations are naturally becoming an especially important point of potential for green entrepreneurship. Such types of wastes include waste oils, waste vegetable oils, hazardous wastes, waste batteries and accumulators, packaging wastes, end-of-life tyres and end-of-life vehicles. Systems for collecting and sorting wastes and, in particular, for waste recycling and recovery technologies and applications are the primary sectors rising in Turkey. “Waste to energy”, “waste to product” kinds of applications are also included in this approach.

The Regulation on the Control of End-of-Life Tyres (ELT) is a good example from this sector. It is indicated in the Regulation that the recovery of ELT's is one of the primary principles and tyre producers are obliged to collect/have collected, recover and dispose the tyres they produce with a certain annual quota (portion of the annual total production) identified. So this makes the feasibility of the “recovery of tyres” investment more probable. One of the entrepreneur and investor interviewees mentioned about his new business in which ELT's are converted into oil, carbon black and steel by pyrolysis [52].

Regulation on Waste Electrical and Electronic Equipments (WEEE) which has recently been introduced is also a critical legal arrangement on which relevant sectors have already started working. It looks like a potential area for entrepreneurs in which different types of services can be developed.

Reverse Logistics stands for the operations related to the reuse of products and materials or more precisely the process of moving goods from their typical final destination for the purpose of capturing value, or for proper disposal. Remanufacturing and refurbishing activities also may be included in the definition of reverse logistics. So, reverse logistics is also an aspect of waste and product management and, as one of the interviewees mentioned, is an important business area particularly for end-of-life high-tech communication equipments [46].

6.1.3. Agriculture and Husbandry

Taking into consideration the population increase in the world, agriculture and husbandry as well as agriculture/ husbandry based industries are becoming more important sectors for Turkey. Especially since Turkey has considerable infrastructure and cultural background in this area. The approach of “green” or “sustainability” could easily be integrated into agriculture/ husbandry and related industry processes, creating new concepts and new jobs (organic products, bio-energy applications, etc.), based particularly on “local solutions” [45]. This is believed to be motivated and promoted by means of social dynamics and awareness as well as through the contributions of the research community - universities. It is anticipated that the Turkish people are going to appreciate the potential of this sector and new facilities will be created.

Since this area is directly related with the food sector and is compatible with Turkish culture and background, it is believed to be a critical sector for regional development, value creation and green entrepreneurship. Organic agriculture and husbandry are critical for the organic food sector.

Moreover, agriculture and husbandry make up a very important sector in regards to waste management and energy aspects as well. As a result of agricultural activities, 60-65 million tons of solid waste is generated annually in Turkey. Currently, the majority of these wastes are burned in open-fields so as to prepare the field for upcoming cultivation period. This unsanitary practice not only causes wide spread environmental problems (air pollution, soil degradation etc.), but also losses in economical value. These losses can be turned into profit via biomass conversion processes/technologies. Biofuels, chemicals, pellet-fuel, composite materials, boards (particle board, fibre board etc.), panels, composts, bio-polymers and enzymes are good examples of a variety of bio-products made from agricultural wastes. In other words, there is great potential for local implementations and/or farm based practices which are being exploited by some entrepreneurial individuals. Current practices have been largely focused on pellet-fuel production. In addition there has been a growing interest for the valorisation of animal wastes by microbiological applications. One of them, biogas production technology, which enables sustainable energy generation, is becoming popular day by day.

6.1.4. Mobility/ Automotive

As previously indicated, transportation has also been determined as one of the world's primary sectors. Green entrepreneurship in the automotive sector is believed to be triggered by companies and intrapreneurship mechanisms, since especially large companies keep close track of the technological developments and the market. Based on this, the perception of new consumption patterns and trends by investors may lead to green entrepreneurship opportunities. New applications of engines and batteries, etc. are critical aspects of the automotive sector in terms of green entrepreneurship potential [45].

"Electrical cars" is one of the hot topics mentioned by Manas [52], who has recently initiated an investment in this area.

6.1.5. Housing/ Electrical Household Appliances

Green Entrepreneurship in the sector of electrical household appliances is also believed to be triggered by companies and intrapreneurship mechanisms. New consumption patterns such as the reduction of house sizes, the demand for smaller and efficient households, "100 pieces of goods for 10 years" types of campaigns, etc. are becoming more common in international markets [45]. This has to be taken into consideration and evaluated as an opportunity by Turkish manufacturers, which generally export to the markets of developed countries.

Within this framework, Energy labelling and Eco-design regulations are expected to create significant opportunities in the market in terms green entrepreneurship.

On the other hand, the concept of "sustainable houses" producing their own energy is not yet regarded as a business area in Turkey, by one of the interviewees, since it is mentioned to provide no "business plans", but only demonstrative cases [52].

6.1.6. Eco-tourism

Turkey, with its natural beauty as well as with its geographical and historical affluence is already a well known touristic place. Meanwhile, the deterioration of such valuable entities is becoming a serious problem. Eco-tourism which is based on environmentally friendly activities and sustainable lifestyles should be considered both as a way of minimizing the deterioration risks and as a business opportunity for Turkish entrepreneurs providing local solutions. However eco-tourism is totally a new concept in Turkey. There are some non-profit non-governmental organizations which try to promote eco-tourism. This sector is directly connected with sustainable transportation and housing.

One of the interviewees underlined that eco-tourism has big potential in Turkey, which can also create synergistic effects for the entrepreneurship in other sectors, especially when taking international investors into account [49].

6.1.7. Environmental and Energy Consultancy

As mentioned in Section 4.2.1, Energy Efficiency Law issues the principles for energy efficiency services, training and awareness activities and Energy Efficiency Consultancy (EEC)

Companies (i.e. Energy Service Companies – ESCO's). This is an important element in creating an EEC market, which presents many opportunities for green entrepreneurship. A number of EEC's have appeared and been authorized after the law and by-laws began to come into force. They try to raise awareness on energy efficiency in the industry and in buildings; they carry out energy audits and facilitate the realization of energy efficiency investments. They play a critical role in improving the energy efficiency market, creating opportunities for different businesses related to energy efficiency. However, as it is mentioned by some of the EEC representatives, there are several problems in practice, related to the authorization of the companies.

On the other hand, as indicated by one of the interviewees, who is engaged in environmental consultancy sector, there is that the environmental legislation in Turkey is quite comprehensive and complicated, particularly when small size enterprises are considered. Hence, the environmental consultancy sector is a continuously growing sector in Turkey [53]. Parallel to this, the social responsibility or sustainability concerns of big companies also require consultancy. Developments achieved in cleaner production applications in Turkey may also create demands and open new activity areas for environmental consultants. It can also be expected that the requirements brought about by the Regulation on Eco-Design of Energy Related Products will enhance this sector.

6.2. Emerging Concepts and Technologies

6.2.1. Industrial Symbiosis

As it is known, industrial symbiosis, is a term defined as when two or more industrial operations, which are preferably close to each other physically and work independently, form long-term partnerships and work in solidarity to increase resource efficiency, environmental performance and competitiveness. From this aspect, by-products or wastes generated by an enterprise can be used as raw materials or resources for other enterprises, such as those in organized industrial zones, industrial parks, etc. As a result, economical advantages can be provided in addition to the prevention of industrial environmental problems. Companies and activities in which the indicated type of synergy relations presented constitute the industrial symbiosis network.

In this regard, based on the very new developments which were discussed in Section 4.2.3, industrial symbiosis is believed to provide a potential for green entrepreneurship. Facilitating waste exchange and valorisation operations, providing logistic services to industrial companies to satisfy the symbiotic relations desired, creating software for optimization and management of symbiotic relations, etc. may be some emerging fields for new businesses.

6.2.2. Climate Change Adaptation

"Climate change adaptation" is simply defined as taking the necessary measures for minimizing the negative impacts of the changing climate conditions while maximizing the benefits out of it. In this respect, climate change adaptation involves a wide range of approaches such as risk management, changing lifestyles and behaviours at the community level and applying advanced technologies. Climate change adaptation is one of the highest priority topics at United Nations Framework Convention on Climate Change (UNFCCC) level and other relevant policy and financing authorities, at both national and international levels. It

is expected that the international funding dedicated to climate change adaptation activities will increase significantly.

Taking into consideration the serious impacts of climate change on many sectors (agriculture, industry, health, etc.) and on many dimensions of life, it is easy to imagine the high potential and context of business opportunities provided by the climate change adaptation requirements. Climate change adaptation incorporates numerous types of services, products, processes and technologies. The primary areas to be considered within this context are water resources, infrastructure, coastal areas, energy, early warning and weather forecast systems, health, terrestrial ecosystems, agriculture, husbandry and fishery. As the impacts of climate change and the adaptation approach are better understood, demand for relevant services and products will also increase. This is really a promising area for entrepreneurs who can catch up with developments, identify needs and orient themselves accordingly.

6.2.3. New Technologies and Products

Some of the emerging technologies and products indicated by different interviewees from different sectors and their different point of views are briefly listed below:

It is believed that low-carbon products and reverse logistics applications, particularly for high tech electronics, have considerable potential in terms of green entrepreneurship.

Carbon capture and storage, a very hot topic world-wide, has potential for green entrepreneurs in Turkey as well. A very recent investment provided by four successful investors to an entrepreneurial new-comer included the “capture of carbon dioxide from a coal operated power plant through algae and the production of fertilizer in the end” [52]. Entrepreneurs/investors find this area quite promising for Turkey.

Finally, new materials, such as carbon nano-particles, which are particularly helpful in “broadening the horizons of products and the world”, are part of a very new area and thus there are few companies working on them [45].

The specific technologies and fields associated with the case studies and business ideas given in Section 7 should also be taken into consideration during the evaluation of new and emerging concepts in Turkey in terms of green entrepreneurship.

7. GREEN ENTREPRENEURSHIP CASE STUDIES IN TURKEY

Based on the examples revealed from the interviews, TTGV's own portfolio and an internet search a number of case studies of green entrepreneurship have been compiled. Six cases were selected in particular to reflect a direct contribution to "sustainable lifestyles" and they have been elaborated in terms of their drivers, barriers, feasibility studies, and key impacts, etc. in Appendix 2. These cases are:

Table 3. Selected Green Entrepreneurship Case Studies from Turkey

Sector	Institution/ Company	Description of the Case
Agriculture - Food	BUGDAY ASSOCIATION	Bridging the gap between organic farmers and urban consumers
Service - Transportation	VIP DRY CAR CLEANING	Waterless car wash service
Food	EZGI GIDA	ETIYOK – Vegetarian Uncooked Meatball
Waste management/ Valorisation	ÇOP(M)ADAM	Handbags, wallets and clutches out of waste
Waste Management/ Valorisation – Energy - Food	KARAGONLER	Production of biofuel and olive oil from olive pulp
Environmentally Friendly Goods – Waste Recycling	STEPPEN	Biodegradable pen

Other case studies are also given in Appendix 2, with relatively limited information. These include examples from different sectors, as listed in Table 4.

Table 4. Other Green Entrepreneurship Case Studies from Turkey

Sector	Description of the Case
Energy	Solar energy cooling Concentrated solar power (CSP)
Energy - Transportation	Solar/wind energy powered sail-vessel
Waste Management/Valorisation - Husbandry	Production of animal feed additives from waste brewery yeast
Waste management/Valorisation	Scrap tyre pyrolysis and recovery
Organic Products	Organic cosmetic products
Waste Management/Valorisation	High quality PET recycling
Information Technologies	Predictive maintenance and process optimization

Some other green entrepreneurship cases and business ideas, compiled from different sources are also listed below, but without any detailed information about the thinking methodology or potential of Turkish entrepreneurs.

Table 5. List of Business Ideas and Initiatives as Examples from Turkey

Sector	Description of the Case
Local and/or Organic Food Production	Innovative bee hive production to be used for organic bee production
	Organic food stores (franchising) for shopping malls
	Local organic tomato production from endemic tomato seeds
	Organic farmers cooperative (See Box 1)
Valorisation of Waste Materials	Production of brick from waste papers, which is lighter than similar construction materials and has better insulation properties.
	Waste battery collection equipment, which provides gifts in exchange for waste batteries
	Soil conditioner production from waste pine crust, which can be used for recreational purposes in parks, gardens etc.
	Animal-feed production from food waste

Sustainable Transportation	Building a car-pooling website, serving as a network for sustainable and economical way of transportation.
Renewable Energy and Energy Efficiency	Wind turbine production and sale
	Energy efficient heating and air conditioning system designed as a comfort air conditioning system for desired temperature conditions.
	LED light bulb production and sale
	Passive and ecological building systems
Human Health	Electromagnetic waves filter for electrical appliances.
Resource Efficiency and Waste Reduction	Waterless pickle production
	Responsible online food delivery service (See Box 2)

Box 1. Organic Farmers Cooperative [54]*Nazmi Ilıcalı*

To keep farmers producing for Turkish and now European consumers and to stave off the rapid migration of rural Turks to already overcrowded cities like Istanbul, a Turkish entrepreneur, Nazmi Ilıcalı, is building a network of organic cooperatives that take advantage of economies of scale. Through the cooperatives, he is arranging financing to support small-scale farms, and he is helping farmers work through inventive product diversification that will secure new markets and aid long-term sustainability. He is also building a consumer base for organic products and building reliable accreditation systems for farm and product certification. While economic gain is the main goal of the network, another important outcome is envisaged: farmers in rural areas are learning to cooperate, share information that strengthens the network, and mobilize in support of their industry. This village-level participation model yields gains in health, education, among others, and imbues farmers with a new sense of the importance of their work in feeding Turkey and contributing to national economic growth.

Box 2. Responsible Online Food Delivery Service [55]

Yemeksepeti.com

Yemeksepeti.com is the Internet's premier provider of food delivery services, powering the online ordering processes for restaurants across Turkey. Customers are able to access member restaurants' latest menus and order without paying any extra fees. With its hundreds of thousands of registered clients, Yemeksepeti.com is one of the biggest e-commerce sites in Turkey. Yemeksepeti.com now takes important steps to reduce the ecological footprint of food delivery. It searches ways to minimize/offset carbon emissions caused by food delivery mostly carried out by motorcycles. It also encourages its customers to reduce the use of service pack (plastic utensils, fork, knife and paper napkins) by offering a choice between alternatives (or not requesting them at all). As a result of this practice Yemeksepeti.com has achieved %11 reduction in the use of these items.

8. RESULTS AND RECOMMENDATIONS

8.1. Analysis of the Current Situation

Many leaders of the business world agree that entrepreneurship in Turkey is at a starting level and needs to be improved a lot. In spite of the fact that the level of entrepreneurial activity is quite low in Turkey, it has been exhibiting increased growth in recent years.

Based on experience and analysis of different samples, it is estimated that in recent years approximately 15% of the existing R&D and entrepreneurship activity in Turkey is related to the environment, and that this ratio continues to grow. The parallel increase of both entrepreneurship and environmental activities in terms of R&D and entrepreneurship is regarded as an opportunity for the development of a green entrepreneurship ecosystem.

Within the ecosystem of entrepreneurship in Turkey, there are a number of organizations and intermediaries providing structural funds as well as several NGOs working for creating networks and providing support for entrepreneurs. According to laws concerning R&D activities and technology development zones there are tax exemptions and deduction incentives for R&D and entrepreneurial activities. All these supports and facilities are independent of specific sectors and therefore available for green entrepreneurship activities as well.

Support of regional development agencies is particularly important and can create good opportunities for local entrepreneurs, including green businesses. The “regional” development approach of this system is believed to be in coherence with the “localization” aspect of sustainable lifestyles.

For entrepreneurship activities, people in Turkey generally use their own money, in addition to the funding from family and friends. Business angels have recently emerged in Turkey. Owing to its social aspect and start up investment opportunities provided, it can be regarded as a good finance alternative for green entrepreneurship. Availability of venture capital for green entrepreneurship is based on the development of this sector in general and the efforts started for the establishment of a fund of funds mechanism in Turkey. Meanwhile, due to the high investment amounts as well as high income and low risk expectations, private equity in Turkey is unlikely to become an opportunity for green entrepreneurship at least until the private equity sector reaches a certain satisfaction level, which is not expected for at least 10 years. In any case, for any investor to be convinced, the business plan, profit potential and economical sustainability of the investments as well as sustainable market policies and conditions are essential.

There are a number of financial supports directly dedicated to environmental (SCP supporting) projects or investments. Some examples are R&D programs of The Scientific and Technological Research Council of Turkey (TUBITAK) provided by the specific research group on Environment, Atmosphere, Earth and Marine (ÇAYDAG); the environmental project support of the Technology Development Foundation of Turkey (TTGV) which targets investment type projects on energy efficiency, renewable energy as well as on environmental technologies; and energy efficiency grants provided by the Ministry of Energy and Natural Resources (ETKB). These are believed to be useful instruments in terms of raising awareness and cre-

ating a more favourable climate to motivate ecopreneurs. In addition these provide financial support which can directly or indirectly be canalized to green entrepreneurship activities. Moreover, energy and environmental related bank credit packages and voluntary carbon trade are other specific financial mechanisms facilitating green entrepreneurship activities.

There are some barriers in front of entrepreneurship in Turkey, arising from the educational and training system as well as the cultural and social norms which do not promote the entrepreneurial way of thought or behaviour. These barriers are expected to act in the same way for green entrepreneurship as well. On the other hand, in 2010 “opportunity based” entrepreneurship in Turkey exceeded “necessity based” entrepreneurship, as opposed to previous years. Since opportunity based entrepreneurship is focused on more ambitious growth objectives rather than the expectation of immediate income, it provides a more favourable climate for green entrepreneurship which generally requires a technical know-how and a visionary approach.

Technoparks, an important medium for technology based entrepreneurs, can play a critical role for green entrepreneurship as well. Technoparks can take more initiative to make demonstrations related to green and eco-efficient applications and can host entrepreneurs which work on the technology side and/or provide consultancy and IT services that support green entrepreneurship.

The major motivations for entrepreneurship in Turkey are generally defined as gaining work independence, high income, personal satisfaction, providing security, etc. Green entrepreneurship however, requires more than these: The two critical drivers for green entrepreneurship are “passion and belief in green values” and “identifying a gap in the market and an environmental solution for it.” This requires an awareness for environmental problems as well as technical, legislative and market knowledge on environmental issues.

Environmental and energy related legislation, particularly its “sustainable consumption and production” (SCP) oriented aspects, is an important driver for green entrepreneurship. This becomes more apparent when taking into consideration the fact that regulations are becoming more stringent and enforcement is being increased as well as the increasing impacts of international agreements. In this respect, regulations on waste management and hazardous chemicals bring about opportunities for new businesses based on pollution prevention, waste recovery and recycling as well as on optimization of products and production. Similarly, regulations related with energy efficiency labelling and energy efficiency in transport and building provide a huge market for energy efficient products and services. The Regulation on Eco-design of Energy Related Products, which has recently entered into force, is also expected to create business opportunities both in technical and consultancy areas. The Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy is itself very important in promoting the use of renewable energy sources although the incentives are not generally found sufficient by the market. This situation generally requires additional efforts or added values such as the manufacturing of the relevant equipment nationally, the use of high efficiency systems or waste to energy type of applications.

A review on the SCP aspects of the existing Turkish legislative framework has shown that there are several dimensions which refer to SCP with the production aspect being quite dominant over the consumption and there is no strategy or action plan specific to SCP as a holistic approach. It is clear that such a strategy would help apply an integrated policy and practical tools for SCP, giving a higher priority to the consumption aspect, which is the key to more sustainable life styles and hence green entrepreneurship.

8.2. Perception of Green Entrepreneurship by Stakeholders

Although “green entrepreneurship” as a concept or definition is quite new for almost all stakeholders, after its context is explained, they can easily give concrete examples and make comments related to the market and investment opportunities. Environmental technologies are regarded to have a big potential, particularly for the future. On the other hand, existing green entrepreneurship examples and their perception are substantially “product based” rather than new business models or replacement of products with services. This can be regarded as an important shortcoming, since dematerialization is one of the building blocks of SCP and green entrepreneurship. The assets and opportunities along with the barriers and challenges for green entrepreneurship in Turkey, based on the analyses made above are summarized in Table 6.

Table 6. Assets/ Opportunities and Barriers/ Challenges for green entrepreneurship in Turkey

Assets and Opportunities	Barriers and Challenges
<ul style="list-style-type: none"> • Rising trends in entrepreneurship activities • Rising trends in environmental R&D and entrepreneurship activities • A number of institutions (governmental and non-governmental) providing support for entrepreneurship in general • Ownership towards cleaner production related topics from relevant ministries • Regional development agencies' supports are favourable for green entrepreneurship • Business angels as an opportunity for green businesses • Opportunity based entrepreneurship exceeding the necessity based entrepreneurship • Technoparks as a possible medium for hosting green entrepreneurship activities • Comprehensive environmental and energy related legislation creating opportunities for green entrepreneurship • Additional legislation (eco-labelling directive, etc.) to be harmonized within EU accession process • Green entrepreneurship opportunities with a high potential of perception by entrepreneurs • Concepts of "corporate social responsibility", "environmental, social and governance (ESG)" and "shared value creation" being considered and discussed by particularly large enterprises • Sustainability Index studies in the Istanbul Stock Exchange • Business world is very much interested in climate change issues and possible actions to be taken • Environmental technologies are regarded as the "technology of the future" • Potential provided by the young generation, high engineering capacity and the existing social and economic buoyancy • High potential in renewable energy 	<ul style="list-style-type: none"> • Low level of entrepreneurship in general • No specific support programs dedicated to "green entrepreneurship" • Limited number of support programs dedicated to environmental projects and investments • Limited knowledge and capacity in SCP and even eco-efficiency • Existing support system and access to finance which need to be improved • Private equity not likely to be available for green entrepreneurship in the near future • Educational system and cultural norms not promoting the entrepreneurship spirit • Environmental and energy related legislation with deficiencies in execution and auditing • No specific strategy or action plan for SCP • Green entrepreneurship is quite a new concept for stakeholders • A product based green entrepreneurship perception rather than dematerialization • Limited capacity and awareness of the environment particularly in small enterprises • Turkish consumers' lack of awareness and interest in environmentally friendly products and services • No Green Public Procurement policies applied • Private sector's disbelief in the existence of sufficient demand for environmentally friendly products and services in the market • Limited capacity in the development and incentives for environmental technologies, including renewable energy technologies • Lack of capacity and awareness in the private sector about chaos management • Lack of tendency of Turkish people towards cooperation and open innovation • Procedures and problems associated with municipalities for waste management related initiatives and investments

8.3. Sectoral Outlook

It is quite a common opinion that “green entrepreneurship covers quite a wide range of investment areas, including energy, although it may be regarded as a niche area by many people”. Based on the insights from the interviewees, existing case studies as well as the experience and market information, the sectors of “energy” and “waste management” come up as the highest priority sectors, which also act as cross cutting sectors for many other sectors including the predefined priority areas namely food, housing and mobility.

The following sectors are determined as the present and potential sectors for green entrepreneurship in Turkey:

- Energy (renewable energy, clean coal technologies, energy efficiency).
- Waste Management (waste recovery, recycling and valorisation).
- Agriculture and Husbandry (efficient techniques, organic agriculture and husbandry, waste valorisation, waste to energy and waste to product).
- Automotive (electrical cars, engine and battery technologies).
- Electrical Household Appliances (energy efficient and eco-designed appliances).

As seen in the three sectors indicated above, there are sectors other than energy and waste management that also directly relate to the priority areas of food, housing and mobility. While agriculture and husbandry are directly related to food, they are also connected with the energy and waste management and valorisation sectors. Similarly the automotive sector is interrelated with mobility and energy and it is also related with waste management due to the regulations on end-of-life tyres and end-of-life vehicles. “Electrical household appliances” is an important aspect of housing. It is also related with energy, waste management and eco-design areas.

Most of the green entrepreneurship cases (or business ideas) in Turkey, according to the research made in this study, are in the sectors of waste management and valorisation, organic agriculture and energy.

In the service sector, environmental and energy consultancy is becoming an important sector, both in technical and legislative aspects. The eco-tourism sector, which has not come into play so far, can be regarded as having potential in Turkey, being able to address all priority areas (housing, mobility, food) and service sectors.

In addition, industrial symbiosis and climate change adaptation, which have the potential to cover and extend to many sectors and areas of services, products and technologies, are believed to hold an extensive potential for green entrepreneurship.

8.4. Recommendations

Based on the current situation of green entrepreneurship in Turkey, as summarized above, the possible initiatives for the improvement of green entrepreneurship in Turkey are proposed below:

Raising Awareness:

Raising awareness on environmental problems and on the significance of SCP at all levels of the community is critical:

- Consumer demand is the primary driver of the market. Therefore, it is essential to generate public awareness on environmental problems and sustainable consumption ap-

proach, in order to create an environmentally friendly product and service market.

- It would be a good approach to use visible and popular people (role models) to start green product/service campaigns and trends [49].
- Eco-label types of indications would also be helpful for this purpose [49]. However the eco-label issue should be treated in a sensitive manner taking into account the confusion presently caused by many types of labels used in Europe.

(Eco-labels, energy/carbon labelling are important marketing tools for promoting green entrepreneurship, however as indicated by an interviewee, such tools may limit the producers and entrepreneurs with incremental improvements, preventing them from making big jumps in terms of innovation and entrepreneurship [52].)

- Passion and belief in green values is one of the specific drivers for green entrepreneurship. In this regard, public awareness in general will also stimulate the potential ecopreneurs or orient entrepreneurs towards green entrepreneurship.
- In the business world, the existing efforts should be enhanced and extended for converting the perception of environment from the “end-of-pipe” approach towards “eco-efficiency”.
- The approach of shifting from “products to services” (dematerialization) should be explained and promoted with efficient examples and pilot applications.
- As suggested by several stakeholders, the organization of “sustainable/green entrepreneur awards” would be helpful in raising awareness as well as promoting the market [49, 50].
 - The Quality Award held by KALDER (Association of Quality) is given as an example, owing to its success in supporting and promoting quality management practices in Turkey since 1999 [49].
 - Another example is the sustainability award presented by the Federation of Turkish Tourist Guide Associations (TUREB) targeting a tourism perception which is environmentally friendly, compatible with local traditions and customs as well as promotive of cultural heritage preservation.

Capacity Development, Communication and Orientation:

Technical and legislative knowledge of the environment is key in identifying gaps and creating solutions. In this respect;

- Programs and activities should be organized for informing and updating the entrepreneurship community on environmental developments, legislation and green entrepreneurship case studies.
- The infrastructure for the development of environmental technologies should be improved so that more expertise and technology verification means are created and investors feel more comfortable towards green entrepreneurship investments.
- Specific and well organized occasions should be created for bringing the entrepreneurship community and environmental experts together so that means for a mutual knowledge exchange is created and new opportunities based on common sense are developed
- Success stories and case studies of green entrepreneurship from Turkey and other countries should be compiled, published and shared with stakeholders.
- Existing institutions having experience and know-how in sustainability issues as well as having contacts with the business world and the government should cooperate to create synergistic impacts for stimulating both the government and the business world towards SCP and green entrepreneurship [46].
- It is also critical for the government to have a good understanding of SCP policies and green entrepreneurship and to be in touch and cooperate with existing institutions that have experience and know-how in sustainability issues.

- Measures should be taken for the adoption of the “supply chain approach” and “supply chain management” by the private sector, so that an interactive environment is created for green entrepreneurship and different entrepreneurial opportunities are developed during materials management, collaborative procurement, collaborative manufacturing , etc.
- Technoparks should be oriented towards green entrepreneurship and should look to promote the hosting of ecopreneurs as well as the provision of necessary support to them.

Policy and Strategy:

- It is believed that the development of an SCP Strategy and Action Plan specifically designed for Turkey by the Government and its implementation would create many positive impacts including the improvement of green entrepreneurship.
- Green Public Procurement (maybe as a part of a SCP Action Plan) should be considered and started at least as pilot applications.
- Environmentally friendly product incentives (tax deductions/exemptions, etc.) should be applied, stable market policies and conditions should be maintained for encouraging entrepreneurs and investors.
- Some high potential sectors such as “waste management and valorisation” and “agriculture and husbandry” could be used as entry points to specifically focus on and to increase the number of good green entrepreneurship cases. It may be easier to convey the success and lessons to other sectors for disseminating green entrepreneurship.
- One of the key aspects of sustainable lifestyles and green entrepreneurship is finding “local” solutions. Hence, SCP and sustainable lifestyles should be explicitly incorporated to the existing regional development policies and the relevant institutions. This will provide more clear and favourable supports for local initiatives of green businesses.

Improving Financial Opportunities:

- Specific support programs for environmental R&D, investment and entrepreneurship activities should be increased and implemented.
- Specific focus should be made on the barriers in front of the present finance instruments such as business angels, venture capital and private equity to be used in green entrepreneurship and specific solutions should be sought.
- Appropriate mechanisms should be created for compensating the risk taken and income expected by the investors, for their green entrepreneurship investments.

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Appendix 1

BRIEF BIOGRAPHIES OF INTERVIEWEES

Didem Altop
Managing Director, Endeavor



Ms. Didem Altop is a Turkish-American born in the US in 1969, and living in Turkey since 1997. Her undergraduate degree is a BA in International Relations and Development Economics from The Johns Hopkins University. Before earning her MS in Industrial Administration from Carnegie Mellon University with a concentration in strategic planning and entrepreneurship, she worked for The World Bank on trade reform and privatization for Algeria, Morocco and Turkey. She is currently the Managing Director of Endeavor Turkey, part of a global non-profit organization supporting high-impact entrepreneurship in emerging markets as a catalyst for economic development. Prior to joining the Endeavor Global network, she was involved in management consulting on social and business entrepreneurship. She has worked with Turkey's leading holding companies to promote and design Corporate Social Responsibility strategies and has also worked with Turkey's leading non-profit organizations on capacity-building campaigns.

Isak Antika
Owner of Actera Group



Mr. Antika received a BS in Industrial Engineering and an MBA from Bosphorus University in Istanbul. Isak Antika is a co-founder and Managing Partner of Actera Group and serves on the firm's investment and operating committees. Prior to forming Actera, Mr. Antika was the founder and Managing Partner of Antika Partners, a leading corporate finance and M&A house based in Istanbul which was the strategic partner of Merrill Lynch in Turkey. Prior to establishing Antika Partners, Mr. Antika was the Head of Investment Banking for Central & Eastern Europe, Middle East & Africa at JP Morgan and was a member of the bank's worldwide operating committee. During his 18-year tenure at the bank, Mr. Antika served in a variety of positions including Regional Manager for Turkey, CIS, Balkans and Israel, Division Manager for Turkey and Central Asia, and Country Manager for Turkey. Mr. Antika started his career at JP Morgan Chase & Co. in London in the Global Markets Group. Mr. Antika serves on the Board of Directors of Mey Icki, Spectrum Radyo Grubu, Karma Acikhava, Guney 2M, LBT Varlik Yonetim and Mars Entertainment Group.

Nevzat Aydın
CEO, yemeksepeti.com



Born in 1976 in Istanbul, Nevzat Aydın graduated from Bursa Anadolu High School. He studied computer engineering at Boğaziçi University and after graduation, went to Silicon Valley to pursue his MBA degree from the University of San Francisco. There, he followed and analyzed the developments in e-business and in 2000, he returned to Turkey to realize his project “yemeksepeti.com”. Nevzat Aydın is the CEO of Yemeksepeti.com, which brought a new dimension into the e-business concept in the country. He is also a member of TOBB Young Entrepreneurs Supreme Board and the founding member of Galata Business Angels. In 2010, Nevzat Aydın is chosen as the “The Most Successful Young Entrepreneur in Turkey” by CNBC-e Business magazine for his prosperous works with yemeksepeti.com. Nevzat Aydın is among the 150 entrepreneurs invited from all around the world to the Entrepreneurship Summit, which was held by USA President Barack Obama on 26-27 April, 2010. Nevzat Aydın is also among the 5 ‘dragons’ of Dragons’ Den Turkey, a TV show broadcasting in 22 countries.

Dr. A. Mete Çakmakcı
Secretary General, Technology Development Foundation of Turkey



Dr. A. Mete Çakmakcı is currently the Secretary General of Technology Development Foundation of Turkey (TTGV). He has been working at TTGV since October 2003. He represents TTGV in various venture capital and private equity investments, including Istanbul Venture Capital Initiative (iVCi) (Turkey’s first dedicated fund of funds), Teknoloji Yatırım A.Ş. (TTGV’s start-up investment vehicle), TURKVEN TPEF-1 and İş Girişim A.Ş. He is often involved in various study groups and technical committees both at national and international levels on industrial innovation and entrepreneurship policy. He is currently the chairman of the TOBB (The Union of Chambers and Commodity Exchanges of Turkey) ICT Sector Assembly and a member in TOBB Young Entrepreneurs Council. He acted as the TAFTIE (The European Network of Innovation Agencies) Secretary during TTGV Chairmanship in 2007. He still represents TTGV in TAFTIE as a board member. His current work involves program and policy development on innovation, entrepreneurship and research and technology aspects of the industrial policy including development of venture capital in Turkey. He has a B.S. in Electrical and Electronics Engineering from METU Ankara (1990), a MSc in EE & a Ph.D. with a degree minor in Manufacturing Engineering from Syracuse University, USA (1993 and 1998).

Pervin Katmer Gürkan
Managing Owner, UZD Consultancy



She graduated from Environmental Engineering Department of Middle East Technical University. She received her master degree from Biotechnology Department of Middle East Technical University. She worked as Environmental Coordinator, EHS Training Manager and Personnel Manager in Goodyear, Consultant in Enki. Currently she is managing owner of the UZD Consultancy. Mrs. Pervin Katmer Uzer is specialized in Environmental, Health and Safety Compliance, Corporate Sustainability, Environmental Management Systems, ISO 14001, Environmental Reporting, EMAS, Health & Safety Management Systems and OHSAS 18001.

Engin Güvenç
Executive Director, Business Council for Sustainable Development Board Member, Boreal Group Ltd.



She has more than 15 years of experience in corporate world about financial markets, project management, business development, sales and marketing. She has established her own company in 2002 and restructured in 2007, focusing on fund raising for cause related events/projects, corporate responsibility and sustainability. With the involvement of corporate responsibility projects, she has focused on Sustainable Development Issues and acted as lead person to initiate the establishment of Turkish Business Council for Sustainable Development (TBCSD) in 2003. She is currently the founder member and executive director of TBCSD and founder and managing director of Boreal Group

Ltd. She believes that Sustainable Development approach would provide long-term profitability and risk management ability to Turkish corporations and bring more quality and efficiency into our own lives. She currently follows international developments on sustainability especially at the corporate area to implement into local actions of TBCSD together with World Business Council for Sustainable Development (WBCSD) based on Turkish business market requirements and momentum.

Alphan Manas
Chairman, Brightwell Holdings BV



Alphan Manas was born in 1962 in Izmir, Turkey. He graduated with a degree in Textile Engineering from Ege University in 1983. He received his Master's degree in Production Management from State University of New York (SUNY) in 1987. He worked as a Production Manager at the New York factory Tenba. In 1987, Alphan Manas returned to Turkey as the country manager of Colonial Corp. He became the founding shareholder of Exim, established under Teknoloji Holding in February 1988 and Planet and Teknosor afterwards. As the founding shareholder and co-chairman of Teknoloji Holding, personally supervised the business and market development activities of the group for 18 years. In

February 2006, ended his shareholding in Teknoloji Holding, taking along 7 companies and established Brightwell Holdings BV, headquartered in the Netherlands. He leaded and par-

ticipated in several important infrastructure projects in Turkey at the government level and assisted the related organizations in the drafting of bills, communiqués and decrees. Elected as the president of the Futurism Thought Group of Turkish Industry and Business Association (TÜSIAD), of which he is a member, in 2011. He is among the 5 ‘dragons’ of Dragons’ Den Turkey, a TV show broadcasting in 22 countries.

Murat Özgen
CEO, Is Private Equity



Murat Özgen is the Chief Executive Officer of Is Private Equity (www.isprivateequity.com), the private equity arm of Is Bank, the largest private bank in Turkey with consolidated asset size of over \$102 billion as of 31.12.2010. Is Private Equity, a pioneer in Turkish private equity industry, is one of the longest established and successful private equity players in Turkey.

Murat Özgen has over 18 years of professional working experience; over 9 years of which is in private equity. He joined Is Private Equity in 2002, the year Is PE’s investment activities commenced. He is an Investment Committee member of Is Private Equity. In addition to his transactional experience, Murat Özgen has significant board level experience with Is PE’s portfolio companies. Before joining Is PE, Murat Özgen spent 9 years mainly in finance and banking industries at local and global institutions in Turkey and abroad; at Kocbank in Istanbul, Commerzbank AG in New York and at Facility Group Inc. in Atlanta.

Fuat Sami
Founder and Managing Director, LabX



Fuat Sami was born in London. He completed his undergraduate degree in Imperial College and MBA (on health management) in Imperial Tanaka Business School. He worked as a consultant, senior consultant and project manager in Helix Management Consultancy in Turkey. He took place in the projects on strategy, renovation, organizational design and purchasing optimization conducted for local and international companies and countries in different geographies (Europe, Middle East and Turkey). He is the founder and managing director of LabX that is initiated in 2006 for providing entrepreneurship services. At the same time Fuat Sami is the Executive Board Member of 6 companies from

telecom, internet, advertisement and medical sector that were actualized via LabX Angel investors. He also actively takes place in the non-governmental organizations and initiatives. One of his largest initiatives “birFiKRiNmİVAR?” (the largest university wide entrepreneurship competition in the region for the last 4 years) is currently running as a TV show on the NTV channel and Mr. Sami is the producer of it.

Cengiz Ultav

Executive Board Member, VESTEL



He was born on February 26, 1950, in Eskisehir. He holds a Master's degree in Electrical Engineering, Computer and Control Option, from Middle East Technical University and a diploma from Philips International Institute in the Netherlands. After taking technical and administrative tasks in Bimsa and Info in Turkey and in Dornier Sytem GmbH, he worked as Assistant General Manager in NCR Turkey and as a General Manager in Sun Microsystemler A.Ş.. Meanwhile, he gave consultancy services to Koç, Sabancı and Eczacıbaşı Groups. Since 1995, he is in the management team of Vestel Electronics Inc. and working as an Executive Committee Member, responsible from the Strategic Planning and Investor Relations. He served as an advisor for UNDP in Vietnam. He is a founding member of Informatics Foundation of Turkey, the Unix Users Association and certified consultant for Microsoft Solution Development Discipline. He received Lifetime Achievement Award for 2005 from TÜBİSAD, Turkish Informatics Business Association. He is one of the executive board members of Technology Development Foundation of Turkey.

Appendix 2

CASE STUDIES

SELECTED GREEN ENTREPRENEURSHIP CASE STUDIES FROM TURKEY

Project name, city, country:

Bugday Association for Supporting Ecological Living
Bridging the Gap Between Organic Farmers and Urban Consumers

Description:

Bugday Association for Supporting Ecological Living is a non-profit, non-governmental organization registered under the Turkish law. The pioneering Bugday (Wheat) ecological movement started in the 1990s with a restaurant/wholesale store offering local and organic food, which also served as a space for like-minded, environmentally conscious people to meet, gather and share their ideas and visions about ecological living. Bugday movement evolved into an association which was officially founded in 2002, under the name of Bugday Association for Supporting Ecological Living

Today, Bugday Association has more than 1500 members and 2000 volunteers throughout Turkey. It reaches up to 20.000 people through its weekly electronic bulletin.

The main working areas of Bugday can be summarized as: Organic Agriculture (e.g. 100% Ecological Market Places); Ecological Living (e.g. Camtepe Ecological Center); Agro-Biodiversity (e.g. Seed Network); Eco-Agro Tourism (e.g. TaTuTa - Eco-Agro Tourism and Voluntary Exchange); Urban Agriculture (e.g. Cumhuriyetköy Community Garden).

The project “Bridging the Gap Between Organic Farmers and Urban Consumers” concerns the Şişli %100 Ecological Market, the first ecological market place model that was set up in Turkey. The market place is a platform that brings small-scale producers of organically grown products in Turkey’s rural to the heart of the urban consumption in Istanbul. Not only does the market place provide healthy and environmentally friendly goods to the consumers but it also acts like an arena of exchange for ecological thinking, ideas, and community projects.

Investment:*Start up capital:*

60,000 € + In-kind support by the local municipality and Bugday Association

Rate of return on investment:

Since this initiative is a non-profit activity of Bugday Association, profit is not the principal aim.

Sources of funding:

60,000 € from institutional sponsors (only the first year)

40,000 € (in-kind) from Şişli Municipality

40,000 € from Bugday as voluntary labor force

Employment generation:

Today the Şişli 100% Ecological Market Place set up by Buğday Association employs 3 full time-staff within the NGO and 2 volunteers each weekend. On the other hand, the market places in Istanbul host 750 stands which in turn employ approximately 80 people.

Timeline:

The inception of the market place took place as Buğday Association was growing as an institution between 2002-2005 as the potential of local producers of organic food in Turkey was being assessed and gathered in a working network. Between 2005 and 2006 the hands-on inception was realized through setting up of the appropriate partnerships and in the summer of 2006 the market place was officially inaugurated. It is ongoing every Saturday of the year.

Feasibility study:

In Şişli 100% Ecological Market Place approximately 10-15 tons of organic food is sold every week. Each week around 1,000 customers visit the marketplace in Şişli. Depending on the season different types of fruits and vegetables are put up for sale on the marketplace. As an example, in winter season onion, potato, cauliflower, carrot, apple, orange and banana comprise the majority of the products. According to the data gathered in winter-2011 majority of the goods are sold at a cost between 1.5-4 € per kilo. As a very rough estimate 25,000-30,000 € of turnover is generated weekly in this single marketplace dedicated to organic goods.

Geo-social-economic setting:

- In Turkey, an old tradition, shopping in the marketplace, is still popular when it comes especially to food products.
- Hundreds of small scale agricultural producers in Turkey are among the most marginalized societal groups, need to be supported through different mechanisms whether financial or not.
- Since Turkey is experiencing a rapid economic development, industrialization and urbanization is at a high rate. This trend is a major transformation from a local and agricultural based economy. Owing to this agricultural intensity is decreasing nationwide. This situation hinders the penetration of locally grown, ecological agricultural products into marketplaces of big metropolises like Istanbul.
- Turkey has a tremendous fertile land for organic agriculture operations along with suitable circumstances both ecologically and climatologically. From the economic point of view, majority of Turkish labour force still works in agriculture industry as well as in rural areas, which accounts substantial share of Turkish population.
- A local market for organically grown and healthy agricultural goods is becoming increasingly apparent in the Turkish society.

Key features:

- Rural development
- Organic Farming
- Sustainable Consumption and Production
- Awareness raising
- Holistic health benefits

Driver:

Overall rational and motivation: To change the situation in Turkey where the majority of the organically grown and certified agricultural goods were exported to the European and other countries while the Turkish consumers did not have direct access to fresh and affordable organic goods. Buğday Association aimed at changing this situation by establishing Şişli 100% Ecological Market Place.

Social: To sustain rural livelihoods through the practice of organic agriculture thus preventing further immigration to the urban center.

Environmental: To realize environmental gains with the help of variety of the available products grown by using environmentally friendly methods taking into account factors such as erosion, water consumption. To increase the demand on agricultural products which do not contain pesticides, insecticides and other additives. To reduce the overall carbon footprint of both the consumers and the producers by producing and supplying of the goods to the national market rather than importing from other countries.

Economic: To establish a commercial zone which guarantees the producers a place for their value-added organic products are sold.

Strengths:

- To set up the market place in Şişli (Istanbul), where purchasing power and awareness is relatively high among consumers.
- To rely on strong relationships between local farmers and Bugday association as well as other stakeholders like Şişli municipality through a working network.
- To use effective communication means including weekly electronic bulletin reaching up to 20.000 people.
- To rely on existing network of Buğday association with more than 1500 members and 2000 volunteers throughout Turkey.

Challenges and constraints:

- The main challenges of the project have been related to legislative and administrative aspects. The market place was founded parallel to Turkey's Organic Agriculture Law which did not have a proper implementation road map. Thus, the rules and regulations in establishing the standards to the market place were not clearly defined and took many years of practical know-how. In the establishment of new markets the standards acknowledged by Buğday Association should be used but the legal infrastructure remains ineffective for this.
- Administrative challenges in project relate to the day-to-day upkeep of the institutional relations, weekly prices, conducting dialogue between producers among others.

Direct activities and impacts:

- The market place itself provides a strong social platform bringing together the producers and the consumers in interactive ways. Through workshops and/or trainings organized by Buğday Association, these two strata of the Turkish society understand and identify mutual needs and issues ranging from social and ecological justice, seed exchange, fair trade etc. Since 2006, over 200 volunteers have participated in the implementation of the market's tasks and programs.
- Şişli 100% Ecological Market Place brings to urban consumers goods whose production is solely in accordance with the organic certification norms.
- Şişli 100% Ecological Market Place enabled the access of affordable and healthy fresh goods to the Turkish consumers. Until then, the prices of organic products remained very high and addressed only the upper socio-economic classes. By regulating the prices and setting fair limits, this trend has been changed.
- As the first model of ecological market place all across Turkey, the economic impact did not become apparent immediately. Through time and through the success of the Şişli market space, however, the demand for organically grown goods has increased in other cities such as İzmir, Ankara and Antalya. Buğday Association was able to share its know-how in the setting up of these economic models.
- The support and active participation of the Şişli Municipality in the project has led to the success of the initiative through its adaptation in other districts by other municipalities who wanted to quickly duplicate the project.

Use of innovative technologies: None**Evidence of a holistic approach/world view:**

- Buğday association has been instrumental in changing perceptions of significant numbers of consumers about the effects of different agricultural practices, Turkey's agro-biodiversity priorities and challenges as well as the health and social-political aspects of food. Through the leadership of the association, urban-based consumers met first-hand producers.

Scale of benefits:

Local	X
Regional	X
National	X
International/Global	

Weaknesses:

- High dependence on external relations with variety of stakeholders

Government policies, incentives and regulations needed:

- Programs and activities should be organized for informing and updating the entrepreneurship community on environmental developments, legislation and green entrepreneurship case studies.
- It is also critical for the government to have a good perception on SCP policies and green entrepreneurship and being in touch with and cooperating with existing institutions having an experience and knowhow on sustainability issues.

Key lessons:

"Sponsors and non-profit support are critical for the initiation and demonstration of certain green business models and create commercially replicable cases"

Recommendations for implementation of similar projects:

“Cooperation with knowledgeable and dedicated NGOs for starting green business is an advantage”

Key references:

Links to images and /or videos.

<http://ekolojikpazar.org/>



Project name, city, country:

VIP Dry Car Cleaning Inc., Istanbul, Turkey
Dry Car Cleaning

Description:

VIP Dry Car Cleaning Inc. is a company active in the car cleaning market that has brought the concept of dry cleaning (without water) of cars from USA to the Turkey. This concept is served as a contributing solution to the drought and reduction of water resources.

The most important advantage of this method is water saving. Because in this new method, instead of water organic solutions which are able to clean variety of dirt are used. Organic solutions form an air media between hatch and the dirt that prevents scratch of the car and longer the period between cleanings. Another advantage of this method is the time saving for the customers, because cleaning is established via motorcycle washers at the place where the customers want (mobile service).

Investment:

Start up capital:

110,000 €

Rate of return on investment:

4 months

Sources of funding:

Financed by the own resources of the entrepreneur Ibrahim Nacar.

Employment generation:

In total 67 workers are employed for this business in Turkey (dealers included).

Timeline:

2006 - Inception

2007 - Implementation

Feasibility study:

Currently there are 13 distributors of the Company. As an average, each distributor provides cleaning services to 250-300 cars/month. This means 3,250-3,900 cars are cleaned monthly. Since the price of a cleaning operation is between 7-12 €, depending on the type of the operation total monthly turnover of 30,000-37,000 € is generated. When compared to traditional car wash operations, cleaning companies save water and time which decrease the requirements for manpower and time.

Geo-social-economic setting:

- The annual per capita water potential is at present 1700 m³ but expected to be reduced to 1000 m³ in the year 2020. Thus Turkey cannot be considered a 'water-rich' country and water efficiency measures and implementations are receiving wide public support.
- High unemployment rate is a concern for Turkey, existence of high regional unemployment differentials is another.
- Automobile sector plays a vital role in Turkey's economy and it has taken an important place in the export mix from the country. According to the figures released by Turkey's statistics authority (TurkStat) the total number of motor vehicles in Turkey reached 15.023 million as of November 2010.
- Some of the provinces with the highest rates of car ownership are; Ankara, İstanbul, Eskişehir, Antalya and Zonguldak where the service of dry car cleaning is provided by the company.

Key features:

- Environmental Friendly Service
- Organic Solutions
- Resource Efficiency

Driver:

- Overall rational and motivation: Need for an attractive and interesting innovation in the sector. Make innovations to attract people's interest to eco-friendly services.
- Social: None
- Environmental: To take part in the protection of environment by water saving.
- Economic: To create a new business model with high income potential.

Strengths:

- Totally eco-friendly service
- Providing water saving
- Providing reductions in pollutions
- Providing time saving

Challenges and constraints:

- The lack of knowledge regarding environmental protection in Turkey
- Well known traditional water cleaning services

Direct activities and impacts:

- Running unemployed people for the assembly of service provides the opportunity to earn money. By this project nearly 70 people are employed in different regions of Turkey (Zonguldak, Eskişehir, Adana, Antalya, Ankara, İstanbul, Konya, Şanlıurfa).
- This project attracts the people's interest to eco-friendly services and at the same time spreads the knowledge of environmental protection.
- Prevention of water consumption is at very high levels.
- Time saving is achieved.

Use of innovative technologies:

The innovation in this eco-friendly approach is dry cleaning of cars with organic solution instead of water. Moreover this innovation provides opportunity to customers to save time from bringing their cars for cleaning. As the objective of our innovation is at one side to attract the people's interest to eco-friendly services and spread the knowledge of environmental protection.

Evidence of a holistic approach/world view:

Creating an alternative way of car cleaning which do not rely on water consumption. This application shows that huge opportunities exist for environmental sustainability even in the car cleaning operations which is almost equated to the use of high amounts of water.

Scale of benefits:

Local	
Regional	
National	X
International/Global	

Weaknesses:

- The lack of knowledge regarding environmental protection in Turkey
- The lack of market for eco-friendly services in Turkey

Government policies, incentives and regulations needed:

- Specific focus should be made on barriers in front of the present finance instruments such as business angels, venture capital and private equity to be used in green entrepreneurship and specific solutions should be sought.
- Appropriate mechanisms should be created for compensating the risk taken and income expected by the investors, for their green entrepreneurship investments.

Key lessons:

"Water is very important natural resource for Turkey and the world"

"Services run with water can be made more eco-friendly"

Recommendations for implementation of similar projects:

"Chase innovations in all over the world and good R&D work"

Key references:

Links to images and /or videos.

Web-site of the company: www.vipsusuzotoyikama.com



Project name, city, country:**EZGi GIDA, Ankara, Turkey**

ETİYOK - Vegetarian Uncooked Meatball (Çiğ köfte)

Description:

EZGi GIDA which was established by a woman entrepreneur Selime Kaya, has gone into operation in Ankara in 1993. It succeeded in becoming a major player in the food sector, by broadening its production capacity and selling network each year.

In 2005, EZGi GIDA developed a new product called ETİYOK, the vegetarian uncooked meatball, which was a major innovation when compared to uncooked meatball traditionally made of meat. The product is patented by the verdict of the Turkish Republic Patent Institute. The penetration of the product into market was very successful thanks to its unique taste although produced without meat. It is seen as a good example of reducing meat consumption, which is known to be environmentally unsustainable owing to intensive resource (especially water) use associated with meat production.

Investment:*Start up capital:*

86,000 €

Rate of return on investment:

1 year

Sources of funding:

Financed by Technology Development Foundation of Turkey (50% of the project budget), and TUBITAK (50% of the project budget).

Employment generation:

13 workers are employed for the project.

Timeline:

2001 - Inception

2006 - Implementation

Feasibility study:

Since the meat is the most expensive raw material (ingredient) vegetarian uncooked meatball is advantageous in terms of raw material costs when compared to traditional uncooked meatball. EZGi GIDA estimated their selling potential to be 60,000-90,000 €/year including the export share. This market potential enabled them producing 4-5 tones of meatball daily.

Geo-social-economic setting:

- Turkey is often a country whose cuisine is associated with meaty kebab dishes, doner sandwiches, and lahmacun; where essentially the food revolves around beef or lamb.
- Traditional uncooked meatball (Çiğ köfte) originated from south-eastern Turkey is prepared with “bulgur” and raw minced meat. It is one of the well known tastes of traditional Turkish cuisine.
- The raw meat is accepted as a threat to human health when is not treated with caution and hygiene. So, traditional uncooked meatball has a very short shelf life when compared to cooked forms of meatball. This situation hinders the widespread consumption of traditional uncooked meatball in Turkey.

Key features:

- Sustainable Consumption and Production
- Social change
- Innovation in food sector
- Traditional product
- Resource Efficiency

Driver:

- *Overall rational and motivation:* To develop a new innovative product for the vegetarian people
- *Social:* To produce a more durable and more hygienic uncooked meatball for not only vegetarian people but also for those who have reluctance towards “uncooked meat” concept
- *Environmental:* To minimize the ecological footprint of meatball production which is very high mainly associated with meat production (due to high water consumption during meat production).
- *Economic:* To create a new sector with a vegetarian uncooked meatball

Strengths:

- Totally eco-friendly product
- Hygienic Product
- Saving natural sources indirectly
- More durable than the traditional one
- Same taste with the traditional one
- Sold in many shops as a take-away type of food

Challenges and constraints:

- Strict laws and regulations as well as standards on food products.
- Replicability of the concept by other companies in the sector.
- Unfair competition between other producers who are not taking hygiene as an issue sufficiently.

Direct activities and impacts:

- Production of durable uncooked vegetarian meatball
- Thousands of shops opened in Turkey to sell vegetarian uncooked meatball.
- Creation of a vegetarian meatball sector in Turkey by which thousands of people are employed
- Production of uncooked meatballs in a more hygienic way which is also a new alternative for the vegetarian people
- Provide employment opportunity
- Minimize the consumption of resources (especially water) associated with meatball production.

Use of innovative technologies:

The innovation in this eco-friendly approach is not using meat in the product. The vegetarian uncooked meatball eliminates the meat production process which requires high amount of water, from its life cycle. The main starting point for this project is to make vegetarian uncooked meatballs more durable with same taste quality. Another innovative aspect of the project was to use automation instead of manpower which also brings hygienic production processes. As a result of the activities, vegetarian uncooked meatballs that are preserving its taste, texture and freshness were produced without meat and without human touch. This product of the company has been patented by Turkish Republic Patent Institute.

Evidence of a holistic approach/world view:

“Meatball without any meat” is itself a radical change.

Scale of benefits:

Local	
Regional	
National	X
International/Global	

Weaknesses:

- Potential competitors and the fact that the products can't be protected through patents.

Government policies, incentives and regulations needed:

- Specific support programs for environmental R&D, investment and entrepreneurship activities should be increased and implemented.
- For environmentally friendly products incentives (tax deduction/ exemption, etc.) should be applied, stable market policies and conditions should be maintained for encouraging entrepreneurs and investors.

Key lessons:

“Sustainable Consumption and Production concepts should be disseminated”

“Innovation brings many indirect positive impacts”

Recommendations for implementation of similar projects:

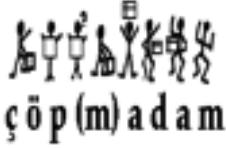
“Patience, non-stop working, ambition and taking help from academicians are the key points for the success of an innovative work”

Key references:

Links to images and /or videos.

Web-site of the company: www.ezgigida.com/index.php?english2



Project name, city, country:	
	Project name, city, country: Çöp(m)adam (Garbage Ladies), Ayvalık-Balıkesir, Turkey Handbags from recycled materials
Description: Çöp(m)adam is a social development project aiming to provide chance for women who never had opportunity to work and earn regular salaries in the course of their lifetimes. Through generating a fair and regular salary for the ladies, the project also aims to increase/ build ladies' self-esteems. The project offers a fun and creative method to ladies by producing items made out of recycled materials. Çöp(m)adam is a project that successfully combines many aspects of social life; trying to produce solutions for all stakeholders and focus on main problem areas in Turkey, such as local development, sustainability, entrepreneurship, women's employment/unemployment, empowerment of women; as well as awareness raising on issues related with the protection of environment (recycling, waste management etc.). With all these qualities it is possible to call Çöp(m)adam as "social, green enterprise".	
Investment: <i>Start up capital:</i> 27,000 € <i>Rate of return on investment:</i> 4 years <i>Sources of funding:</i> Sponsored by Unilever Turkey and Sabanci University	
Employment generation: Up till now, Çöp(m)adam offered 400 women to work in 3 workshops. Currently there are two workshops where 120 women are working.	
Timeline: 2007 - Inception 2008 - Implementation	
Feasibility study: The raw material of the production process is delivered by Unilever-Turkey. Since the raw material is a kind of packaging waste there is no problem in terms of supply of raw materials. On the other hand, the workforce is provided by the unemployed women in Ayvalık region. In other words the project is based on one side an endless resource of material on the other side bulk of population (talented, hard worker, traditional and lacking financial resources). The commercialization channels are also diverse including shops, websites, campaigns etc. So, via these channels it was able to put almost 5,000 products (produced from 30 tons of waste) on the market. And more than %80 of the products is already sold on the market.	

Geo-social-economic setting:

- In Turkey rural areas face problems of human resources (poor level of education and skills), ineffective institutional structure and farmer organisations (cooperatives, producer unions etc.) to support rural development, scattered settlement pattern in some regions, insufficient development and maintenance of physical, social and cultural infrastructure, a high rate of dependence on subsistence agriculture, high rate of hidden unemployment, insufficient diversification of agricultural and non-agricultural income generating activities, low income level and relatively low quality of life for rural population, migration (rural to urban areas and interregional) and ageing of rural population.
- It is very well known that the contribution of women labor to Turkish economy is not at a desired level. It is also a fact that as long as they work as unpaid family workers, the contribution of Turkish women to the country's economy would remain undefined or would not be stated statistically adequately. The necessity of improving the life quality of rural women in terms of social and economic aspects, as in all other developing countries also in Turkey, is the common finding of many studies.

Key features:

- Rural development
- Women's employment
- Empowerment of women
- Awareness raising
- Recycling
- Waste management.
- Waste to product

Driver:

- *Overall rational and motivation:* To empower women in Turkey, to produce a creative, fun and replicable model in order to bring Turkish women into the workforce, to raise awareness with regards to protection of environment and recycling
- *Social:* To establish a model in order to have effects on problems that women are facing currently in Turkey.
- *Environmental:* To create a green economy based investment with mainly trash.
- *Economic:* To present a new, innovative and genuine product to the Turkish market.

Strengths:

- Focusing on social and environmental problems in a way that gets people's attention in a positive manner.
- Offering a new type of product, which is a very new field for the market.
- Being attractive for people, business, local governments, media etc.

Challenges and constraints:

- Risk of not being sponsored
- Foreign competition in the future

Direct activities and impacts:

- Çöp(m)adam positively contributes to the problems regarding the women in Turkey ranging from empowerment to employment.
- Main raw materials are selected from trash, which means products that are wasted and don't have any economic value. Environmentally this is an asset. Also through the project employees, customers, companies, local governments find an innovative and creative solution in order to reutilize their waste.
- Economically the products produced are new to the Turkish market and this makes Çöp(m)adam an asset for the country's economics.
- Getting local support is an important component of the Project in order to make the business known nationally. A very important fact is that the Projects should be owned by the locality as it functions in the locality. So far Çöp(m)adam was successful in that as it created a positive atmosphere among the local shareholders.
- As Çöp(m)adam is mainly on local development, sustainability, entrepreneurship, women's employment/unemployment, empowerment of women; as well as awareness raising on issues related with the protection of environment; the current situation in Turkey offers a lot for projects/initiatives like Çöp(m)adam.

Use of innovative technologies:

Çöp(m)adam as a whole is an innovative and incorporative (both social and environmental goals) project. Also Çöp(m)adam has the potential to become a model for others in Turkey and elsewhere to follow as hands-on local approach is proving to be effective.

Evidence of a holistic approach/world view:

Production of innovative value-added products from waste materials can contribute to social, environmental and economical gains.

Scale of benefits:

Local	X
Regional	
National	
International/Global	

Weaknesses:

- Potential competitors and the fact that the products can't be protected through copy rights
- Fiscal system's burden on the company
- Being tied to one sponsor, etc.

Government policies, incentives and regulations needed:

- One of the key aspects of sustainable lifestyles and green entrepreneurship is finding "local" solutions. Hence, SCP and sustainable lifestyles should be explicitly incorporated to the existing regional development policies and the relevant institutions. This will provide a more clear and favourable supports for local initiatives of green businesses.

Key lessons:

"Building a business and maintaining it is a hard job to do!"

Recommendations for implementation of similar projects:

"Innovation can be made in all areas of daily life"

Key references:

Links to images and /or videos

Web-site of Company: www.copmadam.com

30 minutes show on Çöp(m)adam (From “Changemakers” of Turkey):

Part 1: <http://www.youtube.com/watch?v=0yHIV5PnrTQ>

Part 2: <http://www.youtube.com/watch?v=v246fJqSAfo&feature=related>



Project name, city, country:**KARAGÖNLER A.Ş., Hatay, Turkey**

Production of Biofuel and Olive Oil from Olive Pulp

Description:

KARAGÖNLER A.Ş. is a middle-scale olive oil producer company with 4,500 tons of oil processing capacity. In 2010, the company management decided to invest in a system which enables them to produce value-added products (biofuel and olive oil) out of their production residues/wastes. Moreover, residues/wastes of nearby olive oil producer companies were attempted to be collected and turned into profit.

As a result of the realized investments KARAGÖNLER A.Ş. is now able to collect the residues generated at local olive oil production companies and utilize them. Collected residues/wastes are first extracted by hexane to produce olive oil. After that spent olive cake is pressed into materials similar to firewood, which has high commercial value.

Investment:*Start up capital:*

2,800,000 €

Rate of return on investment:

1.9 years

Sources of funding:

Financed by Technology Development Foundation of Turkey, Development Bank of Turkey and Company's own resources.

Employment generation:

1 environmental engineer, 1 technician and 14 non skilled workers (in total 16 employees) are employed for the project.

Timeline:

2009 - Inception

2011 - Implementation

Feasibility study:

In Hatay, where the project is implemented the amount of olive oil and olive production is highest among all the cities in Mediterranean Region with 22,278 tons of olive production in total. In other words, the main input of the facility is secured for a long period of time. On the other hand, there is almost no risk for commercialization of the product since firewood is used almost everywhere in the region, including households and industrial enterprises.

The main operational cost of the facility is the raw material (olive pulp) which accounts for 930,000 € annually. Other operational costs can be listed as Personnel, Chemicals, Energy and Maintenance-repair. Total operational cost is estimated to be 1,290,000 €. Since the estimated annual revenue is somewhat 2,800,000 € the return of investment will be in 1.9 years.

Geo-social-economic setting:

- Turkey is at the 4th rank for olive tree population, 6th rank for the olive tree area among the olive producing countries. Turkey contributes to world olive production at a rate of 8% and is at the 2nd rank after Spain. Furthermore, Turkey is at 1st rank for olive consumption.
- According to the “Olive and Olive Oil Harvest” results of 2010-2011 period, in Mediterranean Region, there are 46,727,191 olive trees and 44,414 tons of olive oil will be produced in total.
- Owing to the high production and consumption of olive oil in Turkey high amounts of olive pulp is generated, which have to be disposed of in a safe manner. Currently, in the rural parts of the country most of the produced olive pulp is either burned unsanitary or deposited on wild dumping areas.

Key features:

- Resource Efficiency
- Waste reduction and valorisation
- Value-added Product Formation
- Industrial Symbiosis
- Industry-Industry Cooperation
- Regional competitiveness
- Social responsibility

Driver:

Overall rational and motivation: Production in environmental friendly manner, with the priorities of higher quality products and recovery of the wastes.

Social: To act as an example in the sector, providing a better quality fuel for the people in the region, who tend to use olive pulp directly, which is an unhealthy practice.

Environmental: To overcome an important environmental problem by recovery of wastes. Furthermore, to contribute to the prevention of air pollution by producing fuel from wastes. In addition to these, also to contribute to the saving of natural resources and forests by preventing wood consumption.

Economic: To provide local production of fuel wood that is presently imported from Syria, and to act as an example of industrial symbiosis by the collection of olive pulp from other producers in the region.

Strengths:

- Being an important player in the olive oil market in the Hatay region.
- Producing live oil from olive pulp which is a value-added product
- Compatible with the environmental legislation
- Improvement in the product quality
- Reduction of air emissions

Challenges and constraints:

- Difficulties in creating sufficient investment capital

Direct activities and impacts:

- 30,000 tons/year olive pulp will be utilized
- 15,000 tons/year fuel will be produced.
- Living conditions, health, and awareness level will be increased by this project.
- Contribution to national economy, GDP, country competitiveness
- Improvement in living conditions, health, and education level
- Decreased amount of wastes that are not handled in the region
- Saving natural resources
- Protection of environment

Use of innovative technologies:

This project has an innovative character due to bringing the concept of waste usage for the production of new products and fuel in the region.

Furthermore in this project relatively new environmental technologies such as extraction (including vapour, drying and oil extraction), refining processes and production of olive pulp are used.

This project as a whole is an innovative and incorporative (both social and environmental goals) project. Also it has the potential to become a model for other regions in Turkey.

Evidence of a holistic approach/world view:

Contribution to regional development by the recovery of in plant wastes as well as the wastes of same character originating from other plants in the region, with an approach of industrial symbiosis.

Scale of benefits:

Local	X
Regional	X
National	
International/Global	

Weaknesses:

- Risk of not collecting enough olive pulp

Government policies, incentives and regulations needed:

- Consumer demand is the primary driver of the market. Therefore, it is essential to create public awareness on environmental problems and sustainable consumption approach, for creating an environmentally friendly product and service market.
- Measures should be taken for “supply chain approach” and “supply chain management” to be adopted by private sector, so that an interactive environment is created for green entrepreneurship and different entrepreneurial opportunities are developed during materials management, collaborative procurement, collaborative manufacturing , etc.

Key lessons:

“Wastes are actually raw materials for producing other added value products”


Recommendations for implementation of similar projects:

“Analyzing the status of the regions in terms of market needs is important”

Key references:

Links to images and /or videos.



Project name, city, country:	
	STEPPEN, İstanbul, Turkey Biodegradable Pens- GÖKNAR & PEN WITH SEEDS & RECYCLED PAPER PENCIL
Description: STEPPEN, a company active in the field of plastic mould and products manufacturing has developed new products which are eco-friendly pens namely, GÖKNAR, PEN WITH SEEDS and RECYCLED PAPER PENCILS. These are newly emerging methods in the world and STEPPEN is the only producer of biodegradable pen in Turkey so far. The barrel parts of the pens are made of recycled paper while their refills are produced with the ink without any toxic material. Moreover their nozzels, clips and push buttons are produced from biodegradable plastic. In 2009, GÖKNAR received "SME Environmental Friendly Product Award" from Istanbul Chamber of Commerce and PEN WITH SEEDS received "Best Design Award" at Design Turkey 2010. Recycled paper pencils are produced without cutting any trees and are another good opportunity to save natural sources and to provide energy-saving.	
Investment: <i>Company is unable to give the financial information regarding the project due to confidential reasons.</i>	
Employment generation: 10 professional employees and 28 non-skilled workers are employed for the projects.	
Timeline: 2008 - Inception 2008 - Implementation	
Feasibility study: Annually, STEPPEN produces almost 7,000,000 pieces of pens all of which are biodegradable. To produce that much of products 70 tons of biodegradable plastics are utilized per year. Depending on the design and type of the pen, they are sold at a price of 0.15-2 € per item.	
Geo-social-economic setting: <ul style="list-style-type: none"> There is a growing interest in Turkey on eco-friendly product and services. Thanks to the successful applications of biodegradable materials and products around the world there is an increasing demand especially on biodegradable products in Turkey. In Turkey, majority of the housewives are not able to generate income and thereby lack of financial freedom. Owing to this, projects and entrepreneurial activities targeting woman employment is receiving considerable attention. Soil Erosion, Forestation and the Protection of Wildlife are still hot topics in Turkey. There are big campaigns led by TEMA (The Turkish Foundation for Combating Soil Erosion, for Reforestation and the Protection of Natural Habitats) on these subjects. 	

Key features:

- Environmental Friendly Products
- Woman Empowerment
- Woman Employment
- Biodegradable Plastics
- Resource Efficiency
- Awareness raising
- Recycling
- Innovation

Driver:

- Overall rational and motivation: Need for an attractive and interesting innovation.
- Social: To spread the knowledge of environmental protection to the people who are interested in distributing and/or using the products.
- Environmental: To take part in the protection of environment, save natural resources and support forestation.
- Economic: To increase the sales by innovations targeting to an emerging market of environmentally friendly products.

Strengths:

- Innovative product being an attractive and interesting promotion tool.
- Totally eco-friendly product
- Providing energy saving
- Providing reductions in pollutions
- Attractive and interesting promotion tool
- Supporting forestation

Challenges and constraints:

- The lack of knowledge regarding environmental protection in Turkey
- The lack of market for eco-friendly products in Turkey
- High prices of eco-friendly raw materials
- No additional incentives for environmentally friendly products

Direct activities and impacts:

- Create life supporting products series and convert plastic pen production to biodegradable plastic pen. By this way conversion of 70 tons of plastic consumption (environment pollution) into eco-friendly biodegradable plastic.
- Make innovations to attract people's interest to eco-friendly products.
- Employ housewives and unemployed people for the assembly of pens. By this way provide the opportunity to earn money to 50 people in every month for 10 years.
- Add recycled paper pencil to series to avoid cutting new trees for producing pencils, to save energy and to reduce pollution.
- By innovation (eco-friendly pen with torch pine seeds) company has been trying to expand the tree planting and has reached its goal.
- Donate some part of the profit from eco-friendly pens to TEMA (The Turkish Foundation for Combating Soil Erosion, for Reforestation and the Protection of Natural Habitats).
- Converting plastic pen production completely to eco-friendly pen production protects environment and reduces environmental pollution.
- This innovation is at one side attracts the people's interest to eco-friendly products and spreads the knowledge of environmental protection and at the other side supports forestation.
- With the production of recycled paper pencils, it is shown that paper can be used 5 times; 70 kg. waste paper can save 1 tree which actually meets the need for daily oxygen of 72 people. By using waste paper instead of tree the followings can be achieved:
 - %25-70 energy saving
 - %60 reduction in air pollution
 - %40 reduction in water pollution
 - %60 water saving
 - %40 reduction in the volume of garbage

Use of innovative technologies:

The innovation in this eco-friendly approach is seeds in the pen. The pen, with a division on the cap of the pen that tree pieces of torch pine seeds are placed into, is specially designed to reinforce the idea that this product supports the natural life. Its body is made of recycled paper and rest is made of biodegradable plastic. As the company produces pens for promotional purposes also, they expect their products to be attractive and interesting. Pen is a widely used tool for promotion and this innovation makes it more attractive and interesting for people and that is what the key customers would expect. As it is visually very nice, people use it long time thus the promotion time increases. Moreover this innovation provides opportunity to customers to plant their own trees. The objective of this innovation is at one side to attract the people's interest to eco-friendly products and spread the knowledge of environmental protection and at the other side to support forestation.

Evidence of a holistic approach/world view:

Sustainability messages through innovative product designs and environmentally friendly raw materials.

Scale of benefits:

Local	
Regional	
National	X
International/Global	

Weaknesses:

- High prices of eco-friendly raw materials
- Lack of additional incentives for environmental products

Government policies, incentives and regulations needed:

- Green Public Procurement should be considered and started at least as pilot applications.
- For environmentally friendly products incentives (tax deduction/ exemption, etc.) should be applied, stable market policies and conditions should be maintained for encouraging entrepreneurs and investors.
- The substructure for environmental technologies should be improved so that more expertise and technology verification means are created and investors feel more comfortable towards green entrepreneurship investments.

Key lessons:

“Plastic, which is an important environmental problem due to its not being biodegradable, can be converted to an eco-friendly version”

“Usage of waste paper instead of tree provides reductions in pollutions and energy savings”

Recommendations for implementation of similar projects:


“Chase innovations in all over the world and good R&D work”

Key references:**Links to images and /or videos.**

Web-site of the company: www.step-pen.com/default.asp



OTHER GREEN ENTREPRENEURSHIP CASE STUDIES

Company name: SOLITEM Group
Project name: High Efficiency Cooling with Solar Energy 
City, country: Ankara, Turkey
Description: <p>In the year 1999, a Turkish Entrepreneur namely Dr. Ahmet Lokurlu has founded the SOLITEM in order to realize his dream which was the use of solar energy for cooling purposes. Now the company is specialized in concentrated solar power (CSP) systems. It combines highly specialized know-how with its own trend-setting inventions and is therefore one of the worldwide leaders in the area of developing powerful and environmentally friendly energy supply systems, which have been repeatedly honored with internationally acclaimed awards.</p> <p>The SOLITEM-Technology is applicable to offer minus temperatures and to operate a cooling system that way. In this case the double effect absorption chiller used in the system for solar air conditioning is replaced by a single effect absorption chiller, which has the ability of reaching the required low temperature level.</p>
Key features: <ul style="list-style-type: none"> · Resource Efficiency · Renewable Energy · Technology Development
Year project initiated: 1999 - 2004
Website: http://www.solitem.de/solitem.de/index.php
Contact details (email + telephone): Tel: +90 312 354 85 88 - E-mail: solitem@solitem.com.tr

Company name:

DESIGNNOBIS

Project name:

VOLITAN – The Solar/Wind Powered Concept Sail-Vessel

**City, country:**

Ankara, Turkey

Description:

DESIGNNOBIS, specialized in industrial design, is an innovative Turkish firm founded in 2006. The firm is focusing its practices on becoming a foundation whose products are being accepted in the international market and in which numerous young designers have the chance to work or conduct an internship in this strong structure with an impressive team spirit. DESIGNNOBIS which has been found with these aims has won 13 international, 13 national awards making up a total of 26 awards in only 48 months.

The company received many outstanding awards with its products including VOLITAN - The Solar/Wind Powered Concept Sail-Vessel. The VOLITAN received many national international design awards including, Green Dot Award 2008, Green Transportation Vehicle of the Year. VOLITAN name comes from “flying fish” and it is a new symbol of raising awareness about sustainable use of resources on the sea. Volitan will be one of the newest profile solar-powered sailing boats in the world, as well as one of the greenest. Its systems are controlled and optimized by a computer network. Whilst sailing, wind and solar energy is harnessed and stored in the boat’s batteries, allowing her to be propelled day and night.

Key features:


- Green Design
- Innovation
- Renewable Energy

Year project initiated:

2006 – 2008

Website:www.designnobis.com**Contact details (email + telephone):**Tel: +90 312 466 55 23 - E-mail: info@designnobis.com

Company name: ANGORA Ltd. Şti
Project name: Production of Animal Feed Additives from Waste Brewery Yeast <div data-bbox="240 425 735 636" data-label="Image"> </div>
City, country: Ankara, Turkey
Description: ANGORA Ltd. Şti. is a Turkish firm specialized in animal feed additive production. The firm developed a production system to turn waste brewery yeast into profit. Now the firm is drying the waste brewery yeast with locally produced biogas as cheap energy source generated in the brewery wastewater treatment plant. Further it processes the dried yeast to produce the animal feed additive. Through this application waste brewery yeast is valorized by means of industry-industry cooperation also being a good example of industrial symbiosis.
Key features: <ul style="list-style-type: none"> • Resource Efficiency • Waste Valorization • Value-added Product Formation • Industrial Symbiosis • Industry-Industry Cooperation • Product Innovation
Year project initiated: 2005
Website: http://www.angoravet.com/
Contact details (email + telephone): Tel: +90 312 395 82 71 - E-mail: info@angoravet.com

Company name: GREENWAY SOLAR
Project name: Concentrating Solar Power (CSP) Technology 
City, country: istanbul, Turkey
Description: <p>GreenWay Solar, was established in 2005 with Brightwell Holdings, Yilsan and individual partners from Turkey and Israel. Greenway Solar is in cooperation with Tel Aviv University School of Physics to develop Concentrating Solar Power (CSP) Technology, including a hybrid system combined with fossil fuels (coal or natural gas) enable the system to operate around the clock regardless of low solar radiation due to night/weather conditions. "Trough System" may in future integrate thermal storage allowing for electricity generation several hours into the evening.</p> <p>CSPs are relatively small, non polluting, low maintenance, long lasting power generation systems, with close to zero waste of public resources. The systems utilize a large number of parabolic solar concentrating mirrors that focuses the solar energy onto a receiver located on top of a tower where it is absorbed and transferred to the electricity production turbine generator. The use of Solar Concentrating Electricity Generation system for this application is advantageous due to its high efficiency, high power density and its nature for zero pollution long-term, low-maintenance operation.</p>
Key features: <ul style="list-style-type: none"> · Resource Efficiency · Renewable Energy · Technology Development
Year project initiated: 2006
Website: http://www.greenway.com.tr/en/
Contact details (email + telephone): Tel: +90 216 449 52 48 - E-mail: info@greenway.com.tr

Company name:

BALYALILAR A.Ş.

Project name:

Scrap Tire Pyrolysis

**City, country:**

İstanbul, Turkey

Description:

BALYALILAR A.Ş. is a Turkish company specialized in scrap tire pyrolysis. Pyrolysis is the thermal distillation or degradation of organic materials under the exclusion of ambient oxygen. Through pyrolysis of scrap tires BALYALILAR is producing hydrocarbon gases and oils, carbon black and steel, which are processed for reuse. This practice is known to be one of the most efficient methods for scrap tire valorization.

Pyrolysis is seen (by some) as an environmentally friendly way of dealing with large stock-piles of tires and becoming popular in recent years in Turkey. Since the recovery and recycling of scrap tires are not at a desired level, there is a huge market potential can be utilized.

Key features:

- Resource Efficiency
- Waste Material Valorization
- Renewable Energy

Year project initiated:

2010

Website:
<http://www.pyroliz.com/>
Contact details (email + telephone):

Tel: +90 212 366 50 00

E-mail: info@brightwell.com.tr

Company name: Health Food Textile Investment Joint Stock Company (STG A.Ş.)
Project name: Organic Cosmetic Products <div data-bbox="624 342 799 595" data-label="Image"> </div>
City, country: İstanbul, Turkey
Description: <p>In 2007, Neylan ve Semih Dinler have established the production facility in İstanbul to produce organic food and personal care products.</p> <p>After years of research and scientific experiments they had their organic products approved by ECOCERT- the European Ecological Certification Organization. To ensure that their products are compatible with skin they had their products dermatologically tested in accredited laboratories abroad. As a result they created the natural and organic RARE BLOSSOM brand, by which they created a healthy, purifying beauty. STG was established with an investment of 2.5 million dollars in total. Today, it is single-business which uses organic certified processes in each step of the production. Rare Blossom products do not contain chemicals like paraben, silicone or artificial dyes. They contain naturals like 100% organic oils, plant extracts and beeswax. The products include: Skin and body care, aroma oils, bath salts, sun protection lotions and baby care series.</p>
Key features: <ul style="list-style-type: none"> • Sustainable Consumption • Organic Products • Chemical Substitution
Year project initiated: 2007
Website: http://www.rareblossom.com/
Contact details (email + telephone): Tel: +90 212 535 77 69 - E-mail: mail@rareblossom.com
Company name: PETFOR A.Ş

Project name:

High Quality Pet Recycling



City, country:

Kocaeli, Turkey

Description:

Established in 2003, PETFOR PET Recycling is the leading manufacturer of high quality recycled PET flakes in Turkey. With its annual capacity of 10,000 tons, PETFOR serves as the main supplier to the major Turkish and European packaging and fiber manufacturers. In the production facility of the PETFOR, post consumed PET bottles are first unbaled and then separated both manually and with the help of PVC detectors. Contamination free bottles are then grounded and washed with chemical additives. Friction washed and dried flakes are subject to a second automatic separation and packaged in PP big bags.

Key features:

e.g. Inclusiveness / Collaborative Consumption / Social inclusion / Resource efficiency

- Resource Efficiency
- Waste Recycling

Year project initiated:

2003


Website:

<http://www.petfor.com/>

Contact details (email + telephone):

Tel: +90 262 751 14 24

E-mail: info@petfor.com

Company name: ARTESIS A.Ş.
Project name: Predictive Maintenance and Process Optimization 
City, country: Kocaeli, Turkey
Description: <p>Since 1999 Artesis technology Systems A.S , ex-Koc Holding subsidiary, has been making this revolutionary technology commercially available through licensable applications, OEM sales and industrial products. Products developed by Artesis for condition monitoring and quality assurance have received national and international recognition through a number of awards. Artesis has a robust Intellectual Property Portfolio of issued and pending patents with broad foreign coverage</p> <p>The condition monitoring products Artesis MCM, Artesis PCM, MCMSADA + Diagnostics and MCMSOC Integrated Products are used for plant monitoring, predictive maintenance and process optimization across multiple industries including those of the chemical & petrochemical, metal processing, power generation, pulp and paper, water and waste water, gas distribution, cement, food and beverage, automotive, textile, metallurgy sectors.</p>
Key features: <ul style="list-style-type: none"> · Resource Efficiency · Cleaner Production · Predictive Maintenance · Production Process Optimization
Year project initiated: 1999
Website: http://www.artesis.com.tr
Contact details (email + telephone): Tel: +90 262 678 88 60 - E-mail: ahmet.duyar@artesis.com



Regional Activity Centre for Cleaner Production (CP/RAC)

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